

THE



THIRD ANNUAL REPORT OF THE SANITARY BOARD,

THE THIRTY-FIFTH ANNUAL REPORT OF THE
SANITARY COMMISSIONER,

AND THE

NINTH REPORT OF THE SANITARY ENGINEER,

MADRAS.

1898.

MADRAS:

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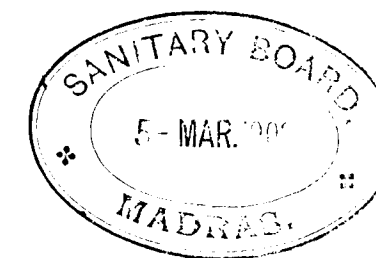
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THIRD REPORT OF THE SANITARY BOARD.



THIRD REPORT OF THE SANITARY BOARD

FOR THE YEAR 1898.

THE constitution of the Board, and the rules for the conduct of its business continued the same as in the previous year.

2. The Board scrutinized plans and estimates for 36 Municipal and 78 Local Fund Works of the total estimated value of Rs. 4,89,525-4-5. Details of these works will be found in the appendix to the report.

3. The Reports of the Sanitary Commissioner and the Sanitary Engineer contain detailed reviews of the sanitary works undertaken in this presidency. It is thus unnecessary for the Sanitary Board to do more than notice the most important of the projects with which it has had itself to deal.

4. Schemes for the water-supply of Vizianagram, for the extension of the water-works at Kurnool and Tanjore, and for the drainage of a portion of the town of Kumbakónam were examined and laid before Government.

5. The undermentioned projects were duly sanctioned by Government—

	Amount of estimate. RS.
(1) Improving the Ootacamund water-supply	35,700
(2) Fencing the site of the head works of the Tirupati water-supply. ...	...
(3) Extension of the water-works at Tanjore	27,000
(4) Drainage scheme for the Tanjore Fort	33,440

6. Proposals for undertaking the following schemes were received and considered by the Sanitary Board. As, however, estimates had not been prepared, the projects are not included in the list of works given in the appendix :—

- (1) Berhampur water-supply scheme.
- (2) Negapatam water-supply scheme.
- (3) Extension of the Dindigul water-works.
- (4) Cuddapah water-supply scheme.
- (5) Kumbakónam drainage scheme.
- (6) Calicut water-supply scheme.
- (7) Tuticorin water-supply scheme.
- (8) Tiruvannámalai water-supply scheme.
- (9) Coonoor water-supply scheme.
- (10) Ellore water-supply scheme.
- (11) Constructing pipe sewers in the Manual Pillay Street group of the Ootacamund drainage scheme.
- (12) Improvements to the Trichinopoly water-works.
- (13) Cuddapah drainage scheme.
- (14) Extending and improving the municipal hospital at Madura.
- (15) Combined hospital and dispensary for the Gódávári district.
- (16) Combined hospital and dispensary at Cocanada.
- (17) Bellary hospital.
- (18) Improvements to the mortuary at Máyavaram.
- (19) Constructing a burial ground for Muhammadans at Yadiki.

7. *Water analysis.*—The question of framing a set of rules for the periodical examination of the sources of proposed water-supply was considered by the Sanitary Board; but it finally determined that rules for this purpose, however carefully framed, would unduly interfere with the freedom of action of Sanitary authorities. The proposal was therefore allowed to drop.

8. *Filtration of water.*—The Board was much struck with the excellent results of filtration obtained in certain towns in the North-West Provinces and Oudh, and

instituted inquiries as to the methods employed. The matter was still under correspondence at the end of the year.

9. *Sanitary works of the Madras Municipality.*—The general question as to whether the sanitary works of the Madras Municipality should, in common with those of other municipalities, come under the cognizance of the Board, was raised by the Sanitary Engineer. The matter was referred by the Board to Government who suggested to the Municipal Commissioners the desirability of consulting the Board in regard to sanitary projects.

10. *Formation of towns in the vicinity of Railway Stations.*—The following addition was made to the rules on this subject by order of Government:—

“Collectors shall consult the Sanitary Board whenever, in laying out house sites near railway stations, special difficulties arise that may not be provided for in any general rules that the Board of Revenue may issue.”

11. *Repairs and improvements to tanks.*—The Board issued a circular recommending to local bodies that all proposals for repairs and improvements to tanks hitherto used for bathing, watering cattle, and drinking indiscriminately should include separate provision for drinking purposes, so that the people might at least have the opportunity of drinking uncontaminated water.

12. *Repair estimates.*—In order to prevent wasteful expenditure on defective works, local bodies were invited last year to send up to the Board proposals for the repair and maintenance of works the designs of which had not been approved by the Board. It was subsequently decided that repairs to existing buildings not involving important structural alterations need not be laid before the Board; but local authorities were asked to consider in all cases of repairs to existing works built on defective designs whether it would not be more profitable to construct new buildings on approved sanitary principles.

13. *Drainage channels for storm or surface water.*—Statements of particulars to accompany proposals for such projects were drawn up by the Sanitary Engineer in communication with the Sanitary Commissioner and were, after approval by the Sanitary Board, issued to local officers for information and guidance.

14. In order to facilitate the consideration of sanitary projects and expedite their disposal, the Board prescribed rules as to the channel through which the schemes should be submitted. These rules having been repeatedly overlooked by local officers, the Board decided that all projects which were not sent up through the prescribed channel would be returned for resubmission. Notwithstanding these orders to which prominent attention was drawn, the plans and estimates for 28 works had to be returned.

15. The Sanitary Board maintains a list of officers and local bodies to which type designs issued by the Board are communicated. The Resident in Travancore and Cochin applied to be added to the list. The application was acceded to and the Resident was furnished with a complete set of the Board's type designs which, it is hoped, will prove of use and aid the progress of sanitary work in the Native States in question.

16. A series of type plans for hospital buildings was issued during the previous year and this was followed up in the year under review by the issue of detailed estimates for the buildings.

17. Having in view the possibility of plague visiting this presidency, the Sanitary Board considered it advisable to issue a type design of a temporary plague hospital, but, in the meanwhile, a plan prepared by the Sanitary Engineer and approved by the Sanitary Commissioner was circulated by Government. The subject was therefore dropped. In considering certain estimates for plague sheds the Board observed that as buildings for plague purposes would have to be erected on emergency, and as there was a special officer appointed by Government to super-vise plague operations, the specific sanction of the Board to the estimates did not seem called for and proposed that the type design issued with G.O., No. 256-P., dated 23rd March 1898, should be adhered to.

18. The following type designs were approved during the year:—

- No. 67. Ward for 4 beds, semi-permanent (suitable for general diseases).
- No. 68. Do. (suitable for isolation cases).
- No. 69. Choultry.
- No. 70. Weekly market shed.
- No. 71. Do.
- No. 72. Do.
- No. 73. Ward for caste patients issued under G.O., No. 923, Public, dated 14th November 1889, and G.O., No. 966, Public, dated 17th November 1891. Alternative to type design No. 62.
- No. 74. Ward for 4 beds, also suitable for venereal cases (female) issued under G.O., No. 1297-M., dated 4th October 1889. Alternative to type design No. 54.
- No. 75. House latrine.
- No. 76. Single latrine with 12 seats.
- No. 77. Double latrine with 12 seats.
- No. 78. Double latrine with 20 seats.
- No. 79. Iron water-tight conservancy cart.

19. In addition to the above, type plans for the undermentioned buildings were under preparation:—

- (1) Vaccine depots for District Boards.
- (2) Slaughter-house for small municipalities.
- (3) Dispensary (semi-permanent) for minor towns and villages.
- (4) Hospital wards of 3 beds each for males and females (semi-permanent).

(Signed) R. PARSONS,
Secretary, Sanitary Board.

27th April 1899.

APPENDIX.

Statement of estimates for sanitary work scrutinised by the Sanitary Board during 1898.

Locality.	Local body.	Description of work.	Amount of estimate.	Proceedings of the Sanitary Board.		Remarks.
				Number.	Date.	
Firuchengodu	Namakal (T.B.)	Converting the Tiruchengodu school-house into travellers' bungalow.	Rs. A. P. 725 0 0	1 S.	4th January 1898	Returned, as the sanction of the Sanitary Board was unnecessary.
Do.	Do.	Do. the old cutcherry into school-house.	275 0 0			
Gopalapuram	Rajahmundry (T.B.)	Digging a drainage channel	280 0 0	19 S.	11th "	Approved.
Madurantakam	Chingleput (T.B.)	Constructing a dispensary in accordance with type design No. 26.	8,300 0 0	26 S.	14th "	Recommended to adopt either type plan No. 42 or 63.
Usilampatti	Tirumangalam (T.B.)	Do. a compound wall to the market.	2,530 0 0	30 S.	17th "	Approved.
Cannanore	Cannanore (M.)	Do. an iron latrine in the village of the Lebbas.	400 0 0	31 S.	17th "	Recommended to adopt covered forms of latrine as shown in type designs Nos. 4 and 12.
Jinnur	Narasapur (T.B.)	Improving a drinking-water tank	750 0 0	32 S.	17th "	Approved subject to certain remarks.
Udavigiri	Nellore (D.B.)	Restoring the dispensary building	1,250 0 0	39 S.	19th "	Approved.
Saktisamangalam	Madura (T.B.)	Repairing a drinking-water well	465 0 0	53 S.	25th "	Do.
Velluraniyam	Mannargudi (T.B.)	Reconstructing the inlet and outlet of the Vedanadi tank.	500 0 0	54 S.	25th "	Do.
Tiruvannamalai	Tiruvannamalai (M.)	Constructing a well for the use of the cattle market.	303 8 11	57 S.	25th "	Returned for revision.
Do.	Do.	Do. a reservoir for the use of the cattle market.	1,195 7 1	498 S.	3rd September "	Recommended certain arrangements for adoption.
Wandiwash	Arni (T.B.)	Adapting a part of the old taluk cutcherry building for a dispensary and hospital assistant's quarters.	680 0 0	63 S.	27th January "	Returned for revision.
Ellore	Ellore (M.)	Sinking tube wells	500 0 0	76 S.	2nd February "	Recommended the Sanitary Engineer's suggestions.
Kumbakonam	Kumbakonam (M.)	Re-roofing the verandahs around the in-patients' ward of the municipal main hospital.	560 0 0	83 S.	9th "	Approved.
Cannanore	Cannanore (M.)	Sinking a well near Talap toll-gate	250 0 0	93 S.	14th "	Recommended to adopt one of the Sanitary Board's type designs for wells.
Coonoor	Coonoor (M.)	Constructing an isolation ward for old and incurable cases at the Coonoor hospital.	336 0 0	97 S.	16th "	Disapproved. A cheapest design of an isolation ward suitable for a climate like Coonoor at a cost of Rs. 1,200 prepared by the Sanitary Engineer was forwarded for adoption. Recommended cutcha shed on the type design No. 32, if the council cannot afford this sum.
Erode	Erode (M.)	Do. a contagious diseases shed based on type design No. 32.	1,550 0 0	105 S.	18th "	Approved with remarks.
Tiruvur	Kistna (D.B.)	Reconstructing a well	480 0 0	117 S.	25th "	Do.
Chandrakal	Do.	Sinking a well in Malapalli	380 0 0	118 S.	25th "	Do.
Kodali	Do.	Constructing two wells	480 0 0	119 S.	25th "	Do.
Intur	Guntur (T.B.)	Deepening a drinking-water tank	912 0 0	120 S.	25th "	Approved.
Tirupati	Tirupati (M.)	Improving penta drains	2,324 0 0	121 S.	28th "	Disapproved the detached scheme prepared by the Sanitary Engineer, and advised the council to spend the amount in commencing the main drainage scheme for the town.
Sendamangalam	Namakal (T.B.)	(Constructing a school-house and dispensary at Sendamangalam.	1,965 0 0	131 S.	2nd March	Approved.
Wynaad	Wynaad (T.B.)	Do. a well at Sultan's Battery	1,350 0 0	139 S.	5th "	Do.
Tirur	Palghat (T.B.)	Do. market sheds	1,375 0 0	141 S.	5th "	Recommended the Sanitary Engineer's suggestions as to pumping and storage arrangements if within the means of the Taluk Board, and if not fully system suggested by him might be adopted.
Manappalai	Trichinopoly (D.B.)	Sinking a well in the cattle market		150 S.	9th "	Approved.
Kancharagunta	Narasaraopet (T.B.)	Constructing a well	400 0 0	152 S.	10th "	Do.
Melur	Melur (T.B.)	Do. compound wall to Melur weekly market.	1,330 0 0	233 S.	22nd April	Do.
Yercaud	Salem (D.B.)	Do. an iron slaughter-house	720 0 0	255 S.	25th "	Recommended for adoption any one of the two designs prepared by the Sanitary Engineer instead of the one submitted by them.
Palapurru	Guntur (T.B.)	Deepening a tank	1,720 0 0	257 S.	25th "	Approved.
Ferringapett	Mangalore (T.B.)	Sinking and steaming a well	350 0 0	261 S.	27th "	Approved with remarks.
Proddatur	Proddatur (T.B.)	Repairing six wells and constructing one in the Pulivendla taluk.	2,910 0 0	262 S.	27th "	Do.
Nellore	Nellore (M.)	Constructing a beef slaughter-house	610 0 0	266 S.	2nd May	Recommended to adopt one of the Sanitary Board's type designs for slaughter-house.
Karnathankudy	Tanjore (M.)	Do. a drain in the Vania street	274 11 0	267 S.	2nd "	Do.
Methapatti	Madura (T.B.)	Repairing a well	740 0 0	268 S.	2nd "	Do.
Amayankakkandur	Madura (D.B.)	Constructing a dry goods market	1,600 0 0	274 S.	5th "	Do.
Hospet	Hospet (T.B.)	Rebuilding a contagious diseases ward attached to the local fund hospital.	800 0 0	275 S.	5th "	Disapproved the design proposed and recommended the Sanitary Board's type plan No. 32.
Bezwada	Bezwada (M.)	Constructing a vaccine depot in the Public Works quarry compound.	250 0 0	276 S.	5th "	Recommended to adopt the design for an open shed such as that shown in the Sanitary Board's type plan No. 26.
Yeddanapudi	Narasaraopet (T.B.)	Repairing and increasing the capacity of a tank.	2,810 0 0	291 S.	14th "	Advised certain additions to be provided in the estimate.
Thali	Do.	Do.				Approved with remarks.
Manamadura	Salem (D.B.)	Constructing a dispensary	2,810 0 0	602 S.	18th October	Do.
Nalakota	Madura (D.B.)	Do. dispensaries	1,975 0 0	293 S.	16th May	Do.
Kethayerumha	Do.	Do. a dry goods market shed	2,950 0 0	294 S.	16th "	Approved.
Kurupam	Vizagapatnam (D.B.)	Do. an hospital	2,950 0 0	321 S.	27th "	Approved with remarks.
Do.	Do.	Do.	4,400 0 0	323 S.	30th "	Returned for revision in accordance with the type plans for hospital buildings.
Ellore	Do.	Do.	4,400 0 0	468 S.	13th August	Disapproved with remarks.
Cocanada	Ellore (M.)	Do. an hospital at Turupurpetta	392 S.	392 S.	22nd June	Do.
Mettupalaiyam	Cocanada (M.)	Laying out a portion of the town in house-sites.	....	359 S.	27th "	Do.
Tirupattur	Coimbatore (T.B.)	Site plan for the Hindu and Muhammadan burial-grounds.	....	360 S.	27th "	Disapproved.
Do.	Tirupattur (M.)	Constructing a cholera shed	250 0 0	361 S.	27th "	Recommended to adopt type design No. 68 if a building on type plan No. 32 could not be afforded.
Tiruchengodu	Salem (D.B.)	Do. a semi-permanent ward in the Tiruchengodu hospital.	930 0 0	362 S.	27th "	Returned for revision in accordance with the type plan No. 67 or 68.
Peruvoorani	Do.	Do.	750 0 0	706 S.	8th December	Approved.
Kavilamvandanallur	Patukkottai (T.B.)	Improving the Peruvoorani market	1,185 0 0	363 S.	27th June	Do.
Gopalpur	Tinnevely (T.B.)	Constructing a tiled shed in the weekly market.	420 0 0	364 S.	27th "	Do.
	Ganjam (D.B.)	Repairing civil dispensary	855 0 0	365 S.	27th "	Approved with remarks.

