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# MADRAS RECORD OFFICE

GOVERNMENT OF MADRAS

*Revenue* DEPARTMENT

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Sanitary.

No. 76. Read the following despatches from the Right Honorable the Secretary of State for India:—

Statistics and Commerce.  
No. 51.

INDIA OFFICE, LONDON,  
29th June 1876.

My Lord,—I forward herewith, two Memoranda by the Army Sanitary Commission on the Bengal Sanitary Reports for 1873 and 1874, the former of which arrived too late to be treated last year.

2. The remarks at the end of the first of these Memoranda, respecting the duties of Indian Sanitary Commissioners, should be taken into your consideration in connexion with my recent despatch on the subject, No. 51, dated the 15th June 1876.

3. In paragraph 7 of the same Memorandum suggestions are made regarding the disposal of sewage, which should be brought specially to the notice of those concerned.

I have, &c.,  
SALISBURY.

His Excellency the Right Honorable  
The Governor-General of India in Council.

MEMORANDUM of the Army Sanitary Commission on the Report of the Sanitary Commission for Bengal for 1873.

This report, with its tables and appendices, fills no fewer than 550 folio pages, and is mainly devoted to a discussion of the vital statistics of the Government, in regard to which it may safely be said generally that the data are so obviously incorrect as not to be admissible for sanitary purposes, and that their sole use is to mark a certain stage only in the development of registration in Bengal Presidency.

1. The population under registration in 1873, exclusive of the population of Calcutta, was 63,498,881, occupying an area of 172,708 square miles. On this population the registered deaths for 1871, 1872, and 1873 were respectively 1.10, 1.08, and 1.15 per 1,000, showing a progressive increase of registered deaths. The town death-rate in 1873 was 24.84 per 1,000, and for rural tracts 7.35 per 1,000, showing greater accuracy of registration in the towns, but not necessarily giving the correct death-rate.

Even in regards so well known a disease as cholera, the death-rate returned for rural districts is only .04 per 1,000 as against 3.07 for towns. In the same way fever deaths, which are 17.94 for towns, are only 1.64 for rural areas.

2. Impressed with the uselessness of these general statistics, Sir George Campbell's Governmental Commission for having a certain number of districts selected for registration in which more efficient control could be exercised over the machinery for registration in sanitary areas.

With this view 148 areas (17 urban and 131 rural) were selected, and the results for one year's work are stated as follow:—

|                   |           |
|-------------------|-----------|
| Population        | 2,609,510 |
| Deaths            | 2,037     |
| Ratio per 1,000   | 26        |
| Male population   | 1,372,611 |
| Deaths            | 2,076     |
| Ratio per 1,000   | 26.7      |
| Female population | 1,236,902 |

|                                               |        |
|-----------------------------------------------|--------|
| Deaths                                        | 29,913 |
| Ratio per 1,000                               | 32.1   |
| Number of males living per 100 females living | 100    |
| Number of male deaths per 100 female deaths   | 125    |

The lowest death-rate in any selected town was 14.21 at Cachar; the highest 45.85 was at Calcutta. In both, however, the deaths were scarcely numerous enough for comparison. Where the deaths of the year exceeded 1,000, the death-rate lay between 23.1 and 54.1 per 1,000.

The highest registered death-rate was seventy-four per 1,000 in a rural district, Khasi Hills. In many rural districts the deaths quite equalled those in towns.

It seems not improbable that the estimate given in this portion of the report of a death-rate of 4 per cent. for the towns and 3 per cent. for rural areas in Bengal may be found eventually not far off the truth—subject, of course, to large variations in different localities.

3. The death-rates per 1,000 from the chief diseases in those selected town and rural areas were:—

|                   | Ratio per 1,000 of Population. |             |                |
|-------------------|--------------------------------|-------------|----------------|
|                   | Towns                          | Rural Areas | Combined Areas |
| Cholera           | 1.00                           | 2.26        | 2.83           |
| Small-pox         | 4                              | 21          | 31             |
| Fever             | 14.51                          | 14.42       | 14.46          |
| Bovine Complaints | 2.95                           | 1.25        | 2.19           |
| All other Causes  | 5.45                           | 2.77        | 4.51           |

These ratios are subject also to considerable variations according to locality.

So far as they go, these are the only approach to reliable statistical facts yet obtained for Bengal, and they include little more than 4 per cent. of the population.

They show the great importance of the diseases classed as "fevers" to the public health. For the mortality registered as due to fevers was fivefold the death-rate due to cholera within the "malaria area" (from which cholera may be said never to be absent), and the adjoining districts of Bengal.

4. Imperfect as the mortality statistics may be, they nevertheless afford valuable information on the history of cholera in 1873. If they do not give the entire mortality, they at all events show where the disease was within the bounds of the Presidency for every month of the year.

There are 704 registration areas included within the present registration limits. Cholera deaths were registered in 111 of these smaller areas, and none were registered in forty-seven areas. No information was received from one area.

Considered comparatively, cholera prevailed during some portion of 1873 over the whole of Bengal Presidency, leaving a few areas here and there exempt.

The high number of deaths in towns, according to the mortality of 1873, was as follows:—Excluding Calcutta, the 104 registration areas in the Presidency are comprehended within fifty-four districts. Cholera deaths were registered in forty-four of these districts in January, and in ten districts no deaths were registered during this month.