PART I.

GENERAL SANITATION.

THIRTY-FIFTH ANNUAL REPORT
OF THE
SANITARY COMMISSIONER FOR MADRAS,
1898.

SECTION V.

GENERAL POPULATION.

RAINFALL.

1. In the Presidency, considered as a whole, the rainfall during the north-east monsoon of 1898 exceeded the decennial average (14·94 inches) by 6·13 inches; that during the south-west monsoon (25·70 inches) closely approximated it (25·84 inches). In Anantapur, Cuddapah, Salem, Malabar, Tanjore, Chingleput, Trichinopoly, Kistna, Nellore, Gó dávari and Vizagapatam, the south-west monsoon was below the average; but the greatest deficit (in the case of Cuddapah) did not exceed 27·99 per cent. of the average. In the East Coast north districts—excepting Gó dávari—and in the North Midland districts—excepting Cuddapah—the north-east monsoon was below the average, the greatest deficit being in Kurnool, where it amounted to 51·19 per cent. of the average. All districts south of, and including, Nellore registered an increase over the average during this monsoon; in South Arcot and Chingleput, the excess was more than 100 per cent. and, in seven others, it was more than half. In South Arcot and parts of the Chingleput district, the rain fell within so limited a period that it was feared the crops would suffer seriously. As it turned out, however, the rain decreased in time to permit of their recovery.

PRICE OF FOOD.

PRICE OF FOOD.

2. The conditions noted in the last report as influencing the price of food, which expressed themselves to an extent to produce a state of famine in the Ceded districts and the Northern Circars, continued to exhibit their effects during the year 1898. By the end of October 1897, Government had completed the closing of all relief works in the districts just referred to; but it was found necessary to offer facilities for relief, in the form of labour, in the district of Nellore in 1898, up to the month of October. The high prices prevailing throughout the Presidency in 1897 were accentuated in parts of this district during this period, owing to failure of crops, following the scanty north-east monsoon of 1897 and south-west monsoon of 1898. For three months, the staple grain (ragi) was more than 100 per cent. above the normal price, and therefore was above "scarcity rates," and, for nine months, above "warning rates." Indeed, so far as the "warning rate" is concerned (implying an increase above normal price of 33·3 per cent.), the price of staple grains was above this rate in all districts in the Presidency throughout the year, except in December, when it fell below it in thirteen districts. Taking the average for the whole Presidency, cholam was very slightly cheaper (1·6 seers) when compared with 1897, whilst ragi had the same average price. This cheapening of cholam must be regarded as due to the reaping of crops, and consequent tendency to recoupment of stocks in the districts which happened to be the chief scene of scarcity, and which are the great cholam producers and consumers of the Presidency; whilst the absence of fall of ragi indicates that stocks had not yet been fully replenished, following the unusual depletion which must have taken place, in response to the abnormal demand for it during the famine, in districts where the staple grain cholam had failed. The persistence with which prices have kept up, to an appreciable extent, must have been brought about by the unwillingness of ryots to part with their grain. The late famine and the introduction of plague have been regarded as mere forerunners of much heavier disasters, which it has been prophesied will occur during the last year of a cycle of the Kali Yuga—the "Vikari" (evil) year 1899-1900. But, whilst these factors may account for the prices not falling, with the rapidity that might reasonably be expected in the presence of favourable monsoons, it does not account for the persistence in high prices of food-grains which has been evident since 1883. The following table illustrates this fact:—

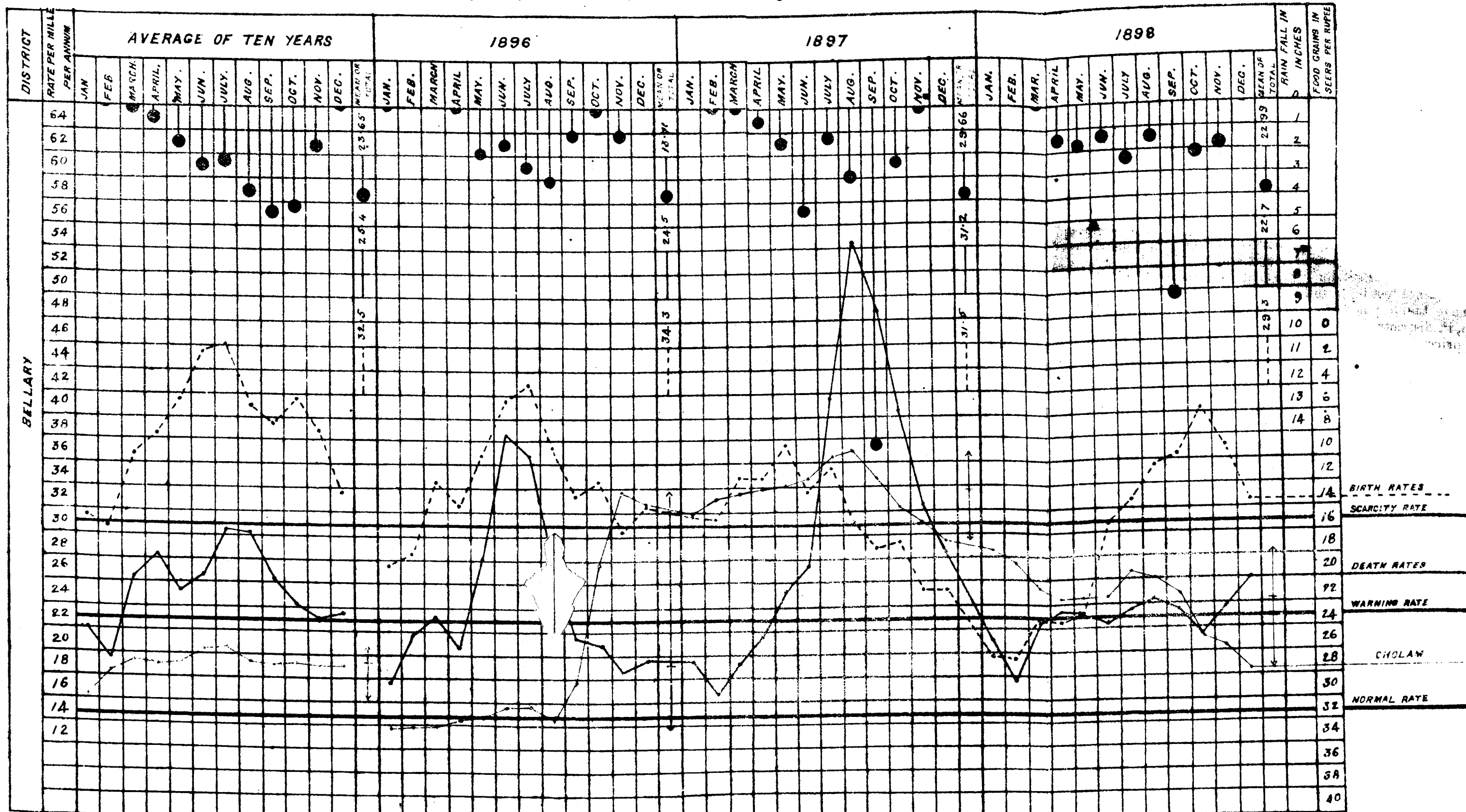
Years.	Prices of food-grains.		
	Rice.	Cholam.	Ragi.
1875	16·4	26·9	28·8
1876	13·4	22·3	* 22·7
1877	8·1	10·5	* 10·7
1878	8·6	12·8	* 13·2
1879	11·5	17·6	19·0
1880	14·7	26·0	26·2
1881	15·9	31·3	31·6
1882	16·2	31·9	32·3
1883	16·1	32·2	32·6
1884	15·1	28·8	30·1
1885	13·4	22·9	25·3
1886	14·5	26·4	28·0
1887	15·5	28·0	29·9
1888	15·3	27·5	29·4
1889	13·6	24·6	27·8
1890	12·7	21·6	26·2
1891	11·8	21·1	22·4
1892	10·2	16·0	17·4
1893	11·2	18·2	20·3
1894	12·5	21·3	23·5
1895	12·8	2·5	26·5
1896	12·7	22·6	25·8
1897	9·9	14·5	17·2
1898	10·1	16·1	17·2

* Famine years.

Diagram showing the Birth and Death Rates per Mille per annum in the District of Bellary with Rainfall and price

of food (CHOLAM) during the year 1898 Compared with 1897 and 1896 and the average of the ten years ending 1895.

Census population of 1891 = 900,126 * Area = 5,975 Sqr. Miles * Pasture & Agriculture 66·08 per cent * Indefinite occupations 7·90 per cent

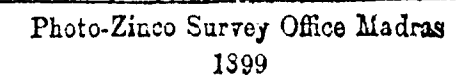


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1899

18 B

Indefinite occupations 7.38 per cent



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3. It would go beyond the scope of this report to enter into the various factors which have brought about this rise in the price of food-grains; but, whilst it is probable that certain sections of the community have been affected adversely by it, or rather have been left *in statu quo* during the changes which have taken place around them, the chances are that for the majority it implies a wave of prosperity, that will, in due time, bear with it in its advance the temporarily suffering minority. Some little time must necessarily elapse before complete adjustment occurs to suit altered conditions. Such at least is the impression conveyed by a rough examination of the subject—disclosing a decided tendency to increase of wages of the lower classes, no diminution of the area under cultivation, a cycle of seasons not markedly abnormal, no excessive emigration (and this confined to localities where wages are good and the stay of the emigrant is but for a brief period), great increase of capabilities of interchange of products by rail and sea, the gradual accession of manufactories of raw products, and increasing exports of seeds and grains.

4. The annexed table demonstrates how far the prices of food-grains can be connected with the birth and death rates of two districts—one selected as representing a fair state of prosperity, the other as being known to have been recently under the influences of high prices:—

A.

Comparative Statement showing the Mortuary and Meteorological Statistics for the undermentioned two selected Districts of the Presidency, together with the prices current of the chief Food-grains sold at the Head-Quarter stations of each Collectorate for 1898 and five years preceding it, as required by the Government of India—vide G. O., No. 1239-L., dated 25th May 1892.

Districts.	Years.	Population.	Total deaths.	Deaths from			Temperature of air in shade.			Mean humidity.	Wind.		Rainfall in inches.	Average quantity in seers per rupee of the chief food-grains in general use in the districts.		
				Cholera.	Small-pox.	Fevers.	Dysentery and	Maximum.	Minimum.		Prevailing direction.	Mean velocity in miles per diem.		Rice, second sort.	Cholam.	Ragi.
Tinnevely.	1898	1,915,702	41,610	3,224	149	5,013	1,228	95.1	76.7	85.9	N. W.	142	31.67	10.0	14.4	13.9
	1897	"	48,309	7,971	118	7,597	1,767	94.6	77.4	86.0	Do.	122	24.74	10.3	14.9	13.9
	1896	"	41,597	2,260	54	7,088	1,191	93.8	75.6	85.3	N. S. W.	142	37.11	12.5	19.5	10.4
	1895	"	47,948	4,649	126	8,754	1,608	94.5	76.5	85.5	N. W.	151	30.46	11.1	16.4	14.8
	1894	"	51,585	7,084	451	8,731	1,947	94.6	76.8	85.7	Do.	163	19.86	11.3	17.3	15.6
Dollary.	1893	"	40,272	1,392	918	6,483	917	93.5	76.2	85.0	Do.	163	26.70	10.4	16.2	13.3
	1898	890,455	20,237	161	450	7,376	1,681	93.5	71.4	82.5	Calm; W.; N. W.	166	22.99	9.6	22.6	"
	1897	"	27,802	3,135	401	11,703	1,783	94.7	72.2	83.4	Do.	122	29.66	8.37	11.81	"
	1896	"	21,841	4,205	284	7,432	613	94.8	71.6	83.2	Do.	156	13.71	10.46	27.07	"
	1895	"	18,810	1,778	529	7,255	616	91.9	69.6	80.3	Calm; S. E., W., N. W.	144	26.98	10.84	29.80	"
1894	"	"	21,364	53	702	10,375	581	92.6	70.5	81.8	Do.	166	22.26	10.92	23.70	"
1893	"	"	20,141	2	1,027	9,572	684	90.7	69.8	80.2	Calm; S. E.; S. W.; W.; N. W.	149	30.57	10.50	21.89	"

Statement showing the influence of Prices of Food upon the birth and death rates in each district in the Madras Presidency.

Districts.	Years.	Quantity in inches.	Rainfall.		Prices of food-grains.												Ratio per mille of population.												
			Increase.	Decrease.	Rice.	Cholam.		Ragi.	Cholum.		Ragi.		Cumbu.		Birth.	Death.	Increase.	Decrease.	Birth.	Death.	Increase.	Decrease.							
						Increase.	Decrease.		Increase.	Decrease.	Increase.	Decrease.	Increase.	Decrease.															
Anantapur	Average.	25.60	6.85	...	13.4	27.3	30.2	...	3.1	...	8.4	...	10.5	...	...	...	...	...	31.8	21.5	7.0	...	...	...	...	...	...	...	...
	1896	14.49	...	4.26	11.5	26.7	29.1	...	1.2	...	7.8	...	9.4	...	...	...	...	29.1	19.4	4.3	...	...	...	...	...	...	...	...	...
	1897	25.70	6.95	...	9.1	13.3	16.6	...	...	1.2	...	...	...	...	...	...	...	27.7	26.9	2.9	...	...	...	...	...	...	...	...	...
	1898	18.75	...	...	10.3	18.9	19.7	...	...	...	...	...	...	...	...	...	...	24.8	19.4	...	...	...	...	...	...	...	...	...	...
Bellary	Average.	23.65	0.66	...	12.1	27.0	32.1	...	2.6	...	5.4	...	8.6	...	...	...	...	38.9	25.4	9.6	...	...	...	...	...	...	...	...	...
	1896	13.71	...	9.28	10.8	27.0	33.2	...	1.3	...	5.4	...	9.7	...	...	...	...	34.3	24.5	5.0	...	...	...	...	...	...	...	...	...
	1897	29.66	6.67	...	8.6	12.7	15.6	...	...	0.9	...	8.9	...	...	...	...	...	31.5	31.2	2.2	...	...	...	...	...	...	...	...	...
	1898	22.99	...	...	9.5	21.6	23.5	...	...	...	...	...	...	...	...	...	...	29.3	22.7	...	...	...	...	...	...	...	...	...	...
Chingleput	Average.	43.67	...	21.62	13.5	...	23.7	...	4.2	...	...	...	8.1	...	...	...	...	37.0	24.4	1.3	...	...	...	...	...	...	...	...	...
	1896	54.81	...	10.48	13.1	...	21.0	...	3.8	...	...	...	6.4	...	...	...	...	39.5	23.8	3.8	...	...	...	...	...	...	...	...	...
	1897	33.20	...	32.09	10.7	...	15.5	...	1.4	...	...	...	0.9	...	...	...	...	37.1	23.2	1.4	...	...	...	...	...	...	...	...	...
	1898	65.29	...	...	9.3	...	14.6	...	...	...	...	...	...	...	...	...	...	35.7	24.3	...	...	...	...	...	...	...	...	...	...
Coimbatore	Average.	25.22	...	7.68	12.4	20.4	24.8	24.7	2.5	...	5.3	...	6.9	...	...	...	...	30.4	18.6	8.1	...	...	...	...	...	...	...	...	...
	1896	27.51	...	5.39	12.0	20.9	25.3	24.4	2.1	...	5.8	...	7.4	...	...	...	...	27.8	24.2	0.5	...	...	...	...	...	...	...	...	...
	1897	28.44	...	4.46	10.5	16.0	19.6	18.9	0.6	...	0.9	...	1.7	...	...	...	...	26.9	20.1	...	...	...	...	...	...	...	...	...	...
	1898	32.90	...	...	9.9	15.1	17.9	17.6	...	...	...	...	...	...	...	...	...	27.3	18.5	...	...	...	...	...	...	...	...	...	...
Cuddapah	Average.	28.77	3.29	...	13.3	25.1	37.9	...	3.6	...	7.9	...	9.9	...	...	...	...	27.6	22.6	4.3	...	...	...	...	...	...	...	...	...
	1896	18.80	...	6.68	11.8	23.7	26.9	...	2.1	...	6.5	...	8.9	...	...	...	...	30.1	19.5	6.8	...	...	...	...	...	...	...	...	...
	1897	24.00	...	1.48	8.6	13.5	16.6	...	...	1.1	...	...	...	...	...	...	...	28.2	25.9	4.9	...	...	...	...	...	...	...	...	...
	1898	25.46	...	...	9.7	17.2	18.0	...	...	...	...	...	...	...	...	...	...	28.3	18.8	...	...	...	...	...	...	...	...	...	...
Ganjam	Average.	49.41	3.62	...	15.3	...	27.1	...	2.5	...	...	...	10.4	...	...	...	...	19.3	17.6	...	...	...	...	...	...	...	...	...	...
	1896	33.44	...	12.35	16.5	...	27.2	...	3.7	...	...	...	10.5	...	...	...	...	26.6	20.6	3.7	...	...	...	...	...	...	...	...	...
	1897	56.79	11.00	...	9.7	...	13.3	...	...	...	...	...	...	...	...	...	...	23.9	50.1	1.0	...	...	...	...	...	...	...	...	...
	1898	45.79	...	...	13.8	...	16.7	...	...	...	...	...	...	...	...	...	...	22.9	22.7	...	...	...	...	...	...	...	...	...	...

Statement showing the influence of Prices of Food upon the birth and death rates in each district in the Madras Presidency—cont.

Districts.	Years.	Rainfall.		Prices of food-grains.												Ratio per mille of population.	
				Rice.						Cholum.		Ragi.		Cumbu.			
		Quantity in inches.	Increase.	Decrease.	Rice.		Cholum.		Ragi.		Cumbu.		Birth.	Death.			
					Increase.	Decrease.	Increase.	Decrease.	Increase.	Decrease.	Increase.	Decrease.					
Górávari	Average.	42.83	...	1.16	14.2	24.1	25.7	...	7.1	...	8.9	...	22.3	20.3	...	3.6	
	1896	25.10	...	18.89	12.9	21.9	24.8	...	4.9	...	8.0	...	25.8	17.1	...	0.4	
	1897	47.15	3.16	...	9.4	14.0	13.7	...	1.3	3.0	...	3.1	...	25.4	22.8	...	0.8
	1898	43.99	...	...	10.7	17.0	10.8	...	...	...	...	...	...	26.2	16.7	...	...
Kistna	Average.	35.25	2.37	...	Warning rate. 12.8	...	26.0	...	...	...	8.9	...	33.4	22.1	...	0.8	
	1896	25.82	...	6.46	13.9	20.6	24.7	...	5.2	...	7.6	...	33.9	19.3	...	0.3	
	1897	32.31	0.03	...	9.7	13.7	15.0	...	0.9	1.7	...	2.1	...	34.9	22.0	...	0.7
	1898	32.28	...	...	10.6	15.4	17.1	...	...	...	...	...	...	34.2	23.1	...	...
Kurnool	Average.	28.96	3.21	...	Warning rate. 12.3	...	20.1	...	...	...	7.2	...	36.1	27.8	...	...	
	1896	15.69	...	10.06	12.4	25.6	25.1	...	5.6	...	6.2	...	30.9	23.1	...	7.1	
	1897	25.00	...	0.75	8.7	12.7	14.9	...	1.2	7.3	...	4.0	...	28.0	28.8	...	2.4
	1898	25.75	...	...	9.9	20.0	18.9	...	...	...	...	...	...	25.8	20.7	...	8.1
Madras	Average.	46.07	...	22.07	11.7	18.7	22.9	...	6.4	...	7.5	...	40.2	41.5	...	1.3	
	1896	68.68	0.54	...	10.7	18.6	21.2	...	6.3	...	5.8	...	41.5	38.2	...	...	
	1897	38.47	...	29.67	9.7	12.2	15.7	...	...	0.1	0.3	...	41.6	35.8	...	...	
	1898	68.14	...	...	8.9	12.3	15.4	...	...	...	...	...	41.5	45.2	...	...	
Madura	Average.	31.20	...	10.17	12.4	23.3	23.5	...	7.8	...	7.8	...	31.8	20.6	...	...	
	1896	39.87	...	1.50	13.2	22.2	24.7	...	6.7	...	9.0	...	30.1	20.1	...	5.0	
	1897	29.55	...	11.82	11.2	17.6	19.8	...	2.1	...	4.1	...	28.0	28.7	...	4.5	
	1898	41.37	...	...	9.8	15.5	15.7	...	...	...	...	...	22.7	15.6	...	8.1	
Malabar	Average.	110.89	2.06	...	Warning rate. 10.7	...	21.0	...	...	...	3.2	...	23.7	18.0	...	...	
	1896	135.72	26.89	...	12.4	...	23.5	...	...	...	8.7	...	22.5	16.7	...	0.5	
	1897	149.29	40.46	...	11.9	...	19.4	...	0.7	...	...	0.9	...	20.8	30.2	...	12.7
	1898	108.83	...	...	10.1	...	20.3	...	...	...	...	...	...	18.6	17.5	...	...

Nellore	Average.	32.64	...	5.59	13.3	22.6	25.3	22.6	10.6	...	10.6	...	...	25.6	16.7	1.6	...
	1896	35.91	...	2.32	13.2	25.4	27.2	25.4	12.5	...	12.5	...	...	27.3	16.9	3.3	...
	1897	26.34	...	11.89	10.5	15.1	17.2	15.1	2.5	...	2.5	...	...	28.3	19.5	4.3	...
	1898	38.23	...	...	9.4	14.0	14.7	14.0	...	...	...	...	...	24.0	19.7	...	...
Nilgiris	Average.	68.57	...	1.75	10.6	...	20.5	...	6.1	...	6.1	...	...	23.3	20.8	...	...
	1896	35.47	15.15	...	9.4	...	19.2	...	4.8	...	4.8	...	...	27.6	27.0	...	...
	1897	76.75	6.43	...	8.2	...	15.3	...	0.9	...	0.9	...	...	30.7	25.5	3.0	...
	1898	70.32	...	...	7.7	...	14.4	...	...	...	...	...	...	27.7	30.9	...	...
North Arcot	Average.	36.94	...	...	Warning rate. 8.8	...	26.2	...	9.4	...	9.4	...	...	29.6	19.7	3.0	...
	1896	33.60	...	10.20	13.6	23.0	26.2	23.0	8.0	...	8.0	...	...	28.7	17.9	2.1	...
	1897	33.11	...	13.54	12.8	21.7	25.1	21.7	6.7	...	6.7	...	...	27.3	20.2	0.7	...
	1898	47.14	...	14.03	10.5	14.4	17.8	14.4	0.6	...	0.6	...	...	26.6	18.3	...	...
Salem	Average.	34.90	...	6.52	13.1	22.7	25.8	22.7	9.8	...	9.8	...	...	34.2	20.2	2.4	...
	1896	30.20	...	11.22	12.6	21.7	25.8	21.7	8.8	...	8.8	...	...	32.1	20.4	0.3	...
	1897	37.11	...	4.31	10.6	16.1	19.5	16.1	2.5	...	2.5	...	...	33.2	19.3	1.4	...
	1898	41.42	...	...	9.7	14.8	17.0	14.8	...	...	...	...	...	31.8	20.4	...	...
South Arcot	Average.	43.91	...	24.91	13.8	...	24.4	...	8.3	...	8.3	...	...	30.3	22.6	1.0	...
	1896	41.01	...	27.81	14.8	...	27.2	...	11.1	...	11.1	...	...	32.8	22.5	3.5	...
	1897	37.32	...	31.50	11.9	...	19.1	...	3.0	...	3.0	...	...	28.7	21.2	...	...
	1898	68.82	...	...	10.2	...	16.1	...	...	...	...	...	...	29.3	24.4	...	...
South Canara	Average.	145.05	...	10.34	13.5	...	Warning rate. 19.5	...	...	...	...	...	...	31.6	21.8	5.7	...
	1896	158.48	3.09	...	13.4	...	...	...	...	...	...	...	...	33.7	17.5	7.8	...
	1897	181.11	25.72	...	10.1	...	...	...	1.0	...	...	...	...	34.1	28.0	8.2	...
	1898	155.39	...	...	11.1	...	...	...	...	...	...	...	...	25.9	24.6	...	...
Tanjore	Average.	45.88	...	Warning rate. 11.2	11.2	...	...	...	7.3	...	7.3	...	...	28.7	24.6	...	...
	1896	45.76	...	13.51	13.7	...	24.3	...	12.4	...	12.4	...	...	29.7	24.7	...	...
	1897	32.63	...	13.63	14.9	...	29.4	...	5.2	...	5.2	...	...	27.3	27.4	...	...
	1898	59.39	...	26.76	11.5	...	22.2	...	...	...	...	...	...	32.0	25.9	...	...
Tinnevely	Average.	26.58	...	Warning rate. 12.0	12.0	...	...	...	5.6	...	5.6	...	...	28.7	22.9	...	...
	1896	37.11	5.44	...	11.7	...	21.2	...	6.2	...	6.2	...	...	30.1	21.7	...	...
	1897	24.74	...	6.93	10.6	...	18.5	...	2.9	...	2.9	...	...	30.1	25.2	...	...
	1898	31.07	...	...	9.8	...	15.6	...	...	...	...	...	...	31.0	21.7	...	...

Statement showing the influence of Prices of Food upon the birth and death rates in each district in the Madras Presidency—cont.

Districts.	Years.	Quantity in inches.	Rainfall.	Prices of food-grains.						Ratio per mille of population.			
				Rice.	Cumbu.	Ragi.	Cholum.	Rice.	Cumbu.	Birth.	Death.	Increase.	Decrease.
				Increase.	Decrease.	Increase.	Decrease.	Increase.	Decrease.	Increase.	Decrease.	Increase.	Decrease.
Trichinopoly	Average.	33.79	...	...	...	...	...	...	...	29.3	23.0	...	1.6
	1896	34.81	...	9.02	24.2	23.8	27.6	12.5	24.2	27.8	24.1	1.2	0.5
	1897	37.95	...	4.86	26.0	28.1	23.8	13.2	26.0	28.6	21.0	2.7	0.5
Vizagapatam	Average.	42.81	...	...	19.5	16.1	14.1	9.4	15.5	30.5	24.6	1.9	3.6
	1896	50.43	...	...	...	...	...	...	...	...	...	...	...
	1897	34.93	...	7.39	...	26.2	...	13.8	...	23.0	17.8	0.8	0.7
Total, Madras Presidency.	Average.	52.52	...	...	...	14.5	...	...	...	31.7	18.5	...	...
	1896	42.32	...	...	...	19.6	...	...	...	28.3	31.6	...	...
	1897	45.92	...	...	...	25.3	23.4	...	...	29.0	21.2	1.6	0.4
	Average.	48.14	...	...	...	17.2	14.5	...	...	29.9	20.6	2.5	...
	1896	51.32	...	...	...	...	...	...	...	28.7	25.4	1.3	4.4
	1897	...	...	...	...	...	16.1	10.1	...	27.4	21.0	...	...

GENERAL POPULATION.

5. The population of the Madras Presidency, according to the last census, was, inclusive of Europeans and Eurasians, 35,641,828. The estimated population for 1898 is 37,715,417. The census population for which returns of vital registration were received, amounted to 33,288,122, or 93.4 per cent. of the total. Emigration and immigration statistics show that the Presidency lost 68,247, against 92,118 in the previous year, which was one of scarcity, and consequently favoured emigration. Of this number, about 98 per cent. was contributed by the districts of Ganjám, Vizagapatam, Gódvári, Madras, Tanjore, Madura and Tinnevely. The migrations were chiefly to the ports of Burma, Ceylon and the Straits Settlements. The "natural increase" of the population under registration amounted to 212,774.

6. Compared with the previous year, the population brought under registration shows an increase of 649,879. This has been effected in the districts of Madura, Ganjám, and Vizagapatam.

7. No change has been made in the system of registration. This was fully described in the report for 1893, and need not be here repeated. It is unlikely, until the Village Proprietary Act comes into force, that any great improvement can be effected in registration in rural areas. As illustrating the influence which is exercised by districts where zemindari tracts are large, it may be said that if the districts of Ganjám, Vizagapatam and Madura, where these predominate, be excluded from the calculation, it is found that instead of the total death-rate for the Presidency (as subsequently shown) being 21.0 it becomes 21.5 per mille, and the birth-rate, instead of 27.4, becomes 28.2 per mille.

8. The following table exhibits the action taken by municipalities towards enforcing registration:—

Name of Municipality.	Penalties inflicted for failure to register.		Name of Municipality.	Penalties inflicted for failure to register.	
	Births.	Deaths.		Births.	Deaths.
1. Anantapur	Nil.	...	30. Ongole	6	3
2. Adóni	28	28	31. Coonoor	Nil.	...
3. Bellary	Nil.	...	32. Ootacamund	4	8
4. Chingleput	Nil.	...	33. Gudiyáttam	13	15
5. Conjeeveram	9	...	34. Tirupati	4	...
6. Coimbatore	20	32	35. Vellore	Nil.	...
7. Erode	Nil.	...	36. Wallajapet	6	8
8. Karúr	2	1	37. Salem	8	6
9. Cuddapah	14	35	38. Tirupattúr	10	13
10. Berhampur	13	6	39. Vaniyambadi	9	37
11. Chicacole	6	...	40. Chidambaram	Nil.	...
12. Parlákimedi	65	3	41. Cuddalore	Nil.	...
13. Cocanada	14	...	42. Triuvannámalai	14	11
14. Ellore	Nil.	...	43. Mangalore	3	2
15. Rajahmundry	1	2	44. Kumbakónam	5	3
16. Bezwada	26	9	45. Mannargudi	6	17
17. Guntúr	35	19	46. Mayavaram	Nil.	...
18. Masulipatam	* 29	21	47. Negapatam	Nil.	...
19. Kurnool	Nil.	...	48. Tanjore	Nil.	...
20. Dindigul	26	35	49. Palamcottah	9	16
21. Madura	5	...	50. Srivilliputtúr	34	13
22. Palni	9	...	51. Tinnevely	45	37
23. Peryakulam	* 41	34	52. Tuticorin	26	6
24. Calicut	4	1	53. Srirangam	13	...
25. Cannanore	Nil.	...	54. Trichinopoly	Nil.	...
26. Cochin	23	22	55. Anakapalle	...	...
27. Palghat	Nil.	...	56. Bimlipatam	Nil.	...
28. Tellicherry	8	4	57. Vizagapatam	14	11
29. Nellore	...	...	58. Vizianagram	...	...

* Number prosecuted.

9. In the case of rural areas where reports of District Medical and Sanitary officers, or statistics of this office, showed that Village Heads had neglected registration, the fact was brought to the notice of the Collectors concerned by this office.

BIRTHS IN DISTRICTS.