In two of the districts exempted in January, Darjeeling had deaths in April and the adjoining Bhowanipore in February. Gya had deaths registered in March. Churpurnia, Durgachang, Baidyabati, and Purneah in February; Khasi and Jaintia Hills in April. The only district in which no cholera deaths were registered during the year was Naga Hills district.

The facts afford no support for the spread of cholera by human agency. They rather tend to show that, whatever may be the primary or aggregating causes of cholera, they acted simultaneously over large areas of country.

Within the Ganges Delta, the maximum number of cholera deaths fell apparently within the first six months of the year. In districts outside the Delta, the maximum number of deaths appears to have fallen between April and August, the hottest months, indicating apparently a movement, not of the disease, which was already in these countries, but of the maxima, i.e., the number of persons attacked within a given time. The Army Sanitary Commission has already called attention to this point as requiring special investigation, because the movement of cholera, which has been supposed to show the effect of human intercourse on the spread of the disease, may be due in reality to a progressive movement of the period of maximum severity over a tract of country, the result of causes possibly mainly of a climatic character.

The total deaths registered from cholera in 1873 amounted to 61,306 within the registration areas of the Bengal Presidency.

4. The deaths registered from fevers in 1873 amounted to 420,173. The mortality is not given by areas as in the case of cholera, but fever deaths were registered in every district during every month of 1873.

The prevalence and fatality of this scourge were universal, and upwards of five per 1,000 of the population died of it.

Unfortunately no adequate information is in existence as to the nature of these Bengal fevers, or indeed whether a variety of diseases may not be classed under the same designation; this matter has been referred to by the Commission on other papers as one of essential importance to the discussion of sanitary questions connected with Indian fevers. The presumption at present is that the majority of these fever cases are of malarial origin, and require for their mitigation improved agriculture, draining, better country drainage, better other local sanitary measures.

5. Small-pox yielded a registered mortality of 11,502 in 1873, equal to a death-rate of .18 per 1,000. This disease was by no means so universally spread as either fever or cholera, for in 130 areas of registration no small-pox deaths were reported.

These summaries of the statistics of 1873 will be sufficient to give a general idea both of the present state of the registration and of the main results of a sanitary kind deducible from them. They only afford a background, so to speak, for facts and views of another kind contained in reports on the districts by officers exercising medical and sanitary functions within the Presidency.

It is proposed next to give some account of those, and their practical bearings on sanitary improvement of the people.

6. The first fact which excites attention is the very small sum of money expended on sanitary work. A list of thirty-nine municipal districts is given, within which the total outlay for conservancy work was 14,737, out of a total municipal expenditure of 97,607. The remainder of the income was spent on roads, police, buildings, establishments, and contingencies. Of so extent roads, part of the expenditure on which might go towards sanitary improvement, by ensuring better and cleaner surfaces, it cannot be said that much could be accomplished by even the entire present municipal income in the way of protecting and improving the public health.

The work carried out appears to be mainly of a temporary and recurring kind, such as cleaning, removal of house refuse, and the like, but in special cases works of a more permanent character are being carried out.

At Baranagar, for instance, which has suffered so much from fever, a water-supply has been brought to the vicinity of the town, and steps have been taken to ensure a flow of water through the town in what appears to have been hitherto but an open sewer, indicating the air in its vicinity. It is satisfactory to learn also that "the very important sanitary measures to be taken in hand are the cleaning of streets, and the removal of refuse to be found in the town, the filling up of the holes and the half-fall of stagnant water, and the removal of refuse, the removal of manure and other sources of pollution from the banks of drinking tanks, and the completion of the system of public house conservancy."

There have been several cases of this type which it is interesting to see discussed in the same way in the records of fever which have been noted in this country. The great wonder is that they should ever have been considered as being the same thing after the fever broke out, some number of years ago.

At present, water has been admitted into the Santa Baldo, owing to the collection of the people. The water, however, has also been improved generally.

There is a remark made in the report on Alcohol which appears to call for notice. The author observed the same matter was abundant in the lives of soldiers in Germany. In this instance the fact appears to be collected in haste and is rather covered with earth, and the Civil Surgeon observes that the "moral standard grows fast lower" as "vice" are concentrated by it, owing to the over-press so much as the abundant views of others. It is one of the cases where statistics regarding disease causes, which are very proper subjects of discussion in their own place, furnish no part of sanitary matters, at all, are introduced into sanitary practice much to the detriment of progress in public health. The local Hygienist, transferring the subject on the purely practical side, appends a marginal note on the subject, in which the attention of all persons engaged in sanitary work, may be productively directed. He says: "Thousands of men or persons in so various and far-reaching an activity like the army, the navy, etc., are sure to have a special opinion arrived at on 'vice'" and he goes on to state that the burial of night and day with humans has been followed by no evil results.

His own view, however, is plain and bears in the face of fact. "In the first place, in doing sanitary work, the officer has nothing whatever to do with disease theories. He has to do chiefly with observation and experience, however on the production of disease. His task was that of all 'householders'," says a person who has been, and has been again, in the front line of the work with cholera.

It is known that, when the argument of the Ziegler-Nichols method exceeds a certain threshold, there is a significant increase in the error, and therefore, in order to improve the quality of the control, it is necessary to use more sophisticated methods for the selection of the parameters of the controller.

However, by far the greatest danger, however, if the water table were lowered by pumping, would be the seepage of water to other grain silos and other enclosed storage structures, tanks or vaults, as could be readily as proved accounted by the leakage of floodwaters which were erected over former foundations of abandoned grain silos or other structures. Incidental to the practice, human health and life have suffered, especially during the drought years.

The other experts the Commission have suggested the following procedure to provide this advice:

Q. The best method of dealing with all these matters is to apply them at once to parliament, are taken in the form of savage manners, or by fighting them out, and with this will be measure, and with reference solely to the liberty, peace, and comfort.

(d) - Sewer to carry effluents & ground the drainage of which can reach any river or stream, or any water tank from which water is drawn for human use.

(3) If the conditions cannot be complied with, then to construct suitable receptacles of a capacity below the level of the ground, taking care that there are places of easy access from dwellings, that they are water-tight and covered to keep out rain. Into such receptacles ordinary despoiled matter mixed with earth may be safely placed, and left until decomposed, to be then used for manure, dressed.

It is assumed that such wastes can be disposed of by burial in localities where no danger is likely to arise. There can be no reason for increasing the cost of water-tight pits.

2. In the Herbrand report another very important question is raised as to the bearing of insight on the patient's health, including a prior surface, viz. what ought to be considered as insight?

Regarding the question raised in 275 secondary aspect, the following remarks appear to be relevant:

First, as to the definition of the term. Any undergrowth which interferes with the free sweep of air over inhabited districts in India, or keeps out sunlight, or fosters surface dampness in earth or air, thereby favoring the retention near dwellings of a stagnant damp malarial atmosphere must come under the designation of "jungle" in its primary sense. Again, any undergrowth which affords facilities for nuisance near inhabited dwellings, or which infests village streets and lanes, thereby interfering with cleansing operations, or which leads to accumulations of decaying vegetable matter within village boundaries, must come under the same designation.

Closely allied with undergrowth and its results to health must be considered such tree growths as interfere with ventilation.

But admitting all this, it is not necessary to denude a country of trees (a very serious evil in India), or to cut the undergrowth of an entire country, for even undergrowth of this kind may have a certain beneficial function to perform as regards subsoils. What is needed is to lop lower branches of trees, to allow pervasion of air where this measure may be needed, or to open up avenues through jungle country, to let the air pass freely. Jungle which is used near dwellings for such purposes as to endanger their healthiness ought to be rooted out, and village surzees should be kept entirely free of this growth.

Generally a belt of open ground should be preserved free of jungle round all villages, and this belt should be sown with grass where it will grow, as pointed out in the present report. The following correct principles on this part of the subject may be quoted from the report of a local Sub-Committee who examined into it. They say—

"Before cutting jungle it ought to be settled what is to take its place, and then the work ought to be done methodically and thoroughly, come the cost. To this end owners of jungle might be aided by the Municipality to root out the jungle, on the condition that they keep the land in cultivation or under grass afterwards."

"The growth of large trees should also be fully encouraged and aided, for large trees are not only wholesome in themselves, but they keep down scrub or jungle cheaply and effectively."

This refers to dealing with jungle in the way of clearing rather than as a local military measure; and wherever such percentages are carried out, temporary increased unhealthiness must be looked for, if people are to live on the cleared ground.

The safest way is to leave it after clearing to the action of summer air for a summer or two before taking possession of it in the way of housebuilding. With suitable precautions, it may be worked on, but not slept on, at least for a time.

9. Public health within the Ganges Delta appears to be largely influenced by the state of the rivers, and the relation of the land to this state. Instances are given in the report which leave no reasonable doubt of injury to health from natural changes, such as shifting up of water-courses, or artificial widening of channels, or changes in level, whereby tracts of country receive more water or less water than before. The general fact appears to be that if the health of a group of population living on the delta has arrived at a certain standard, it may be largely depressed by merely local changes in the relations of land and water.

The following illustration is given in the Secondary Reader :—

1. Director, American Bureau of Ethnology, Smithsonian River and Inhabitant, and District  
United States, Bureau of Indian Affairs.

The mouth of the Indus was closed at Sukkur about thirty years ago, report says, by a weekly Zamindar thus cutting off the water supply, drainage, and irrigation of a considerable portion of the country.

Thousands and thousands of people for years have suffered the greatest inconvenience through the selfish and short-sighted policy of a venal landholder, and "I have no hesitation," says the reporter, "in stating that interference with this ancient, wise, and humane custom has led to a gradual deterioration of the health of the people, predisposed them to disease, and has at last culminated in the frightful epidemic which has for years been decimating the population of the East India Company's dominions."

The murder referred to has been welcomed to the great joy of the people, and the reporter expresses a hope that the other murders will also be welcomed.

In the Dornier-Gutge report, another source of danger to health is stated as follows:

The saturation of the "shun" in the south-eastern portion of the station, and the filling up of the "khuu," combine, nevertheless, with the northeast portion of the river is being rapidly set dry by the river.

The effect of the dam will be a large increase of marshy land between the mill stream and the river, and at a point from which the prevailing wind blows for at least two-thirds of the year; and if the second mill increases with the conservancy the drainage of the town, and render all the marshy lands useless by destroying their river communications; while the effect of the third will be still more serious, if the river does not throw out a spur; either to divert the stream, where is, the reporter states, the whole town will be drained in a few years or twenty years.

The Chungking report contains similar facts regarding what we can infer to be the country drainage, and information as to death of the population. The in this case, as in many others, the reports themselves have done more to harm the public health than nature has. It is noted that the "run off" tanks in the Yangtze and Yangtze-Kiang basin, and elsewhere for all purposes, including washing clothes and other dirty articles, as well as for drinking. The tanks are one which the natives delight in gradually filling in during the rains, leaving a layer of decaying vegetation on the surface which emits a most offensive smell. The water at the bottom, about six inches deep, is muddy-yellowish brown, tinged with reddish and

In 1994, this paper was one of the first to bring clarity to the long-overlooked and often poorly understood world of the lower middle class and to show that there are many reasons why this class is essential to the economic health of a nation and to its distribution.