10. A total of 911,742 births was registered during the year, affording a birth-rate of 27·4 per mille upon the census, and 24·3 upon the estimated population. This represents a decline of 1·1 per mille in the birth-rate when compared with the five years' average, implying a loss to the population of 36,573 souls. On looking at the figures for the various districts, it will be recognized that this decline has not been brought about by a single factor. There is no system of registration of marriages in this country—although were one introduced it might well yield an income that would go largely towards the development of a vital statistics department; but, there is reason to presume that marriages have been deferred during the last three years, as far as feasible; that is to say, as far as the caste customs directing marriage of a female within a certain age will allow, because evil times have been prophesied. Again, the decline in the birth-rate that was alluded to at page 32 of the last year's report as having already exhibited itself in the districts affected with famine * (1896-97) necessarily was more pronounced in 1898, as will be seen from the following table:—

Statement showing the loss of population in 1898 due to the late famine in the Ceded Districts.

Districts.	Increase over normal rate of total deaths excluding cholera and small-pox per mille of population.	Increase over the normal death-rate under fever per mille of population.	Difference between columns 2 and 3, being deaths due to the famine of 1896-97.	Number of deaths due to the late famine calculated on the average population of the year.	Decrease under births as compared with the normal rate per mille of population.	Decrease in population due to decrease of births.	Total loss to population due to the late famine, columns 5 and 7.
1	2	3	4	5	6	7	8
Anantapur ...	+ 1·8	+ 1·1	+ 0·7	+ 558	5·9	+ 4,705	5,263
Bellary ...	- 4·1	- 3·5	- 0·6	- 563	7·8	+ 7,320	6,757
Cuddapah ...	- 3·9	- 3·6	- 0·3	- 419	4·9	+ 6,842	6,423
Kurnool ...	- 0·4	- 2·0	+ 1·6	+ 1,713	6·9	+ 7,385	9,098
Total ...	...	...	...	1,289	...	26,252	27,541

11. But, in the case of Madura, which shows a decline in the birth-rate, and claims, moreover, the highly satisfactory figure of 15·6 per mille for its death-rate (notwithstanding the presence of cholera throughout the year in the midst of the population) I consider the main cause is defective registration. It is presumed this has chiefly occurred within the zemindari areas. The heavy fall in the birth-rate in South Canara cannot be so accounted for, and it seems probable, therefore, that this district approached a critical condition owing to the high price of food-grains during a portion of 1896-97 (page 35, Sanitary Commissioner's Report for 1897). It will be remembered that the districts of Bellary, Kurnool, Cuddapah, Vizagapatam, and Ganjām were recognized officially as affected with famine. Of the total decrease in the births, 63·0 per cent. is due to these districts. Parts of the

* The Ceded Districts alone were considered.

Districts of Malabar, Chingleput, North and South Arcot were also recognized, owing to the continuance of high prices, as approaching a condition where public relief would have been necessary. These districts contribute 33·1 per cent. of the total decrease. On the other hand, increase of the birth-rate over the average occurred in districts where the chief characteristic is the large extent of country under irrigation, affording the agricultural coolie a fair amount of certain labour. Thus the districts of Trichinopoly, Gódvári, Kistna, Tinnevely and Tanjore recorded 20,149 more births than warranted by the average for the previous five years. Births of boys to girls were in the proportion of 104·3 to 100 girls, against 100·9 and 100 of the previous year. The birth-rate according to classes was;—Native Christians 22·9, Muhammadans 23·5, and Hindus 27·8. In the previous year, the rates were 23·7, 25·4, and 22·3, respectively.

BIRTHS IN MUNICIPALITIES.

12. The total birth-rate in municipalities was 34·9 per mille, against 34·4 of the previous year, and against 27·4 for the total Presidency for 1898. Notwithstanding that, of a total of 59 municipalities, 25 exhibit a decrease below the average of the previous five years in the aggregate, there has been a gain in the birth-rate of 0·5. The gradual increase of the recorded rate (not be it remembered the true rate according to either the census of Stokes or Stuart) due to the influence of better registration and of increasing increments of population, is shown in the following table:—

Years.	Birth-rate per mille of Population.
1892 ...	31·4
1893 ...	34·1
1894 ...	33·2
1895 ...	35·3
1896 ...	36·1
1897 ...	34·4
1898 ...	34·9

13. In the Section dealing with prices of food grains, special conditions that affected Malabar and South Canara have been alluded to. These remarks seem borne out by the decrease of birth-rate, to a marked extent, in Tellicherry, Cochin, Calicut, Cannanore, and Mangalore—all towns situated on the coast. It is probable that the recorded decrease in the case of Conjeeveram, Palni, Walajapet, Coonoor, Dinidigul, Tirupati, Palamcottah, Nellore (notwithstanding the existence of "scarcity") and Bimilipatam is due, in chief part, to careless registration. The decline in Bellary, Cuddapah, Parlákimedi, and Vizagapatam may fairly be ascribed to conditions following the famine of 1896-97.

DEATHS IN DISTRICTS.

14. 699,108 deaths were registered, giving a total death-rate on the census population of 21·0, and, on the estimated population, of 18·6 per mille. This is a decrease of 4·4, when compared with the previous year. This is accounted for chiefly under cholera, fever, and dysentery and diarrhoea. The distribution of death causation is given in the following table, which also enables a comparison to be made with previous years:—

Years.	Birth-rate per mille of population.	Death-rate per mille of population.						
		Cholera.	Small-pox.	Fevers.	Dysentery and diarrhoea.	Injuries.	All other causes.	Total.
1892	25.1	2.3	1.3	8.3	1.0	0.3	9.0	22.3
1893	27.0	1.0	0.8	7.7	0.7	0.3	8.8	19.3
1894	27.7	1.3	0.3	8.0	0.7	0.4	9.3	20.1
1895	29.1	0.6	0.1	8.3	0.7	0.3	9.6	19.6
1896	29.9	1.5	0.3	8.0	0.7	0.3	9.8	20.6
1897	28.7	4.4	0.7	9.0	1.2	0.3	9.8	25.4
1898	27.4	2.0	0.6	7.5	0.9	0.3	9.7	21.0

15. When compared with the previous year, the districts of Chingleput, Kistna, Nellore, Nilgiris, Salem, South Arcot, and Trichinopoly showed an increase in the total death-rate.

Districts.		Cholera.	Small-pox.	Fevers.	Dysentery and Diarrhoea.	Injuries.	All other causes.	Total.
Chingleput	{ 1897 1898	1.7 1.6	0.1 0.2	5.4 3.9	2.0 3.6	0.4 0.4	13.6 15.6	23.2 24.3
Kistna	{ 1897 1898	1.7 2.9	0.1 0.4	8.0 8.0	0.4 0.3	0.4 0.3	11.4 11.2	22.0 23.1
Nellore	{ 1897 1898	0.5 2.8	0.1 0.1	9.6 8.0	0.4 0.5	0.2 0.3	8.7 8.0	19.5 19.7
Nilgiris	{ 1897 1898	0.9 0.01	0.1 0.6	17.0 22.1	1.7 1.7	0.2 0.2	5.6 6.3	25.5 30.9
Salem	{ 1897 1898	1.7 0.9	0.2 0.1	7.7 8.4	0.5 0.6	0.4 0.4	8.8 10.0	19.3 20.4
South Arcot	{ 1897 1898	4.2 5.2	0.2 0.5	5.2 4.8	0.5 0.6	0.3 0.3	10.8 13.0	21.2 24.4
Trichinopoly	{ 1897 1898	2.7 5.5	0.05 0.1	4.0 3.6	0.4 0.6	0.4 0.3	13.5 14.5	21.0 24.6

16. The heads under which the increased death-rate occurred in these districts, in instances where it exceeded 2 per mille, are shown in the annexed table :—

Districts.	Increase over 2 per mille.	Distribution of increase under several heads.				
		Cholera.	Small-pox.	Fevers.	Dysentery and Diarrhoea.	All other causes.
Nilgiris	+ 5.4	- 0.9	+ 0.5	+ 5.1	...	+ 0.7
South Arcot	+ 3.2	+ 1.0	+ 0.3	- 0.4	+ 0.1	+ 2.3
Trichinopoly	+ 3.6	+ 2.8	+ 0.05	...	+ 0.2	+ 1.0

17. The total death-rate in rural towns was 19.0 per mille, against 21.0 for the Presidency, and 31.9 for municipal towns. The following table gives the birth and death rates in 34 towns; that is, in inhabited areas having more than 10,000 inhabitants. Their respective populations are quoted. Although this rule is not universal, it will be seen that the larger the population the more inferior is the registration—a natural sequence in an organization only suited for dealing with petty villages. The passing of the revised Local Boards Act, which may be expected shortly, will doubtless get rid of this difficulty :—

Number.	Rural towns.	Population for which returns were received.	Birth-rate per mille.	Death-rate per mille.
1	Tadpatri	10,275	18.5	12.9
2	Hospet	12,869	20.8	13.8
3	Kampli	10,528	28.0	24.8
4	Rayadrug	10,378	22.4	15.3
5	St. Thomas' Mount	12,140	30.4	19.0
6	Pithápuram	13,731	14.0	13.8
7	Peddápuram	13,652	37.2	26.7
8	Samalkot	13,409	12.3	8.1
9	Dowlaishwaram	10,454	27.1	19.5
10	Chirála	10,581	31.9	25.4
11	Nandyal	10,704	16.6	13.9
12	Ramnád	13,589	18.5	33.2
13	Aruppukóttai	12,673	26.2	17.3
14	Kilakarai	12,396	17.8	15.8
15	Paramakudi	10,001	13.8	9.2
16	Kálahasti	11,715	22.1	20.5
17	Arcot	10,928	27.5	27.6
18	Ambúr	10,583	19.9	12.3
19	Sendamangalam	13,354	13.2	9.8
20	Rasipur	10,539	32.0	15.0
21	Porto Novo	14,045	11.9	12.7
22	Tiruválúr	12,934	27.2	33.7
23	Kulasékarapatnam	15,910	27.9	21.1
24	Virudupatti	14,075	16.8	11.9
25	Viravanallar	13,951	21.3	16.8
26	Rajahpalayam	13,301	37.8	18.7
27	Tenkási	12,861	40.2	27.6
28	Sivakási	12,184	36.9	30.1
29	Káyalpatnam	11,464	19.1	20.6
30	Kalladakurchi	11,096	26.6	23.8
31	Bobbili	14,448	25.5	19.5
32	Sálúru	12,910	9.9	12.5
33	Palkonda	10,364	20.7	16.3
34	Párvatipuram	10,053	22.7	26.5
Total of 34 rural towns ..		414,095	23.3	19.0

18. The infantile death-rate, per mille of births, was 163·3—a rate 1·2 per mille less than the previous year, and 6·4 higher than in 1896. This result points to the influence of the higher price of food-grains on the obtaining of luxuries suitable for infant life during 1897-98, and the production of weakly infants by ill-nourished mothers.

19. The extent of variations in districts will be found at page 24 where, for convenience of contrast, they are exhibited side by side with rates found in Municipalities.

20. The following table exhibits the results of registration in 1898 in the various districts, as compared with 1897 and the average of the preceding five years :—

Districts.	Years.	Ratio per mille of population.		Ratio per mille of population.			
		Birth.	Death.	Birth.		Death.	
				Decrease.	Increase.	Decrease.	Increase.
Anantapur ...	Average ...	28·5	19·6	3·7	...	0·2	...
	1897 ...	27·7	26·9	2·9	...	7·5	...
	1898 ...	24·8	19·4	...	...	...	...
Bellary ...	Average ...	32·9	24·5	3·6	...	1·8	...
	1897 ...	31·5	31·2	2·2	...	8·5	...
	1898 ...	29·3	22·7	...	...	...	...
Chingleput ...	Average ...	36·9	22·1	1·2	...	2·2	...
	1897 ...	37·1	23·2	1·4	...	1·1	...
	1898 ...	35·7	24·3	...	...	...	...
Coimbatore ...	Average ...	28·1	19·5	0·8	...	1·0	...
	1897 ...	26·9	20·1	...	0·4	1·6	...
	1898 ...	27·3	18·5	...	...	...	...
Cuddapah ...	Average ...	27·2	22·4	3·9	...	3·6	...
	1897 ...	28·2	25·9	4·9	...	7·1	...
	1898 ...	23·3	18·8	...	...	...	...
Ganjām ...	Average ...	21·0	21·9	...	1·9	...	0·8
	1897 ...	23·9	50·1	1·0	...	27·4	...
	1898 ...	22·9	22·7	...	...	...	...
Gódvāri ...	Average ...	24·4	18·6	...	1·8	1·9	...
	1897 ...	25·4	22·8	...	0·8	6·1	...
	1898 ...	26·2	16·7	...	...	...	...
Kistna ...	Average ...	33·0	19·5	...	1·2	...	3·6
	1897 ...	34·9	22·0	0·7	...	1·1	...
	1898 ...	34·2	23·1	...	...	...	...
Kurnool ...	Average ...	30·1	24·4	4·3	...	3·7	...
	1897 ...	28·0	28·8	2·2	...	8·1	...
	1898 ...	25·8	20·7	...	...	...	...
Madras ...	Average ...	40·8	38·1	...	0·7	...	7·1
	1897 ...	41·6	35·8	0·1	...	9·4	...
	1898 ...	41·5	45·2	...	...	...	...
Madura ...	Average ...	29·4	20·3	6·7	...	4·7	...
	1897 ...	28·0	23·7	5·3	...	8·1	...
	1898 ...	22·7	15·6	...	...	...	...
Malabar ...	Average ...	21·9	19·3	3·3	...	1·8	...
	1897 ...	20·8	30·2	2·2	...	12·7	...
	1898 ...	18·6	17·5	...	...	...	...
Nellore ...	Average ...	25·9	17·0	1·9	...	2·7	...
	1897 ...	28·3	19·5	4·3	...	0·2	...
	1898 ...	24·0	19·7	...	...	...	...
Nilgiris ...	Average ...	28·6	24·4	0·9	...	6·5	...
	1897 ...	30·7	25·5	3·0	...	5·4	...
	1898 ...	27·7	30·9	...	...	...	...
North Arcot ...	Average ...	28·2	17·7	1·6	...	0·6	...
	1897 ...	27·3	20·2	0·7	...	1·9	...
	1898 ...	26·6	18·3	...	...	...	...
Salem ...	Average ...	31·8	18·6	...	...	1·8	...
	1897 ...	33·2	19·3	1·4	...	1·1	...
	1898 ...	31·8	20·4	...	...	...	...

Districts.	Years.	Ratio per mille of population.		Ratio per mille of population.			
		Birth.	Death.	Birth.		Death.	
				Decrease.	Increase.	Decrease.	Increase.
South Arcot ...	Average ...	31·0	21·7	0·7	...	2·7	...
	1897 ...	28·7	21·2	...	0·6	3·2	...
	1898 ...	29·3	24·4	...	...	...	...
South Canara ...	Average ...	32·1	21·2	6·2	...	3·4	...
	1897 ...	34·1	28·0	8·2	...	...	...
	1898 ...	25·9	24·6	...	...	...	...
Tanjore ...	Average ...	28·4	25·8	...	3·6	0·1	...
	1897 ...	27·3	27·4	...	4·7	1·5	...
	1898 ...	32·0	25·9	...	...	...	...
Tinnevely ...	Average ...	29·5	24·0	...	1·5	2·3	...
	1897 ...	30·1	25·2	...	0·9	3·5	...
	1898 ...	31·0	21·7	...	...	...	...
Tiruchinopoly ...	Average ...	28·1	22·6	...	2·4	2·0	...
	1897 ...	28·6	21·0	...	1·9	3·6	...
	1898 ...	30·5	24·6	...	...	...	...
Vingapatam ...	Average ...	27·0	20·4	3·2	...	1·9	...
	1897 ...	28·3	31·6	4·5	...	13·1	...
	1898 ...	23·8	18·5	...	...	...	...
Total, Madras Presidency.	Average ...	28·5	21·0	1·1	...	...	...
	1897 ...	28·7	25·4	1·3	...	4·4	...
	1898 ...	27·4	21·0	...	...	...	...