There are small numbers of houses in the town. "The whole town and neighborhood is built with a few old stone walls, some of them by the Germans, and the houses are made of mud-brick and plastered with mud."

The death rate of the urban district of Chicago is 27.5 per 1,000, of which 1.10 per 100 is due to fever, and 2.42 per 1,000 to cholera. It has been 85 per cent of the mortality since the first outbreak of enteric fever in 1892, and never so high.

It appears immediately obvious to me that the drainage of these districts must be effected by artificial means. The forced or natural drainage of the districts must not only be effected by these means, but also by the construction of a drainage canal. But, at the same time, the reports clearly show that much may be done to be done in changing and by relieving entirely of the water, filling up holes, sand-banks, and improving the surface drainage.

72. But for many, there are no family safety devices at all, leaving parents the responsibility of ensuring their children's safety. For instance, the current trend is a majority of homes with smoke detectors, with a total of 42.34 per 1,000, of which 72 per cent were caused by owners, small property, and fire complaints. What else can be expected under such conditions is the obvious.

During the 1960s, the first use of a road of minor dimensions was the following: a road was built for the transport of cotton to one or two places in the neighbourhood of the village, a large ditch, which is filled during rains, but dry during the dry season. The road of minor dimensions was used for a few years, but in the end it was found that the road was not suitable for the transport of cotton. The reason for this was that the road was too narrow and the ditch was too deep. The road was then widened and the ditch was filled. The new road was used for the transport of cotton and the ditch was used for the transport of water.

There are many instructions for running town which might need to be done as well as what is stated. A change has had to be made, which it surely was a very obvious duty of the Municipal Council to provide. Instead of doing so, they took the majority of all parties and decided to leave the case of the Council without one—very much a problem which in the very nature of the case could not be simply left, while, even if the people could have proved the qualification of the City Council, that the result would have been increased to the benefit of the citizens. It is clear that the Council is not doing its duty.

The Civil Surgeon has no doubt that the night-soil could be made a considerable source of profit to the Municipality, as probably it could; any way it is an obvious part of their duty to dispose of it safely away from the city.

11. It is satisfactory to learn that in a number of places sanitary improvements are in progress. Except in Calcutta, there is no information of any considerable permanent works having yet been undertaken in these Bengal towns; neither is there much new information as to the sanitary condition of the rural population generally. Among the latter class the principal local disease causes are those already mentioned as existing in certain districts, and appear to be connected with defects in disposing bad water, useless water-holes near dwellings, bad surface drainage, poor house accommodation, and damp or wet soil.

But, besides these, there are causes connected with the social condition of the people, which cannot fail to exert an important influence on their health, especially as regards the prevalence among them of epidermics. They are described in the report under review, and it will answer the object of calling attention to those causes, for it is quite clear that, among a people who can do so little to remedy them, help must in some way or other come from without.

The case will be best exhibited by quoting a few sentences from the report:

"The petty peasant lives almost from hand-to-mouth. The principal and interest of the advance in kind he receives from the Manjans take away more than half his produce, and before the sowing season he has to resort to him even for seed-grain." "Fever commenced last year so early as May, so we have not far to go to seek for the cause of the bad type of the disease, bringing the poorer classes into the lowest state of vitality, or leading to such results as enlargement of spleen and liver. The contemned manner in which a bathosic Bengali will take his meals, is the real source of the mischief. Repeated attacks of fever are gradually undermining his under-fed system until he wants food no longer, and regains everything by life. His family is always unwell, and when reduced to the last extremity, he either gives them up or sells them to his richer neighbours."

"In India, therefore, there is hardly a line of demarcation between capacity and actual output."

\* With a very few exceptions the ryots in Bengal have no margin in their annual incomes; on the contrary, they are in a state of perpetual indebtedness to the landlords.

Whether it be possible to reach this end is beyond the province of this Commission to decide. But one thing is very obvious, viz., that people living under them are likely enough to furnish victims for the occurring epidemics of them, the effects of which may in turn be experienced among the most civilized nations of the West.

Every intensifying wave of epidemics in India is a source of danger far beyond its boundaries. It is, according to the report, a report on the hard-core fever, which has not in previous knowledge of the world.

The reporter admits that the feverdies seem unanimously declared by all who have made it the subject of inquiry to be of malarious origin. He appears to believe that the conditions usually supposed to favor the development of malarial miasmata are to be recognized, but certainly does not follow that they may not exist. Some of the statements on this point would require the most ample of quotation before they could be admitted as true, and even when were admitted, it would be no reason for not taking every precaution.

For example, as regards Buddhism in China, there are numerous authorities who have carried off the people who follow the sect, who are distant from the doctrine that they wish to preach. It is not very strange in law being broken. I think on other social issues are that is subject to the class in the long run, the ground. All of these propositions may be true, and yet on a time when the other might be on a material and the other might be on a time.

The 100 patients included in the first two studies are compared with these controls, 50 cases which had died before the majority of our cases (age 40). The report is intended to believe that this group included a wide range of cases, and that the majority of the cases were

The reporter admits that the fever is "malarious in origin," but contagious—a "typho-malarial" fever. If that be so, the information would be important for sanitary purposes, but unfortunately we have no sufficient knowledge of the precise pathology of the fever, or whether there may not be more than one type in question.

The whole subject is now undergoing scientific examination and the present report may very well form part of the documentary evidence, as suggested in the Government letter prefixed to the report. In the mean time there is nothing in these unsound views which would justify delay in proceeding with the various sanitary improvements in all towns, villages, and districts where the disease has prevailed.

This is the real practical result of the papers. The scientific questions to be decided need not stand in the way of improvements.

22. While fully admitting the great amount of labor involved in preparing a report such as that of the Sanitary Commissioner for Bengal of 1875, the Army Sanitary Commission feels obliged to state the views of the Government regarding the contents of the report.

Referring to the great amount of statistical work in it, His Honor says that we are in danger of overlooking those appointments and other offices for registering the vital statistics of the country, whereas it was contemplated when Sanitary Commissioners were first appointed, that their duties should be the supervision of the public health and more effective sanitary administration. The desired object contemplated throughout was the improved health of the people.

It is subsequently said the Local Governments were required to note that when the Sanitary Commission should be notified on any doubtful case, whether "intentional or accidental" with the special object of which they were appointed. It is difficult to believe that there is any such association between the manipulation of these masses of figures and the sanitary condition of the people.

It is also stated that the Sanitary Commissioners have been mainly statistical officers. It appears to His Honor that it was to tell us year by year how many people have died, instead of the amount of useful sanitary work carried out, and its results to health.

This Commission has repeatedly called attention to this subject, and it may not be out of place to repeat the general principles applicable to the sanitary statistical work.

The Royal Commission on the sanitary state of the Indian Army recommended the appointment of Sanitary Commissioners to India for fulfilling certain specified sanitary objects, of which the collection of death statistics was not one. They nevertheless advised that registration of deaths should be introduced into India, for which the authorities would have to provide the machinery.

As there was either not at all, or the Sanitary Commissioner is not, first, then the importance of the duty, and making him a statistical officer with a wrong name. Vital statistics are nevertheless a primary necessity for all sanitary work. But it should not be forgotten that the duty of the sanitary officer begins when the statistical officer has put his tables into his hands.

The duty of the sanitary officer is the continual inspection of districts, towns, and villages, in connection with local disease causes, pointing out remedies, and seeing that they are carried out. His annual reports should include full details on these subjects, and the Government should be published separately by the proper statistical officer.

22d April 1876.

MEMORANDUM of the Army Sanitary Commission on the Report of the Sanitary Commissioner for Bengal for 1875.

The first practical point in the Commissioner's report on the sanitary state of Bengal for 1875 is that there is a want of improvement in the registration of deaths—a want mainly due to the imperfectness of selected areas of registration.

In Bengal, exclusive of the Assam districts, there are 636 registration circles (including seventy-seven towns and municipalities and 559 rural circles); of this number, seventy-six urban districts and sixty-three rural areas have been under improved registration arrangements. But the results are such as to show how much requires to be done before the figures can be confidently used for sanitary purposes.

The death rates in the urban districts range between 14 and 47½ per 1,000, and in the rural areas they vary from 6½ to 57½ per 1,000. Still there is a considerable proportion of all the areas which show high death-rates, and increase in the number of deaths registered when compared with those of 1873; at the same time not a few districts show a decrease in 1874.

The present position of the death registration is shown by Dr. Coates in the following abstract:—

| Rate at which Registered. | Number of General Registering Circles. |        | Number of Selected Areas. |        |
|---------------------------|----------------------------------------|--------|---------------------------|--------|
|                           | Town.                                  | Rural. | Town.                     | Rural. |
| Under 5 per 1,000         | 2                                      | 141    | —                         | —      |
| 5 to 10                   | 8                                      | 212    | —                         | 6      |
| 11 to 15                  | 11                                     | 125    | 6                         | 5      |
| 16 to 20                  | 15                                     | 54     | 9                         | 13     |
| 21 to 25                  | 12                                     | 18     | 13                        | 12     |
| Above 25                  | 29                                     | 14     | 49                        | 30     |

These figures clearly indicate how much the general registration of Bengal requires improvement, while the experience of the selected areas shows that improvement is possible.

The method by which this improvement is to be effected must be left to the Government, but there are several points raised by the Sanitary Commission which will require separate attention.

Taking the facts as they are represented, they afford the following singular comparative death-rates for 1873-74:—

|                              | 1874. |        |           | 1873. |        |           |
|------------------------------|-------|--------|-----------|-------|--------|-----------|
|                              | Town. | Rural. | Combined. | Town. | Rural. | Combined. |
| In selected areas            | 24.51 | 21.25  | 21.72     | 23.84 | 21.27  | 21.55     |
| General registration circles | 12.34 | 7.50   | 7.53      | —     | —      | 7.09      |
| English provinces            | 25.47 | 7.03   | —         | 24.14 | 7.03   | —         |

This abstract affords a good starting point for future comparison, and, on the whole, it is hopeful as regards progressive improvement being possible.

In the letter of the Government of India of 10th November 1875, attention is forcibly called to discrepancies in figures in the mortality statistics; this hence unnecessary to enter further details on this point in the report.