DEATHS IN MUNICIPALITIES.

21. The total death-rate in Municipalities amounted to 31·9 per mille, against 33·3 for the previous year.

22. The following table contrasts the rates registered in 1898 with those of 1897, and the average for the five previous years :—

Municipalities.	Years.	Ratio per mille of population.		Ratio per mille of population.			
		Birth.	Death.	Birth.		Death.	
				Decrease.	Increase.	Decrease.	Increase.
Anantapur ...	Average ...	33·9	20·6	1·5	...	0·4	...
	1897 ...	58·2	25·4	5·8	...	4·4	...
	1898 ...	32·4	21·0	...	...	...	5·6
Bellary ...	Average ...	32·8	29·4	2·7	...	6·8	...
	1897 ...	30·1	41·8	...	...	...	...
	1898 ...	30·1	35·0	...	6·3	0·2	...
Bijani ...	Average ...	38·2	26·7	...	6·3	11·4	...
	1897 ...	38·2	37·9	...	...	...	...
	1898 ...	44·5	26·5	...	...	2·4	...
Cannjeveram ...	Average ...	37·7	31·8	1·8	...	1·1	...
	1897 ...	34·9	28·3	...	1·0	...	...
	1898 ...	35·9	29·4	...	...	...	...
Chingleput ...	Average ...	32·9	31·2	...	4·3	1·5	...
	1897 ...	37·2	29·7	...	...	...	...
	1898 ...	38·3	31·5	...	2·1	0·3	...
Coimbatore ...	Average ...	37·1	36·5	...	3·3	5·3	...
	1897 ...	40·4	31·2	...	3·4	3·2	...
	1898 ...	38·3	29·4	...	...	...	1·4
Erode ...	Average ...	43·4	24·8	1·7	...	...	...
	1897 ...	41·7	26·2	...	8·1	4·4	...
	1898 ...	36·6	33·2	...	8·8	6·3	...
Karār ...	Average ...	35·9	35·1	...	...	3·1	...
	1897 ...	44·7	28·9	...	...	...	...
	1898 ...	21·3	33·1	3·7	...	...	1·2
Cuddapah ...	Average ...	27·1	28·8	9·5	...	...	...
	1897 ...	17·6	30·0	...	2·2	1·5	...
	1898 ...	21·8	28·0	...	5·4	17·2	...
Chicacole ...	Average ...	18·6	43·7	...	...	...	...
	1897 ...	24·0	26·5	...	...	...	...

* Being a new Municipality, the required information is not available.

23. There was a decrease of mortality in 39 towns. The following towns showed an increase of over 1 per mille. Against each is shown the head under which this excess took place:—

Municipalities.	Increase over 1 per mille.	Distribution of increase among several diseases.					
		Cholera.	Small-pox.	Fevers.	Dysentery and diarrhoea.	Injuries.	All other causes.
Conjeeveram	+ 1.1	- 1.6	+ 0.1	- 2.0	+ 0.8	...	+ 3.8
Erode	+ 1.4	+ 0.9	...	- 5.3	+ 0.6	+ 0.1	+ 5.1
Cuddapah	+ 1.2	- 1.15	+ 0.4	+ 2.7	- 0.1	- 0.2	- 0.4
Madras	+ 9.4	+ 1.4	...	...	+ 3.0	- 0.1	+ 5.1
Palni	+ 7.4	+ 12.0	...	- 0.6	- 0.15	...	- 3.8
Nellore	+ 3.2	+ 5.6	- 0.4	+ 1.0	- 0.9	- 0.1	- 2.0
Ootacamund	+ 8.5	- 0.3	...	+ 2.7	+ 0.7	- 0.3	+ 5.7
Vaniyambadi	+ 4.2	- 2.0	...	- 2.7	+ 3.7	...	+ 5.2
Tiruppattur	+ 3.5	- 0.3	...	- 1.6	- 0.2	- 0.1	+ 5.7
Cuddalore	+ 3.7	- 1.8	+ 0.2	- 0.3	- 0.2	+ 0.1	+ 5.7
Chidambaram	+ 2.6	- 0.4	+ 0.4	- 0.2	+ 1.9	+ 0.2	+ 0.7
Tiruvannamalai	+ 10.1	- 1.5	+ 0.2	- 2.0	+ 1.7	- 0.3	+ 12.0
Tuticorin	+ 2.3	- 4.7	+ 0.04	- 1.7	+ 5.3	...	+ 3.4
Srivillipattur	+ 1.3	- 0.4	+ 0.1	+ 0.6	- 0.2	+ 0.1	+ 1.1
Trichinopoly	+ 7.4	+ 4.8	+ 0.1	- 0.3	...	+ 0.1	+ 2.7
Srirangam	+ 1.1	+ 1.3	- 0.06	- 0.6	- 1.0	- 0.1	+ 1.6

24. In certain of these will be noticed an increased mortality, which has been registered under the indefinite head of "all other causes." Thus, under this head in Municipalities, during 1898, a greater proportion of deaths has been registered than hitherto. This might be explained on the theory that, as education advances, it is becoming increasingly common to specify the real cause of death, as diagnosed by a qualified medical man, instead of confining statements to the simple heads given in the register; but the increase (1.8 per mille) is of too sudden a nature for this theory to satisfactorily account for it. It is more probable that the "plague scare" has caused alteration in methods of registration elsewhere than in the City of Madras (*vide* paragraph 38). This will be evident from perusal of the following table:—

No.	Municipalities.	Rate per mille from all other causes.		No.	Municipalities.	Rate per mille from all other causes.	
		1897.	1898.			1897.	1898.
1	Bellary	18.2	20.5	19	Vellore	11.5	12.7
2	Conjeeveram	16.9	20.7	20	Gudiyattam	9.8	10.6
3	Chingleput	16.0	17.1	21	Salem	10.9	14.8
4	Coimbatore	16.0	17.3	22	Vaniyambadi	14.7	19.9
5	Erode	13.3	18.4	23	Tiruppattur	12.3	18.0
6	Karur	13.2	13.3	24	Cuddalore	14.9	20.6
7	Berhampur	9.9	11.0	25	Chidambaram	14.5	15.2
8	Ellore	13.7	14.3	26	Tiruvannamalai	9.2	21.2
9	Guntur	26.0	29.0	27	Mangalore	14.5	14.8
10	Madras	18.0	23.1	28	Tanjore	11.0	13.2
11	Madura	14.3	16.2	29	Kumbakonam	18.2	18.6
12	Dindigul	6.0	8.5	30	Mayavaram	15.3	15.9
13	Tellicherry	16.6	16.7	31	Negapatam	18.1	20.2
14	Calicut	17.4	19.3	32	Tuticorin	12.1	15.5
15	Palghat	15.3	21.0	33	Srivillipattur	6.0	7.1
16	Ongole	16.5	16.8	34	Trichinopoly	13.4	16.1
17	Ootacamund	17.2	22.9	35	Srirangam	19.3	20.9
18	Coonoor	24.7	22.2				

25. Such an explanation does not, however, get rid of the fact that increased total mortality actually existed in certain instances, and the suspicion may naturally arise that, in, say, Tiruvannamalai—a pilgrim resort—in the absence of any registered

increase of cholera and fever, the heavy rate of 12 per mille above the previous year must be due to some new condition, for example, unreported plague. It is, however, a Municipality that has been well drilled as to sanitary precautions in reference to festivals, and it may be taken for granted that the selection of "all other causes" for registration was induced by self-interest on the part of the inhabitants, whilst activity in registration in this but lately constituted Municipality may really account for the greater part of the supposed total increase. The probable actual cause of increased total death-rate in the City of Madras (cholera falsely registered) is alluded to under "Fevers."

26. The infantile death-rate in districts and towns is noted below. It is held that the demand of factory life upon a large number of the female population of England, tells most adversely upon the infantile death-rate, owing to insufficient time available for females to attend to their infants. In 1898, the London decennial average infantile death-rate was 151, and for the 33 "great towns" in England the same average rate was 167. If these figures be contrasted with those exhibited below, it will be seen that the death-rate amongst infants in this country is appalling. As both rates are reckoned per mille of births, they are strictly comparable—the error, if any, being most probably in the full mortality of Madras infants not being correctly exhibited; that is to say, that births in this country are more likely to be registered than the deaths of infants. I have, in a former report, adverted to the cause of such heavy mortality, namely, the ignorance of the poorer classes of the most simple ideas of sanitation, in connection with child-life. There need be no question as to purposeful neglect. The mothers of the uneducated classes in this Presidency cannot be excelled in any nation as to devotion to their children. The advent of a female infant is certainly regarded as somewhat humbling to the pride of the head of the family; still she gets fair treatment so long as, at reasonable prices, food is obtainable; when grain becomes dear, it is possible that the male child would receive the greater share of attention. The gradual rise of wages will ameliorate conditions following the high price of grain in time. The matter of ignorance of mothers can only be altered, by better attention to spread of general education and of sanitary knowledge amongst them.* It will, however, be noticed if Madras be placed in its proper place as a Municipality, and be not regarded as a district, that the total district infantile death-rate becomes 160.6 per mille of births, which is not much above that quoted for London, and is less than in the 33 "great towns." Probably, an infant's death in a rural area is less likely to be registered than that in a municipal town; but, allowing for this fact, the rates are so enormously to the disadvantage of the latter that they cannot but be regarded as the expression of the insanitary conditions incident to the inhabiting of sites crowded with dwellings, inefficiently protected by the present type of municipal efforts towards rubbish and night-soil removal, unprovided with sewerage systems, and frequently possessing water-supplies innocent of the most simple modes of protection.

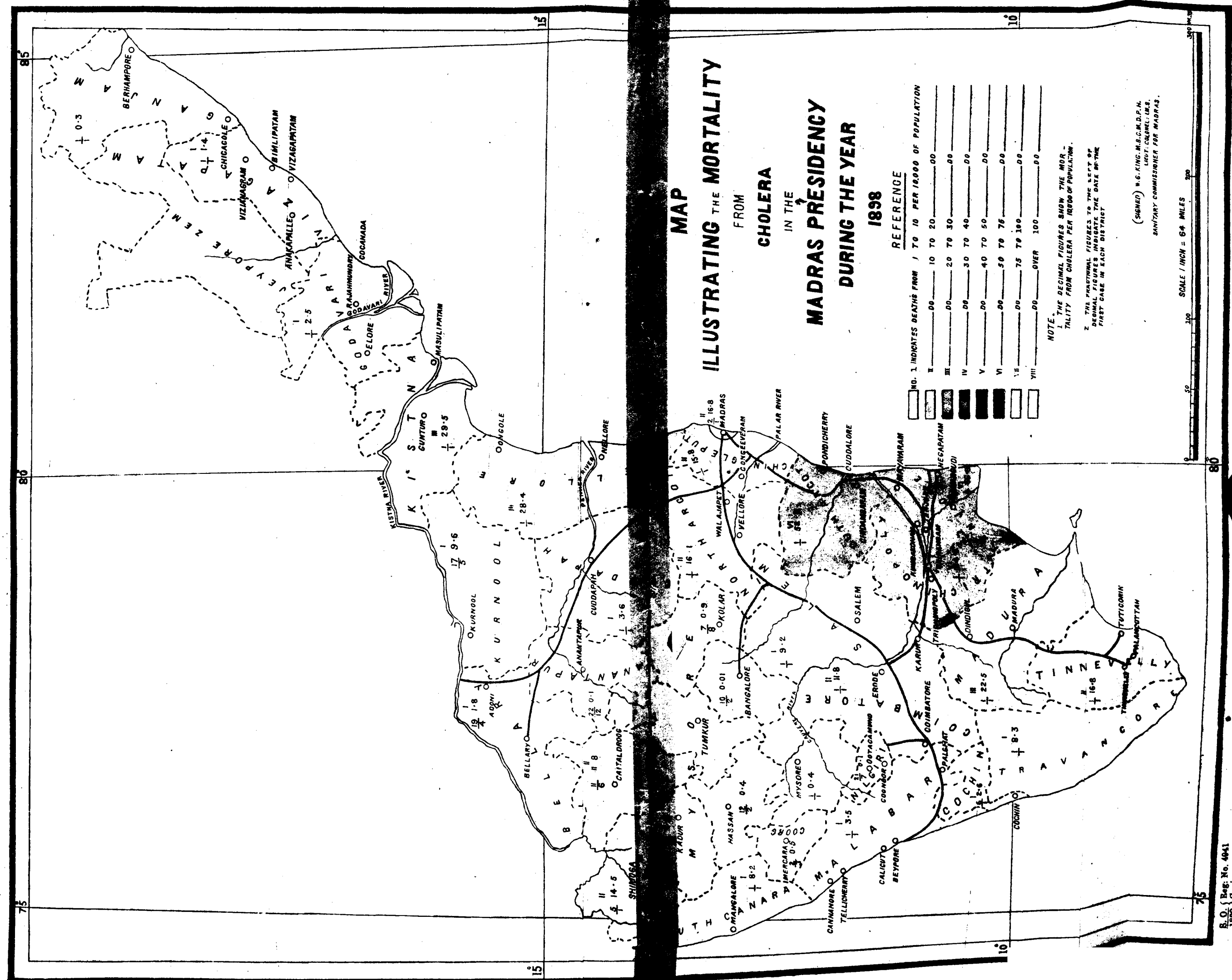
27. If it be granted that to a number of towns this description be correctly applied, the question as to which shall exhibit the heaviest infantile death-rate, would ultimately be determined by the relative capability of the soil to dispose of sewage reaching it, in respect to its nature and configuration, and proximity of the sub-soil water; all matters that possibly affect the *bacillus enteritidis*, *sporogenes*, and other forms of microbic life having a relation to intestinal fluxes. Bellary may well be regarded as a town whose sub-soil is saturated with sewage; its rate is 324.9 per mille; the same may be said of Negapatam; its rate is 276.2; and of Madras, with its 297.7 per mille, the same is true. In the case of Ootacamund (304.5) not only has the soil saturated with sewage in the neighbourhood of the native dwellings to be thought of, but the rigour of its climate. It is noteworthy that in Coonoor the major portion of which is drained, but where the climate factor is also to be contended against, the rate is 190.5 per mille.

* The desirability of efforts for spread of sanitary knowledge amongst women is, I am glad to say, engaging the attention of several native gentlemen, notably, C. V. Swaminatha Aiyar, editor of the *Viveka Chintamani*.

Statement showing the rate of Mortality of Infants under one year of age in Districts and Municipalities in 1898.

Districts.	Ratio per mille of registered births.*	Municipalities.	Ratio per mille of registered births.*
Ganjām	159.2	Berhampore	200.3
Vizágapatam	115.4	Chicacole	221.5
Górávavi	132.1	Párlakimedi	156.3
Kistna	168.6	Vizágapatam	170.6
Nellore	139.6	Bimlipatam	129.5
Madras	297.7	Vizianagram	155.4
Chingleput	194.1	Anakápallo	184.5
South Arcot	180.6	Cocanada	158.4
Trichinopoly	177.9	Rajahmundry	174.9
Tanjore	179.6	Ellore	177.0
Madura	141.1	Masulipatam	176.0
Tinnevely	180.7	Bezváda	238.8
Kurnool	139.4	Guntúr	296.9
Cuddapah	173.9	Nellore	133.2
Bellary	170.9	Ongole	226.9
Anantapur	140.8	Madras	297.7
North Arcot	150.8	Conjeeveram	229.4
Salem	181.7	Chingleput	245.2
Coimbatore	158.9	Cuddalore	199.8
Nilgiris	257.3	Chidambaram	226.2
South Canara	178.9	Tiruvannámalaí	188.2
Malabar	101.4	Trichinopoly	222.6
		Srirangam	199.1
		Tanjore	207.1
		Kumbakónam	203.7
		Máyavaram	180.2
		Negapatam	276.2
		Mannárgudi	152.5
		Madura	237.3
		Dindigul	110.6
		Periyakulam	229.1
		Palni	128.0
		Tinnevely	228.6
		Palamcottah	186.9
		Tuticorin	246.2
		Srivilliputtúr	157.4
		Kurnool	170.2
		Cuddapah	224.4
		Bellary	324.9
		Adóni	162.8
		Anantapur	141.6
		Vellore	169.4
		Wallajahpet	197.1
		Tirupati	233.3
		Gudiyáttam	188.3
		Salem	221.2
		Vániyambádi	221.3
		Tiruppattúr	189.7
		Coimbatore	219.2
		Erode	203.5
		Karúr	185.0
		Ootacamund	304.5
		Coonoor	190.5
		Mangalore	239.7
		Tellicherry	186.4
		Calicut	163.2
		Palghat	243.0
		Cochin	224.8
		Cannanore	164.1
	163.3		229.5

* Excluding Europeans and Eurasians.



SECTION VI.

GENERAL HISTORY OF CHIEF DISEASES.

CHOLERA.

28. A total of 65,444 deaths occurred from cholera, yielding a rate of 2 per mille of the population of the Presidency, against 4.4 per mille in 1897, and a decennial average of 2.1 per mille. The incidence of the disease was very heavy in Tanjore (6.7), Trichinopoly (5.5), South Arcot (5.2), and Kistna (2.9). These are the great irrigation centres of the Presidency, and offer good facilities for the transmission of the cholera microbe from village to village by means of lengthy channels that are liable to contamination, by reason of the insanitary habits of the people. The only district where irrigation under this plan is not carried out largely that was much affected was Nellore, where the death-rate from this cause was 2.8 per mille. This was the district affected with famine during the year. Granting that no cases of "famine diarrhoea" were included in the returns as cholera, the various conditions incident to scarcity indubitably predispose the individual to attack, and to spread of the disease in the community concerned. In the report for 1893, a table was prepared on the basis of a ten years' average, showing the months of the year in which each district was most likely to be affected, and the relation of these to the monsoons. Since then, a similar table has been issued annually for the period under review. It has invariably told one tale, namely, greater incidence of the disease during the monsoon which chiefly affects the districts concerned—a result which I ascribe to the surface and sub-soil water influencing the propagation of the cholera microbe; which matters being theoretical will, however, not be here dilated upon. But, this year, the table showing the incidence upon the districts chiefly affected by the north-east monsoon exhibits a departure, in a slightly greater number of attacks having occurred during the south-west monsoon. This variation, would imply, according to the theory advanced, under the abnormal increase of rainfall during the north-east monsoon, a quicker attainment of the maximum sub-soil water level—the point at which, I hold, decrease of prevalence sets in. The apparent difference would however disappear, were the month of January 1899, which forms really a part of the north-east monsoon period, taken into consideration. In the case of the data prepared in the report for 1893, statistics for this month were duly incorporated.

Cholera incidence exhibited according to monsoon periods.

Districts.	Population for which returns were received.	South-west monsoon.					North-east monsoon.				Grand total of both the monsoon periods.
		June.	July.	August.	September.	Total.	October.	November.	December.	Total.	
Districts chiefly affected by south-west monsoon.	East coast, north—										
	Ganjām	1,335,898	...	...	...	...	...	...	...	...	2
	Vizagapatam	1,531,348	12	...	...	2	...	...	...	...	66
	Góđávari	2,077,858	12	19	4	19	54	5	3	4	12
	Kistna	1,855,024	240	836	1,451	965	3,501	219	30	21	270
											3,771
	North midland—										
	Kurnool	817,660	4	79	237	271	591	120	56	1	177
	Cuddapah	1,271,721	...	1	...	6	7	15	36	208	266
	Bellary	890,485	28	22	11	4	65	...	...	51	116
	Anantapur	727,319	...	...	...	...	...	...	9	9	9
	South-western—										
	South Canara	1,052,002	...	...	...	...	...	...	...	...	24
	Malabar	2,636,674	6	1	14	1	22	1	1	...	1
	Nilgiris	96,765	...	1	...	...	1	...	...	...	...
	Total	14,292,754	301	959	1,717	1,266	4,243	360	126	294	780
											5,023
Incidence per mille of population of south-west monsoon group.		.....	...	...	...	...	0.30	...	...	...	0.05
											0.35

Cholera incidence exhibited according to monsoon periods—cont.

Districts.		Population for which returns were received.	South-west monsoon.					North-east monsoon.				Grand total of both the monsoon periods.	
			June.	July.	August.	September.	Total.	October.	November.	December.	Total.		
Districts chiefly affected by north-east monsoon.	East coast, central—												
	Nellore	...	1,463,357	65	141	273	457	936	310	566	791	1,667	2,603
	Madras	...	436,375	1	88	298	166	553	45	41	13	99	652
	Chingleput	...	1,199,901	12	9	164	347	532	181	236	378	795	1,327
	North Arcot	...	2,113,585	15	54	382	366	817	163	305	1,662	2,130	2,947
	East coast, south—												
	South Arcot	...	2,162,336	730	1,093	969	473	3,265	142	804	2,230	3,176	6,441
	Trichinopoly	...	1,371,726	299	672	491	271	1,733	48	57	379	484	2,217
	Tanjore	...	2,227,081	127	322	430	334	1,213	272	158	648	1,078	2,291
	South-eastern—												
	Madura	...	2,099,668	208	232	60	10	510	81	121	95	297	807
	Tinnevely	...	1,915,702	41	196	134	85	456	33	28	127	188	644
	South midland—												
	Salem	...	1,961,784	50	...	2	2	54	...	...	31	31	85
	Coimbatore	...	2,003,911	135	6	31	1	173	1	...	1	2	175
	Total		18,955,426	1,683	2,813	3,234	2,512	10,242	1,276	2,316	6,355	9,947	20,189
	Incidence per mille of population of north-east monsoon group.		...	...	...	...	...	0.54	...	...	...	0.52	1.06

actively disapproved by the Collectors. The Government Order also places in the hands of the Collector the most important task of giving the warning to the municipality, as to when it is necessary to put in force the rule requiring the employment of a staff for observation. No instance has yet come to the notice of this office of Collectors having given warning to municipalities *at this stage*. Consequently, the system which contemplated a method of observation, which should secure rapid action, on the introduction of the first case of the disease, has degenerated into a method of prevention of spread, *after the disease has exhibited itself*. The effecting of sanitary measures against epidemic disease demands at the hands of the local bodies responsible a rigid adherence to certain principles and methods; relaxation of these, at the option of this or that official, condemns their original necessity, and permits of flaws that stultify them.

31. In the municipal towns of Palni, Nellore, Chidambaram, Mannārgudi, and Trichinopoly, the disease was severe. Of these, Trichinopoly is the only town in which the rules above referred to are in force.

32. On making a comparison of the total population under the rules and those not, the incidence of the disease is found to be as follows :—

	Incidence of cholera in			
	1895.	1896.	1897.	1898.
Populations under the Cholera Rules in 24 towns=987,835.	0.7	2.3	5.3	2.2
Populations not under the Cholera Rules in 21 towns=428,914.	0.8	3.3	7.6	1.8

Had the populations under the rules been attacked at the same rate as those not subject to them, they would have lost, during 1895 to 1898, 2,964 more lives than they actually did.

29. The measures taken to combat the disease in rural areas by the local authorities, in spite of reminders, cannot be described as adequate. Notwithstanding the training of a large number of Certificated Sanitary Inspectors available for special work in connection with epidemics, Local Fund bodies cannot readily be prevailed upon to undertake systematic measures with the aid of these men. Matters are, however, very much better than a few years back, when the chief idea of certain Local Fund bodies in dealing with cholera was to distribute “cholera pills,” by means of Vaccinators. Hospital Assistants are detached, if somewhat tardily, for this duty, and attempt to combat conditions (for which they are not specially fitted as in the case of Certificated Sanitary Inspectors), more especially with reference to specific contamination of the water-supplies of villages. These bodies, however, almost invariably fail to support their efforts, by supplying menial staffs necessary to ensure correct sanitary results.

30. The rules for combating cholera in municipalities laid down in G.O., No. 1536 M., dated 9th September 1896, continued in force. As remarked in last year’s report, their utility is greatly minimized by the power left in the hands of the Collector to approve of any smaller staff being employed than that laid down in the rules as the minimum. Although the Order provides definitely for the provision of sufficient funds for effecting the scheme, the first thoughts of Chairmen of Municipalities seem to be how cheaply the system can be nominally effected, and, apparently on the ground of economy, this is a policy that is not

Statement illustrating the distribution, &c., of Cholera in the Madras Presidency during the year 1898, to accompany the Cholera Map—cont.

Districts.	Number of Circles of Registration.	Name of Circle.	Population for which returns were received.	Date of First Case of Cholera in the Circle during the Year.	Date of Last Case of Cholera in the Circle during the Year.	Cholera.		Period of Maximum Intensity of the Disease.	Number of Villages in each of the Circles.	Number of those	
						Total Deaths in each of the Circles.	Ratio per 10,000 of Population.			Affected by Cholera.	Not affected by Cholera.
Tinnevely.	224	Tinnevely ... M.T.C.	24,756	1st Jan. ...	11th Mar. ...	23	9.3	January ...	1	1	...
	225	Palamcottah ... M.T.C.	18,612	4th Jan. ...	8th Mar. ...	47	25.2	January ...	1	1	...
	226	Tuticorin ... M.T.C.	24,964	11th Jan. ...	22nd Dec. ...	128	51.2	August ...	1	1	...
	227	Srivilliputtūr ... M.T.C.	29,541	3rd Feb. ...	7th May ...	12	4.0	March ...	1	1	...
	228	Kulasékarapatnam ... T.C.	15,910	18th Sept. ...	31st Dec. ...	35	22.0	December ...	1	1	...
	229	Virudupatti ... T.C.	14,075	1st Jan. ...	30th Dec. ...	37	26.3	January ...	1	1	...
	230	Viravanallūr ... T.C.	13,951	26th Feb. ...	26th Feb. ...	1	0.7	...	1	1	...
	231	Rajahpalaiyam. ... T.C.	13,301	...	...	...	...	...	1	...	1
	232	Tenkāsi ... T.C.	12,861	1st Jan. ...	1st Feb. ...	20	15.5	January ...	1	1	...
	233	Sivakāsi ... T.C.	12,184	27th Feb. ...	26th Mar. ...	10	8.2	March ...	1	1	...
	234	Kāyalpatnam ... T.C.	11,464	13th Feb. ...	31st Dec. ...	38	33.1	December ...	1	1	...
	235	Kalladakurchi. ... T.C.	11,096	29th Jan. ...	27th May ...	18	16.2	February ...	1	1	...
	236	Ottappidāram. ... R.C.	316,990	5th Jan. ...	20th Dec. ...	399	12.6	July ...	395	48	347
	237	Srivaikuntam ... R.C.	260,196	1st Jan. ...	31st Dec. ...	627	24.1	January ...	146	73	73
	238	Tinnevely ... R.C.	141,252	1st Jan. ...	30th April ...	216	15.3	January ...	120	45	75
	239	Srivilliputtūr ... R.C.	152,253	1st Jan. ...	16th Aug. ...	346	22.7	January ...	98	29	69
	240	Sankaranayinār-kōyil ... R.C.	209,213	1st Jan. ...	15th May ...	274	13.1	January ...	127	30	97
	241	Nāngunéri ... R.C.	174,410	1st Jan. ...	27th Dec. ...	150	8.6	January ...	236	39	197
	242	Ambāsamudram ... R.C.	158,552	1st Jan. ...	27th May ...	95	6.0	January ...	94	34	60
	243	Sāttūr ... R.C.	158,046	1st Jan. ...	30th Dec. ...	541	34.2	March ...	209	61	148
	244	Tenkāsi ... R.C.	142,075	1st Jan. ...	31st Dec. ...	207	14.5	January ...	101	33	68
	21	Total, District ...	1,915,702	1st Jan. ...	31st Dec. ...	3,224	16.8	January ...	1,538	403	1,135
Trichinopoly.	245	Trichinopoly ... M.T.C.	89,666	1st Jan. ...	31st Dec. ...	656	73.1	February ...	1	1	...
	246	Srirangam ... M.T.C.	21,632	1st Jan. ...	31st Dec. ...	104	48.0	January ...	1	1	...
	247	Trichinopoly ... R.C.	248,561	1st Jan. ...	31st Dec. ...	1,359	54.8	January ...	364	238	126
	248	Musiri ... R.C.	282,615	1st Jan. ...	31st Dec. ...	715	25.3	February ...	223	73	150
	249	Kulittalai ... R.C.	243,685	2nd Jan. ...	31st Dec. ...	764	31.3	February ...	246	102	144
	250	Perambalūr ... R.C.	195,004	1st Jan. ...	27th Dec. ...	674	34.5	January ...	219	87	132
	251	Udaiyarpālaiyam. ... R.C.	201,530	1st Jan. ...	30th Dec. ...	2,538	125.9	July ...	335	205	130
	252	Zamindaries ...	89,033	1st Jan. ...	28th Oct. ...	671	75.3	August ...	113	83	30
	8	Total, District ...	1,371,726	1st Jan. ...	31st Dec. ...	7,481	54.5	January ...	1,502	790	712
Vizagapatam.	253	Vizagapatam ... M.T.C.	33,961	...	...	...	...	...	1	...	1
	254	Bimlipatam ... M.T.C.	9,696	...	...	...	...	...	1	...	1
	255	Vizianagram ... M.T.C.	30,735	1st Jan. ...	23rd Jan. ...	13	4.2	...	1	1	...
	256	Anakāpalle ... M.T.C.	17,001	...	...	...	...	...	1	...	1
	257	Bobbili ... T.C.	14,448	...	...	...	...	...	1	...	1
	258	Sālūru ... T.C.	12,910	9th Mar. ...	9th Mar. ...	3	2.3	...	1	1	...
	259	Palkonda ... T.C.	10,364	...	...	...	...	...	1	...	1
	260	Pārvatipuram ... T.C.	10,053	...	...	...	...	...	1	...	1
	261	Sarvasiddhi ... R.C.	131,652	4th Feb. ...	18th April ...	54	4.1	February ...	145	7	138
	262	Narasapatnam or Golconda ... R.C.	98,389	9th Mar. ...	20th May ...	148	15.0	March ...	176	29	147
	263	Anakāpalle ... R.C.	127,392	...	...	...	...	...	142	...	142
	264	Vizagapatam ... R.C.	52,186	...	...	...	...	...	74	...	74
	265	Viravilli ... R.C.	170,600	17th June ...	21st June ...	2	0.1	...	240	1	239
	266	Bimlipatam ... R.C.	92,438	...	...	...	...	...	117	...	117
	267	Srungavarapukota ... R.C.	113,170	...	...	...	...	...	181	...	181
	268	Vizianagram ... R.C.	92,357	...	...	...	...	...	193	...	193
	269	Gajapatnagaram ... R.C.	88,924	...	...	...	...	...	222	...	222
	270	Chipurupalle ... R.C.	110,230	...	...	...	...	...	268	...	268
	271	Sālūru ... R.C.	44,657	8th Mar. ...	8th Mar. ...	1	0.2	...	159	1	158
	272	Bobbili ... R.C.	82,820	...	...	...	...	...	169	...	169
	273	Palkonda ... R.C.	135,331	...	...	...	...	...	371	...	371
	274	Pārvatipuram ... R.C.	52,034	...	...	...	...	...	203	...	203
	22	Total, District ...	1,531,348	1st Jan. ...	21st June ...	221	1.4	March ...	2,668	40	2,628

SMALL-POX.