3. One very satisfactory result of the enquiry has been to show that the sanitary condition perceptibly influences on the death-rates in districts affected by it. Dr. Coates, who visited the districts, states that there was a decrease in the death-rates in districts where the sanitary condition was improved.

people, "but this expected emergency never happened. The relief measures that were adopted by Government entirely arrested and prevented the sickness which naturally attends privation." "The masses who are generally ill-fed, ill-housed, and are subjected to the malarial influences in their village-houses, were better fed, better looked after, and considerably scattered, and thus removed from the poisonous exhalations which are generated around their dwellings. The consequence has been that they have maintained better health and have escaped death, particularly the aged and infirm who would have been most probably the first to succumb under ordinary circumstances."

The effect of the scarcity was however to produce "famine, debility, and exhaustion of the vital powers." The experience affords important lessons, not only as to the need of irrigation, but as to the benefit of simple sanitary improvements in villages, the mere leaving of which through the necessity of seeking food, together with kindly supervision, helped in no small degree apparently to ward off those disastrous results of famine which have attended it in all historical times.

3. An interesting comparison is drawn between the mortality rates of different seasons, subject of course to uncertainty of the data. In the first four months of the year the death-rate was 31.6 per 1,000; in the second four months 30.98 per 1,000; and in the last four months it was 38.4 per 1,000. "Thus," says Dr. Cooper, "the drier season was the unhealthiest. Famine was neither ill, ebullient, nor housed, consistently so, withered the vegetation and food of these people." "They suffer and die largely from fever, and fever-relapses at this period." "The want of cultivation of the people has thus an important bearing on the public health in Bengal, as in other districts of India." All the Commission cannot fail to call attention to the fact as one worthy to be suggested into public mind, if it be even possible at present to take any step in the matter.

4. The registered deaths from cholera in 1871 were 50,876, or less than 1 per 1,000 of the population. In another year, when the cholera death-rate was nearly the same in some of the large towns, the probability is that countless thousands of deaths escaped registration.

In extracts of cholera reports appended to the report under consideration are given local laws bearing on the prevalence of cholera, which are also summarized by the Sanitary Commission.

"Bad, foul and deficient water-supply, use of water from tanks, kunds, &c., which had run low from consumption and evaporation, or from tanks, wells, &c., caused by overflows, leakage, or percolation from sewers, cesspools, house drains, privies, feed ditches, prolonged stagnation or impeded drainage, retained moisture and filth in the ground, and emitting noxious effluvia, and exposure of refuse and filth to the wind, and filth lying about, in pits, hollows, &c., scattered, exposed and putrescent vegetable and animal matter, insanitary condition of streets, ill-ventilated dwellings, errors of diet, such as the use of sour rice, decayed and putrid food, raw fruit and vegetable or decomposed food. Congregations of large bodies of people at the annual great common pilgrim fairs, or in pilgrim resorts and fairs, during months of excessive heat."

It will be observed that every one of these conditions, which Dr. Cooper has enumerated, are all connected with the filthy, insanitary, and unhygienic conditions of the country. They are all connected directly with the insanitary state of the country, and there is no escape from the conclusion that, if cholera is to be eradicated or banished from the soil of India, the first step must be taken by improving or abolishing these conditions, of which the reports show the universal prevalence in Lower Bengal, the endemic centre and special "breeding-ground" of the pestilence.

In special localities, as, for example, at the seat of the Juggernaut pilgrimage, those predisposing conditions exist in more than usual abundance. The place is described as a thickly crowded town, without a proper system of house or street drainage, with open wells in the vicinity of houses, where the filth of ages has accumulated and sunk into the loose porous soil, a soil of

sand which enables the contents of privies and cesspits freely to permeate and sink into it for some distance around, and thus contaminate water with the deadly germs of specific disease; these are the conditions peculiar to this "Holy City," which, for the sake of science and humanity, call for immediate interference. "A crying evil is the Namdra and Chundun tank, held in great reverence by the people during the pilgrim season, who believe that miracles can be wrought by its water for those who bathe or drink in it; hence during the pilgrim season it is in a horrible condition, contaminated with foul smelling impurities."

The Juggernaut temple water has been analyzed by the Officiating Chemical Examiner, who reports that "the present specimen is so foul and putrid as to resemble sewage rather than drinking water. It contains sulphuretted hydrogen sufficient to blacken lead paper immediately it is exposed, and it requires thirty-four parts of oxygen per million to purify it."

The reporter calls attention to the condition in which pilgrims arrive at this place, badly fed on the route, and then eating to excess of unwholesome food on arrival; crowding in ill-ventilated huts; excitement amounting to frenzy; exposure to wet, and lying on damp ground, besides being brought into contact with such local predisposing conditions as those mentioned. "Haro we not an adequate cause for these Juggernaut epidemics? The difficulty in dealing with this locality lies in the fact that it has been long used up. The whole soil is so polluted that nothing short of despoiling it would be a sufficient protection from cholera."

If the pilgrims were camped on new ground, placed under sanitary regulations as to cleanliness, space, &c., as in other Indian pilgrimages, and supplied with pure water, there is no reason to doubt that a check would be placed on the development of cholera. The local authority might possibly be able to take steps for preventing the poor people from being poisoned by the filthy tank water. But if suitable precautions of this class are not or cannot be taken, the only hope for the future is that this place of pilgrimage may gradually come to be deserted. A satisfactory indication of this is not apparent in the present report. It was reported, however, that in the great pilgrim years, during which, however, no more than 25,000 persons were assembled.

The pilgrims carried cholera away with them as usual, and along their routes were exposed to the usual conditions of fatigue, bad food, dirty water, filthy resting places, and exposure. But it was observed that, wherever rapid communication and a considerable amount of conveyance occur along a pilgrim road, cholera decreased and did not spread to the people generally.

It appears that year by year, as the various questions regarding Indian cholera are submitted to the test of observation and experience, the local mystery is slowly being solved. Up to the present time there is little progress to report in our knowledge of any intimate nature of cholera, but, so far as practical action can be adopted in mitigating the localities of the disease, every year's experience teaches the same lesson that filth in any form, and water most especially, play a most important part in the daily pestilence, and the Commission would strongly recommend that this view, which has more often advanced, should be fully accepted and acted upon by the authorities in India.

There appears to be no reason on the face of the documents why the Juggernaut pilgrimage should not be dealt with vigorously once for all, and some plan for preventing the public health carried out, so far as the gathering continues to take place. As Dr. Cooper reports in part of a practical kind, there is no chance whatever of the disease being eradicated, but the Commission would be obliged in reply.

The Medical Officer who supplies the report on Juggernaut reports to consider that cholera poisoning by drinking water may be a cause of cholera.

The facts already stated about the Juggernaut water show that, such a poison exists, there are ample means for its being got rid of, and the means for its removal are not far from the means of its pollution, and it is not far from the means of its removal.

Dr. Cooper says: "I know of no instance of attendance on the Juggernaut during the disease, though I do not think such a thing is possible."

Local exciting causes in individual cases of cholera have not yet been looked for as they ought.

"Pettenkofer's theory has up to this time utterly failed to account for the spread or origin of cholera, for cholera is worst in May and June, when the subsoil moisture is farthest from the surface, and again in November and December, when it has descended some distance from its highest limit, a point reached in August." "The fact that intercourse has increased with the rapidity of communication, and that cholera has decreased, is pretty good proof that human intercourse is not the chief cause of the spread of the disease."

The Sanitary Commissioner and the authorities laid most stress apparently on sanitary improvements in checking cholera.

Prompt medical aid was despatched to affected localities. "The fairs that took place during the year were organized, so that too great crowding was prevented; temporary latrines were provided; and the night-soil was properly trenched. These measures were attended with great success, particularly at Mooncheerungu in Pooa, Carigola in Purneah, and elsewhere. Instructions were sent to the Police Department to have the unsanitary condition of the villages affected with cholera put into a healthy state, and drainage and drinking water were chiefly looked after."

This was all good, but cleansing of villages and houses and keeping them clean, is an essential element of safety, and the people must be induced to help in this matter.

6. Small-pox, as usual, prevailed most intensely during the hot months.

The chief practical point mentioned in regard to this disease is that the districts where the disease was most severe and fatal were not protected by the circle system of vaccination, while those which suffered least were under that circle organization. The total registered deaths from small-pox in 1874 amounted to 1,093 in town districts, and 10,438 for rural circles—in all 11,531 deaths.

7. As in other years, intermittent types of fever prevailed most extensively; remittents also appeared abundantly, but there were few continued or typhoid cases.

The total registered mortality in 1874 from fevers amounted to 24,238 deaths in towns and 100,438 in rural circles, a total of 124,676 deaths from fevers of all kinds. The statistics are not quite reliable, because it has been no habit to register other deaths among these fevers, but, making any reasonable deduction for error, the mortality is enormous, and throws the current mortality from cholera quite into the shade. The "laying up" period is the most fatal from fevers.

One of the most important questions at present under discussion in India related to these fevers and their cause.

Besides the usual local conditions arising out of the drainage and agriculture, together with the state of villages, houses, and civilization of the people, common to Indian fever fevers, Dr. Coates in his present report calls attention to local peculiarities more especially connected with the formation of the Ganges delta. He says that "as has been calculated that every thousand million cubic feet of mud is yearly brought down to the Bay of Bengal by the Ganges and Brahmaputra rivers, all more or less charged with organic matters, and that the exposure of this matter to the sun after the ebb and subsidence of the rivers is a cause of malarie."

It appears from other parts of the report that changes in the relative levels of different parts of the delta have introduced elements of danger from interfering with the local drainage, and that perturbations existed to which all parts have and will from time to time be liable.

The remedy he proposes is that which long ago was proposed by the Commission, which he expresses as follows:—

Cultivation of the land by crops certainly takes out of the soil the decomposing debris and renders the land healthy. Let the land be mowed or become fertile and covered with layers of mowing leaves and the reverse occurs. Drain the land so that the water runs quickly off, or keep the surface water so very low in the surface that the subsoil does not remain damp, decomposing and evaporating, necessarily raising the result.

If there be laying up of rivers, ridges and streams, so that there become chains of shallow pools in which the mud that has been brought down in the rains is largely deposited, exposed,

and evaporated, fevers of more or less intensity supervene, even though these river-banks, hollows or plains be quite bare of all vegetation."

The practical deduction from these general and more obvious facts is that the country districts should be examined in detail, the real causes of their unhealthiness described, and some consistent course of procedure for their improvement agreed on for future guidance.

Dr. Coates states that the much dreaded Terai is again becoming inhabited, and healthy just in proportion as the soil is matted and the decomposable material is taken out.

The sub-Terai districts are also improving. But "as regards the more central districts of Bengal, all of which are crossed by old river-beds which still flow and overflow in the rains, we have fevers endemic and severe in proportion to the surface dampness and evaporating moisture from exposed debris."

Bad drinking-water and local sanitary defects in the delta towns and villages no doubt add much to the annual fever mortality of Lower Bengal.