33. There occurred 20,490 deaths from small-pox. This represents a rate of 0.6 per mille upon the census population. Appended is a table showing the rates in municipalities and rural areas, respectively, during the last ten years. It will be observed that, within the last three years, a steady improvement in the rates within municipal towns as compared with their surrounding rural areas, is noticeable. This is possibly *inter alia* due to the influence of G.O., No. 1502 M., dated 19th October 1894, which demands that the Chairman shall give a complete account of the methods of disposal of all births that have been registered, and have arrived at an age to receive vaccination:—

Statement showing Small-pox Mortality in Municipalities and Rural areas for 10 years commencing from 1889.

Districts.	Municipal Towns.	Ratio of deaths from small-pox per mille of population.									
		1889.		1890.		1891.		1892.		1893.	
		Municipalities.	Rural areas.	Municipalities.	Rural areas.	Municipalities.	Rural areas.	Municipalities.	Rural areas.	Municipalities.	Rural areas.
Anantapur ...	Anantapur ...	1.6	2.9	1.6	1.0	0.4	0.4	0.3	0.2	0.3	0.2
Bellary ...	Bellary ...	2.6	0.3	0.3	0.4	0.3	0.4	0.3	0.4	0.3	0.4
Chingleput ...	Chingleput ...	0.5	0.5	1.7	0.6	0.7	0.6	0.8	0.3	0.2	0.1
Coimbatore ...	Coimbatore ...	0.5	0.4	0.7	0.3	2.1	1.1	0.4	0.8	0.4	0.2
Cuddapah ...	Cuddapah ...	0.3	2.0	0.4	1.2	0.4	0.6	0.7	0.2	0.2	0.1
Gaujam ...	Chicacole ...	2.9	0.1	0.1	0.6	0.2	0.2	0.7	0.2	0.1	0.1
Godavari ...	Parikimedi ...	0.8	0.1	0.4	0.8	0.8	2.3	0.02	0.1	0.1	0.1
Kistna ...	Rajahmundry ...	0.2	0.1	0.4	0.8	3.5	1.7	0.04	0.2	0.2	0.1
Kurnool ...	Ellore ...	2.7	0.2	1.3	1.1	5.4	5.3	0.05	0.1	0.2	0.1
Madras ...	Masulipatam ...	0.1	4.3	0.2	0.6	2.3	0.3	0.1	0.3	0.1	0.1
Madura ...	Bezwada ...	0.9	0.2	0.2	0.8	0.1	0.3	0.04	0.3	0.03	0.06
Malabar ...	Kurnool ...	0.8	0.6	0.4	0.1	2.4	0.4	0.4	0.3	0.3	0.1
Nellore ...	Madras ...	1.2	0.2	0.2	0.2	0.1	0.3	0.1	0.1	0.1	0.1
	Madura ...	0.2	0.2	0.2	0.2	0.1	0.3	0.1	0.1	0.1	0.1
	Dindigul ...	0.2	0.2	0.2	0.2	0.1	0.3	0.1	0.1	0.1	0.1
	Periyakulam ...	0.2	0.2	0.2	0.2	0.1	0.3	0.1	0.1	0.1	0.1
	Palmi ...	0.2	0.2	0.2	0.2	0.1	0.3	0.1	0.1	0.1	0.1
	Tellicherry ...	0.2	0.2	0.2	0.2	0.1	0.3	0.1	0.1	0.1	0.1
	Calicut ...	0.2	0.2	0.2	0.2	0.1	0.3	0.1	0.1	0.1	0.1
	Palghat ...	0.2	0.2	0.2	0.2	0.1	0.3	0.1	0.1	0.1	0.1
	Cochin ...	0.2	0.2	0.2	0.2	0.1	0.3	0.1	0.1	0.1	0.1
	Cananore ...	0.2	0.2	0.2	0.2	0.1	0.3	0.1	0.1	0.1	0.1
	Nellore ...	0.2	0.2	0.2	0.2	0.1	0.3	0.1	0.1	0.1	0.1
	Ongole ...	0.2	0.2	0.2	0.2	0.1	0.3	0.1	0.1	0.1	0.1

CHIEF DISEASES.

CHIEF DISEASES.

Statement showing Small-pox Mortality in Municipalities and Rural areas for 10 years commencing from 1889—cont.

Districts.	Municipal Towns.	Ratio of deaths from small-pox per mille of population—cont.									
		1889.		1890.		1891.		1892.		1893.	
		Municipalities.	Rural areas.	Municipalities.	Rural areas.	Municipalities.	Rural areas.	Municipalities.	Rural areas.	Municipalities.	Rural areas.
Nilgiris ...	Ootacamund ...	0.1	0.5	1.4	0.5	0.1	0.9	0.7	0.2	0.1	0.1
North Arcot ...	Coonor ...	1.1	0.9	1.5	1.9	1.9	1.7	1.0	0.6	0.2	0.2
Salem ...	Vellore ...	0.3	1.0	1.2	0.7	0.2	0.7	0.2	0.8	0.1	0.1
South Arcot ...	Walajpet ...	0.3	0.8	0.9	0.6	0.4	0.4	0.9	0.6	0.3	0.3
South Canara ...	Gudiyattam ...	0.3	0.3	0.9	0.6	0.6	0.9	1.0	0.8	0.2	0.2
	Tirupattur ...	0.3	0.3	0.9	0.6	0.6	0.9	1.0	0.8	0.2	0.2
	Vaniyambadi ...	0.3	0.3	0.9	0.6	0.6	0.9	1.0	0.8	0.2	0.2
	Tiruvannamalai ...	0.3	0.3	0.9	0.6	0.6	0.9	1.0	0.8	0.2	0.2
	Mangalore ...	0.3	0.3	0.9	0.6	0.6	0.9	1.0	0.8	0.2	0.2
Tanjore ...	Cuddalore ...	1.1	0.7	1.8	0.8	1.3	0.5	0.8	0.4	0.1	0.1
	Chidambaram ...	3.3	0.7	3.2	0.8	0.5	0.5	0.8	0.4	0.1	0.1
	Kumbakonam ...	0.1	0.1	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Mylavaram ...	0.1	0.1	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Nagapattinam ...	2.2	0.3	3.3	0.3	0.5	0.5	1.5	0.5	0.1	0.1
	Mannargudi ...	0.3	0.1	2.2	0.3	1.6	0.3	0.4	0.4	0.4	0.4
	Tinnevely ...	0.3	0.1	2.2	0.3	1.6	0.3	0.4	0.4	0.4	0.4
	Palacottah ...	0.1	0.1	0.2	0.1	1.4	0.3	0.9	0.9	0.9	0.9
	Tuticorin ...	0.1	0.1	0.2	0.1	1.4	0.3	0.9	0.9	0.9	0.9
	Srivillipattur ...	1.2	0.6	1.2	0.6	1.2	0.6	1.2	0.6	1.2	0.6
Trichinopoly ...	Trichinopoly ...	0.6	0.6	1.2	0.6	1.2	0.6	1.2	0.6	1.2	0.6
	Srirangam ...	0.6	0.6	1.2	0.6	1.2	0.6	1.2	0.6	1.2	0.6
Vizagapatnam ...	Vizagapatnam ...	0.7	0.1	2.6	0.5	0.3	0.3	0.3	0.3	0.3	0.3
	Binilipatam ...	0.1	0.1	1.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Vinayagram ...	4.9	0.1	2.2	0.5	0.1	0.1	0.1	0.1	0.1	0.1
	Anakapalle ...	1.4	0.1	0.5	0.5	0.1	0.1	0.1	0.1	0.1	0.1
Total		0.9	1.0	1.3	0.9	1.7	1.4	1.2	1.3	0.5	0.6

34. It will be noticed that the frightful rate of 12·2 per mille registered against Ganjām, during 1897, has undergone a decline; but that, in 1898, the mortality from this cause (8·5 per mille) was still of a most serious nature. It will be remembered that the impetus given to the disease during 1897 was due to famine conditions, leading to the crowding of the people upon works. What with the existence of extensive hill tracts inhabited by a class of people who probably would much prefer inoculation to vaccination, and the impossibility of dealing satisfactorily with any sanitary subject in zemindari tracts, Ganjām presents a most unpromising field to the sanitarian. Indeed, so little has it been considered possible to deal with this district by ordinary methods, that for the last ten years, in the hill tracts, the entire responsibility for administration of the Vaccination Department has been in the hands of the civil authorities.

35. In judging of the magnitude of small-pox epidemics, it is well to hold in mind that under our present system of registration in rural areas, and to a less extent in municipal towns, deaths from measles are apt to be included under "small-pox."

36. The decline in small-pox mortality in the district of Malabar noticed in the previous report, continued pretty much the same during 1898, as shown below:—

Years.	Actual number of deaths from small-pox.	Rate per mille.
1893	12,068	4·6
1894	3,540	1·3
1895	89	0·03
1896	267	0·1
1897	43	0·01
1898	99	0·04

FEVERS.

37. It is a trite statement, but one necessary to be held in mind that, under the head of "fevers," the majority of all affections in which pyrexia is a prominent symptom are likely to appear, as a sequence of the present system of registration and state of medical advance of the country. Nevertheless, it is safe to assume that the greater number of deaths so registered are due to malaria. In the year under review, there were 248,638 deaths from fevers, which represent 35·6 per cent. of the total mortality reported, and a death-rate from this special cause of 7·5 per mille of the population, against 9·0 of the previous year. The decrease was chiefly marked in districts that in 1897 had been affected with famine; but, in Anantapur, it is trivial. From this may be argued better nutrition and better resisting power to malaria of the people of these districts. A marked exception to the general decrease is exhibited in the case of the Nilgiris, where the death-rate of 22·1 per mille from this cause was registered, against 17 per mille in 1897. This was accompanied by a fall in the birth-rate. If this does not represent mere vagaries in registration, the only feasible explanation, in default of special investigation, is the departure from the rainfall conditions of 1896, representing a gradual decline and, consequently, a changed line of saturation of the sub-soil influencing the production of the malaria germ; thus, in 1896 the total rainfall was 85·47 inches, in 1897, 76·75 inches, in 1898, 70·32 inches.

38. It is probable that the death-rate from fever in Madras town does not represent the truth. During the prevalence of cholera, there was an increased registration of deaths under "fever." A joint investigation by the Health officer and myself satisfactorily proved that the apparent increase had been brought about by false registration of cholera under that head. Subsequent to October, however, a decline in fever below what might normally be expected, during the last quarter of

the year, occurred. This result has been stated by the President of the Municipality to be due to the people reporting an abnormal number of cases under "other causes." "Dysentery and diarrhoea" had become an unsafe head under which to register, as it was likely to be followed by enquiry as to cholera. On the occurrence of plague in the Mysore territory and increased vigilance of the municipal sanitary staff as to "fevers," it became unsafe to register under this head, lest enquiry should be made as to plague. Hence, the refuge for false registration under the convenient head of "other causes" has been fully utilized. The following statement illustrates these facts, and affords a curious illustration of the difficulties the sanitarian in this country encounters, in attempting to interpret registration results, in reference to the health state of populations:—

	Years.	July.	August.	September.	October.	November.	December.
Cholera	1897 1898	0·3 2·3	1·1 7·6	1·0 4·3	"Plague scare."		
Fevers	1897 1898	10·8 15·0	13·2 19·8	11·5 16·0			
Fevers	1897 1898	Cholera prevalent.			12·9 5·3	10·5 3·7	9·8 2·5
All other causes ...	1897 1898				17·7 25·9	17·2 25·2	18·6 26·8

39. The death-rate from fever in municipalities was 7·5 per mille, the same rate as in districts as a whole, that is, including municipalities. The highest rates were registered in Cuddapah (14·8), Kurnool (12·5), Madras (12·4), Ootacamund (11·8), and Vizianagaram (11·7). I have already shown, in former reports, that the variation in the fever rate in Madras town follows closely the fluctuations of the sub-soil water. In my inspection notes of 1894 on the town of Madras, I showed that the "period of greatest mortality is that which immediately follows the greatest fall of the sub-soil water level, and heralds a commencing rise." In my report on the same subject, embodied in G.O., No. 672, Public, dated 28th May 1897, I also pointed out that the incidence of fever, diarrhoea, dysentery, and cholera, is influenced by sub-soil water fluctuation, more especially during the stage of depression. This term "fluctuation," I may state, was used in reference to variation from a known normal period regarded as a standard. I also pointed out that, for the time being, the town exhibited during the continuance of a high sub-soil water level greater freedom from fever; this qualification being with reference to the fact that a fall subsequent to a great rise—a heavy fluctuation—would be followed by increased mortality. These statements from records maintained in this office seem justified. In the absence of any other observations, the levels hitherto trusted to have been those supplied by the Military Works Department in respect to the Seven Wells water-works. These, however, cannot be regarded as fully satisfactory. Systematic observation in suitable localities throughout Madras would seem most desirable. I specially draw attention to this, as the data at my disposal show that since the North-East monsoon of 1896 there has been a tendency for an abnormal rise of the sub-soil water. There has also been of late years an increased consumption of Red-hills water in the but partly drained city, as shown by the following statement, that must at least add to soil moisture:—

	C.F.T.
1896	436,053,834
1897	476,215,173
1898	488,625,534

40. There are reasons with reference to the diminishing use of the Seven Wells water, why the supposed rise of the sub-soil water may be less than supposed; but the chances are that a fluctuation of this nature has occurred. In this connection, the fact is worth remembering in regard to future prospects as to plague.

41. In Cuddapah also the incidence of fever prevalence is, within certain limits, affected by the rainfall, and, it may therefore be safely argued, by fluctuations of the sub-soil water, as will be seen from the following statement :—

Official years.	Total rainfall in inches.	Death-rate from fevers.
1890-91	32.15	19.3
1891-92	15.40	14.1
1892-93	44.68	22.2
1893-94	38.97	29.6
1894-95	34.86	16.9
1895-96	33.02	14.9
1896-97	20.57	9.2
1897-98	31.11	13.2
1898-99	* 27.85	* 14.7

DYSENTERY AND DIARRHŒA.

42. The rate for deaths from "dysentery and diarrhœa" fell from 1.2 of the previous year to 0.9 per mille of the population. This less frequency of bowel affections may fairly be regarded as due to improved dietary of the people, following the fall in the price of grain. The decrease occurred in all districts except Madras, Chingleput, Nellore, Salem, and South Arcot. The greatest mortality occurred in the months of January, November, and December. I have already referred to the condition of the soil as influencing infantile mortality—usually by inducing catarrhal affections of the intestine. The intimate relation of soil and water, however, further forces itself upon notice in considering the mortality at other ages. It is, of course, possible to have a town situated on sewage sodden soil supplied with pure water, should it be brought from beyond the contaminated area; but, it may happen, that a pure water derived from the outside may, under several circumstances, be defiled by the sewage-laden soil. It is, in short, difficult to escape the penalty of the close connection between the soil and water. Thus, there heads the list of mortality from diarrhœa and dysentery within municipal towns, Tuticorin, which yields a rate of 9.3 per mille. In this town, water is received from a tank four miles distant. It is open to contamination on its way to the town, but probably to nothing like the extent it is on delivery within the town, as old and pervious pipes are employed emptying into pervious cisterns forming dip-wells. The sub-soil passed through contains much brackish water, and the filtered sewage of the town—which has no sewerage system. The Sanitary Board has recently, against my advice, approved of a scheme for improvement of the water-supply on the principle of protecting it during its transport to the town, but neglecting its protection when passing through the sub-soil in the pervious conduits referred to, and when exposed in the open wells. It will be of advantage to note the result upon the "dysentery and diarrhœa" rate, in future years, of this halting policy. In Cochin, which has the next highest rate (7.5), the water obtainable is brackish and, presumably, sewage-tainted—considering the nature of the surroundings. Such fairly pure water as is obtainable, is procured at great expense by boat from a distance of twelve miles. The prevalence of filariasis to an extent to cause the name of "Cochin leg" to be synonymous with elephantiasis, sufficiently bespeaks the fact that the water of the locality is open to lodgment by the mosquito. The fact that Madras (7.5) possesses a public water-supply (albeit delivered unfiltered after passage through an unprotected channel) by no means implies that the people obtain the full possible sanitary benefit from it. There hardly exists a house in the thickly inhabited areas that does not have on its premises an open well, with pervious stoning, two or three paces removed from the latrine. Of course, the plea is that such water—chemically little better than a sewage filtrate—is used solely for the washing of eating and cooking vessels:

* Obtained from the statistics of first nine months of 1898-99.

but this statement does not absolve from the sanitary sin, nor its consequences. As for Coonoor with its rate of 6.3, it affords a lamentable example of a town being surrounded with pure water sources, but allowing such as it possesses to be grossly defiled by absence of protection.