8. Appended to the Sanitary Commissioner's report is an instructive report by Dr. Wilson on the Burdwan fever, but as the practical points raised in it are included in the remarks made above, it is only necessary to direct attention to its contents by referring several points relating to the topography of the affected districts well worthy of consideration.

9. There is not much information on the subject of sanitary progress during the year, but good work is nevertheless being done.

Dr. Coates tells us that "very great advancement has been made in the sanitation of Municipal towns during the year. The famine has largely extended in a most practical manner a knowledge of what is needed and how it can be done, to Magistrates as well as to Medical officers. Even those, especially the younger of them, thus early brought into contact with sanitary working on the most extensive scale, we expect the greatest good in the towns and districts to which their future labours are to be given."

The following are a few notes showing the nature of the improvements carried out:—

The town of *Durghanga* has been provided with new and wide streets, open ghats, swamps filled up, and improved canals.

*Berhampore* and its surroundings have been drained.

For systematic improvement of drinking-water and clearance of jungle, *Aliboniga* stands first.

*Comilla* has the best kept tanks and main roads.

*Monghyr* pays Rupees 5 per beegha for land, trenches it with night-soil, and lets the trenched ground at Rupees 27 per beegha.

*Burdwan* has the best latrines.

A filtered water-supply for *Dacca* is the largest and a most beneficial project at present on hand.

*Bankura*.—Several new tanks and races constructed. Sluices and waste places are being filled up.

*Berhampore*.—In the interior, 127 miles of road constructed; new tanks dug and old ones cleaned out and deepened; trees planted.

*Midnapore*.—A water course. An open sewer was cleaned out, embanked, and tanks made at intervals.

*Hooghly*.—Many private owners had their tanks ridged and improved. Eminent drainage works, connected with the Bancooche jallah, were completed during the year. "This canal effectively provides for the rapid flow of water, and the result is that a large tract of the country, which was formerly the centre of much disease and mortality, has become healthy. Irrigation and increased crops also obtain." Surely this is valuable experience.

*Serampore*.—New tanks dug; old ones filled up or cleaned. Drains in the village of *Hisra* reopened.

*Howrah*.—A large number of new canals excavated, and old tanks improved.

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Further.—As Kishnagar, systematic drainage and the letting of fresh water to the principal drinking-water tanks are being advantageously carried out.

*District.*—Water supply already mentioned. Funds provided by Khajian Abdul Gunny, c.s.r., in commemoration of the recovery of the Prince of Wales. Amount for the present to be ten gallons per head of the population, to be supplied without taxation.

These notes give a general idea of the kind of improvements in progress in Bengal. They are few in number when compared with the magnitude of the water-borne and stage land-sale campaigns, and represent in the most striking contrast to what

10. All the reports hitherto received from Bengal point to the same disease causes as requiring removal. They may be briefly summarised as follows:—

- (1.5) Application of principles of river engineering and conservancy in the Tranges Delta for the protection of the public health.

- (2) Providing more wholesome water for the population. The importance of this improvement is shown by the marked decrease of cholera deaths in Cuzco since the filtered floodway water was introduced, and also by the increased mortality which took place when the supply was temporarily suspended.

- (4) Drainage, clearing, and agricultural improvement of wet, damp, unhealthy locations

- (4) Village improvements, to be mainly done by the people themselves, such as cleaning, keeping cattle beyond village limits, removing all latrine and other refuse to a safe distance, leveling and filling up archaeological depressions, or pits. For walls some help would probably be required, and the following principles for improving walls might be beneficially adopted :—

- (2) Tell in reality and with no admitting of improvement, and to dig others in the ground, and to produce in position.

4. The rest of the immediate subsoil water, which is generally contaminated by coming into contact with the well as a sufficient depth below the surface, with concrete, to prevent migration of impure drainage.

- (4) To raise the level of the wall two or three feet above the ground level, to prevent any future surface drainage from entering the wall; to concrete the surfaces around the wall, with slope away from the wall, so that all waste water may flow away to properly constructed drains for its removal.

- d. To provide a suitable cover for the well, to prevent ingress of leaves, dust, or other material.

8. To determine if an item is a solid, liquid, and/or gas, you can use the following tests:

21. These are some of the main practical measures suggested by Dr. Cooper's report and by him which are to be carried out. The Government of India already referred to pointed out a few deficiencies from the short term in which reports should be drawn up, which, no doubt, will be attended to in future. But the report as a whole is one of the most practical summary reports I have ever seen from India, and the Commission desires to commend it to all Indian people in the hope that they will take advantage of its suggestions and so contribute towards the progress of the country without delay or hindrance.

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Compensation to the Government of Bengal and attention drawn to the importance of carrying out the suggestions of the Army Sanitary Commission in respect of actual sanitary work so far as may be practicable.

*Proceedings of the Madras Government, Public Department,  
28th September 1876. No. 1972.*

No. 8-255.

Copy forwarded to the other Governments and Administrations, and the Public Works and Military Departments for information.

By Order of the Governor-General of India in Council,

HOME DEPARTMENT, SANITARY.

(Signed) T. J. C. FLOWDEN.

Simla, 11th September 1876.

*Offg. Under Secy. to the Govt. of India.*

No. 71. OGDEN THILSON, 28th September 1876, No. 1072.

Communicated to all Departments, to the President of the Municipal Commission, Madras, and to the Sanitary Commissioner.

(Tim Extract.)

To the Revenue Department.

Public Works Department

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President of the Municipal Commission, Madrid

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