INJURIES.

43. Under "injuries," the practically invariable figure of 0.3 per mille was registered. It is evident that neither the increase of railways nor of manufacturing—the latter being in number still very small and under full operation of the Factory Act—has sufficed to cause any marked result on mortality.

ALL OTHER CAUSES.

44. Although, as remarked in discussing registration, there was an increased tendency in municipalities to register under this head, owing to "plague scare," the total was not sufficient to affect the supposed incidence in the population as a whole. The figure for 1898 (9.7) approximates closely that for 1897 (9.8).



SECTION IX.

SANITARY WORKS—CIVIL.

MUNICIPALITIES.

45. It might have been thought, with plague threatening to invade the Presidency, that the improvement of the sanitation of municipal areas would have been carried on with unusual energy. In the matter of attempting to make the best effort with the means available, this is probably the case; but it is not possible to record any departure from routine that would signify the introduction of new methods, or additions to those already in existence. The funds available in 1897-98 were "nursed" carefully by municipalities, because it was not till the success of the north-east monsoon was established that all fears of famine had departed; during 1898, there existed the restraining influence of the knowledge that, should plague invade the Presidency, there would be great difficulty in meeting the expenditure required for special measures to combat it.

46. The following statement shows the expenditure for the first nine months of 1898-99:—

Statement showing the estimated income, allotment, and expenditure for sanitary purposes in each Municipality during the year 1898-99.

Districts.	Municipalities.	Population as per census of 1891.	Estimated income, 1898-99.	Rate per cent. of sanitary allotment to estimated income.	Rate per cent. of sanitary expenditure to amount sanctioned.	1898-99.								1897-98.				1896-97.			
						Sanitary allotment.		Conservancy.		Improvement of village sites.		Improvement of water-supply, including cleaning, repairing, &c.		Sanitary arrangements during fairs and festivals.		Construction and repair of markets and slaughter-houses.		Other sanitary objects, including construction and repair of tanks.			
						Expenditure during the 9 months ending December 1898.	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.
Anantapur	Avantapur	6,973	20,840	21.0	58.9	4,390	2,586	2,930	2,409	750	160	110	8	100	100	100	9				
Bellary	Aloni	26,216	36,010	41.3	72.9	11,800	10,851	12,000	9,004	1,000	361	900	876	300	300	300	10				
Bellary	Bellary	57,780	78,980	54.6	61.2	43,110	26,396	37,700	25,043	3,500	1,610	1,610	234	200	200	200	13				
Chingleput.	Chingleput	9,763	13,780	35.1	73.3	4,840	3,550	2,700	1,830	1,900	1,529	240	191	780	780	780	200				
Chingleput.	Conjeveram	42,543	53,020	126.0	71.8	79,580	57,164	13,580	7,934	4,350	1,575	58,910	44,955	2,610	2,610	2,610	2,649				
Chingleput.	Cottabatore	40,007	50,920	12.9	92.8	21,530	20,276	13,330	12,811	4,950	3,840	750	808	70	70	70	154				
Chingleput.	Erde	12,238	17,900	23.7	9.1	4,260	3,840	3,350	3,473	50	28	320	141	50	50	50	79				
Chingleput.	Karur	10,740	19,330	36.1	77.7	6,980	5,427	4,980	3,904	1,800	1,310	100	36	200	200	200	33				
Cuddapah	Cuddapah	17,211	46,300	26.2	106.4	12,130	12,911	8,410	9,273	1,800	1,310	1,220	3,605	200	200	200	155				
Cuddapah	Bothampur	25,493	29,900	40.5	70.5	12,100	8,533	7,530	5,866	2,750	1,901	170	123	100	100	100	121				
Ganjam	Chitrode	18,294	28,500	27.0	67.9	7,710	6,241	5,030	3,156	2,160	1,735	230	170	250	250	250	121				
Ganjam	Parikundi	16,379	13,820	21.6	71.2	2,990	2,128	2,150	1,874	1,760	1,416	170	123	250	250	250	121				
Ganjam	Condam	10,068	11,450	27.3	87.4	31,310	27,515	18,870	15,892	9,200	9,021	1,760	1,416	1,450	1,196	1,450	1,196				
Golavari	Ellur	20,226	37,900	42.2	60.0	16,010	9,611	10,110	6,445	3,100	2,380	540	53	400	400	400	725				
Golavari	Repavandury	28,279	41,150	16.9	64.2	12,391	12,391	13,250	9,650	3,680	1,076	421	236	1,950	1,163	1,950	267				
Kistna	Chitrode	20,611	42,810	36.7	60.3	15,730	9,480	10,740	7,240	3,840	1,830	170	110	800	800	800	280				
Kistna	Guntur	23,267	50,730	45.0	77.2	22,430	17,625	12,870	10,059	7,000	5,185	1,860	1,472	800	461	800	300				
Kistna	Masabalam	38,667	60,430	48.8	58.6	29,540	17,294	16,390	11,412	8,000	3,555	1,360	1,309	1,000	25	9,650	990				
Kurnool	Kurnool	24,306	45,180	26.1	103.9	11,800	12,353	8,500	9,705	2,000	1,445	300	46	1,005	1,073	85	84				
Kurnool	Dindigul	20,115	32,180	11.8	20.9	38,620	8,061	7,300	4,735	3,590	1,377	25,610	1,435	250	72	1,870	227				
Madura	Valasa	87,121	1,88,440	37.1	64.1	62,510	40,104	37,200	25,793	11,000	6,562	4,310	1,750	2,500	300	4,000	1,791				
Madura	Palni	16,940	14,540	53.1	39.4	7,730	3,050	5,780	2,488	1,000	316	200	182	100	31	200	...				
Madura	Periyakulam	16,363	13,840	62.0	56.8	8,580	4,879	5,369	3,080	2,810	1,700	210	90	200	200	200	...				
Madura	Calicut	64,709	71,150	34.0	70.5	24,230	17,106	15,730	10,658	8,500	6,333	900	123	155	158	1,040	827				
Malabar	Cannanore	26,653	30,040	42.0	68.6	12,335	8,696	9,650	6,379	1,550	1,269	170	20	820	225	1,080	730				
Malabar	Coimbatore	16,147	22,530	43.2	63.9	9,740	6,228	5,400	4,316	2,270	945	100	...	28	24	410	284				
Malabar	Palghat	39,367	65,740	29.2	51.5	19,226	10,476	12,550	5,815	6,040	4,372	100	...	50	24	430	84				
Malabar	Idukerry	20,631	49,490	25.3	53.2	12,556	6,703	10,000	5,795	2,000	900	50	...	50	24	430	84				
Nellore	Nellore	29,128	42,050	40.6	56.4	17,690	9,644	10,680	7,548	5,360	1,595	100	323	40	698	828	180				
Nellore	Onore	10,832	13,540	51.7	54.7	7,012	3,886	4,310	2,479	1,534	854	500	720	850	700	700	67				
Nellore	Chittoor	5,886	44,370	52.1	53.9	23,157	12,482	13,369	7,360	7,350	3,639	888	888	850	700	700	67				
Nellore	Chittoor	13,961	1,46,770	75.2	75.0	1,11,905	83,937	37,230	23,478	20,100	14,546	14,030	12,693	1,015	806	39,530	83,916				

Statement showing the estimated income, allotment, and expenditure for sanitary purposes in each Municipality during the year 1898-99—cont.

Districts.	Municipalities.	Population as per census of 1891.	Estimated income, 1898-99.	Rate per cent. of sanitary allotment to estimated income.	Rate per cent. of sanitary expenditure to amount sanctioned.	1898-99.													
						Sanitary allotment.		Conservancy.		Improvement of village sites.		Improvement of water-supply, including cleansing, repairing, &c.		Sanitary arrangements during fairs and festivals.		Construction and repair of markets and slaughter houses.		Other sanitary objects, including construction and repair of tanks.	
						Expenditure during the 9 months ending December 1898.	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.	
North Arcot.	Gudiyattam	18,745	17,850	44.3	43.5	Rs. 7,910	5,230	3,128	1,300	138	280	171	10	636	690	400	400		
	Tirupati	14,238	2,56,940	3.3	76.9	8,410	5,020	4,377	1,650	1,293	620	159	400	50	670	670	670		
	Vellore	44,724	61,560	50.2	51.6	30,940	16,720	12,941	5,850	1,153	610	617	...	2,100	5,660	1,370	1,370		
	Wálpjet	10,485	16,120	37.7	42.7	6,080	2,599	2,841	1,000	1,821	320	383	...	200	810	810	...		
Salem.	Salem	67,640	72,560	41.9	61.6	30,397	18,735	15,647	3,000	1,821	1,370	1,239	...	2,120	387	387	128		
	Tirupattúr	16,463	26,690	44.1	57.9	11,780	8,840	4,854	2,250	1,494	330	298	...	130	230	111	111		
	Váiyambádi	15,838	21,820	44.7	73.0	9,760	6,630	4,813	2,190	1,618	380	178	...	150	520	401	401		
	Chidambaram	18,634	22,470	47.3	73.7	10,642	6,202	3,808	2,800	2,833	890	555	750	236	164	249	249		
South Arcot.	Cuddalore	47,025	51,290	42.5	74.6	21,800	11,500	8,452	6,100	4,730	960	821	1,500	1,381	230	1,510	728		
	Tiruvannámalai	13,643	21,240	54.5	46.5	11,900	3,740	2,328	3,800	2,058	1,010	855	3,000	239	350	50	50		
South Canara.	Mangalore	40,620	44,540	50.1	67.1	22,320	14,984	7,498	6,360	6,166	100	22	...	750	1,940	860	860		
	Kumbakonam	54,254	1,17,430	64.0	35.0	75,240	29,530	17,961	9,260	5,493	1,210	920	100	600	604	34,540	1,414		
Tanjore.	Mannárgudi	20,392	24,240	42.5	66.8	10,310	6,750	4,118	2,600	1,907	430	344	550	263	300	158	...		
	Máyavaram	23,754	35,810	39.9	76.3	14,310	9,290	6,221	2,800	2,599	970	859	150	181	30	...	...		
	Negapatam	58,573	78,640	48.7	71.7	38,270	25,620	18,519	10,270	7,258	1,980	1,461	300	127	1,070	1,060	1,060		
	Tanjore	54,258	1,10,860	67.5	43.0	74,860	24,210	17,110	500	480	47,240	13,570	600	220	2,300	800	800		
Tinnevely.	Palamcottah	18,612	24,430	39.3	66.7	9,600	6,405	5,142	900	985	140	110	190	147	120	109	59		
	Srivilliputtúr	29,541	30,440	26.7	67.9	8,140	6,010	3,712	1,410	670	380	87	150	6	150	103	103		
	Tinnevely	24,756	28,010	57.9	69.3	16,797	10,524	6,891	3,900	2,841	549	460	60	692	1,082	878	878		
	Tuticorin	24,964	40,100	52.9	78.5	21,206	13,870	10,665	5,950	3,959	1,286	1,216	50	10	50	602	602		
Tribi-nopoly.	Srirangam	21,632	26,480	48.5	66.5	12,850	9,310	6,310	2,150	1,555	240	97	1,050	492	100	92	92		
	Trichinopoly	69,666	1,43,100	55.1	87.1	78,920	42,270	36,034	12,000	10,643	21,800	20,774	1,250	686	1,600	626	626		
Vizagapa-tam.	Anakáppalle	17,001	16,770	46.8	64.6	7,980	5,120	3,452	1,800	1,118	120	89	...	...	350	116	116		
	Bimlipatam	9,686	13,730	36.4	54.0	5,000	3,300	2,609	1,250	1	4	4	...	300	450	450	450		
	Vizagapatam	33,961	1,02,030	296.8	6.3	2,92,660	17,520	11,900	7,000	4,220	2,62,730	423	...	...	4,730	1,965	1,965		
	Vizianagaram	30,735	30,800	57.2	69.8	17,630	9,830	7,245	4,500	2,595	1,120	444	120	...	2,060	1,971	1,971		
Total for 1898		1,687,563	29,50,220	53.2	53.8	15,71,540	8,44,931	4,98,175	2,30,254	1,52,042	4,67,094	1,20,315	13,490	7,480	13,545	8,249	58,670		
Total for 1897		1,687,563	33,26,120	63.6	55.4	20,52,373	11,37,397	4,63,861	2,78,375	1,63,353	9,48,885	4,07,095	13,760	10,085	40,111	13,766	79,237		
Madras City		436,375	13,48,150	62.6	63.9	8,44,481	5,35,451	2,96,000	72,262	52,941	53,864	13,303	140	104	80,770	28,492	1,91,455		
																	1,48,611		

	1897-98.		Rate per cent. of expenditure to total allotment.	1898-99.		Rate per cent. of expenditure to total allotment.
	Amount sanctioned.	Amount expended.		Amount sanctioned.	Amount expended during the nine months ending December 1898.	
	RS.	RS.		RS.	RS.	
For conservancy	6,47,324	6,27,947	97.0	7,10,095	4,98,175	70.2
For improvement of village or town sites	2,83,930	2,45,734	86.5	2,39,254	1,52,042	63.5
For improvement of water-supply, cleansing, repairing, and construction of tanks and wells	9,75,921	4,98,620	51.0	4,67,094	1,20,315	25.8
For sanitary arrangements during fairs and festivals ..	13,411	11,923	88.9	13,490	7,480	55.4
For construction and repair of markets and slaughter-houses	39,684	23,561	59.4	19,545	8,249	42.2
For other sanitary outlay ..	1,19,889	1,07,783	89.9	1,22,062	58,670	48.0
Total ..	20,80,159	15,15,568	72.9	15,71,540	8,44,931	53.8

Districts.	Municipalities.	Population as per census of 1891.	Sanitary inspectors.	Sanitary overseers.	Sanitary masteries.	Sanitary peons.	Sweepers for cleaning roads, streets, &c.	Toilets for cleaning public latrines.	Toilets for private scavenging.	Private latrines.		Carts.			Public latrines.				Dust-bins.			
										Total number in town.	Number cleaned by the municipal toiles.	Night-soil.	Rubbish.	Sewage.	Puka built.	Brick-wall enclosures.	Mud-wall enclosures.	Tatty.	Wooden.	Masonry.	Iron.	Tank watchers.
Anantapur	Anantapur	6,973	1	...	...	2	14	8	3	1,40	138	1	3	...	2	4	2	...	...	26	46	...
Bellary	Adoni	26,216	1	...	3	6	30	29	16	1,500	884	12	12	3	6	10	4	...	...	74	51	5
Bellary	Bellary	57,780	8	...	...	23	68	30	24	2,492	1,392	32	38	...	23	...	6	...	...	285	95	4
Chingleput	Chingleput	9,763	1	...	...	1	14	4	4	500	162	2	6	...	5	3	...	...	...	24	26	...
Chingleput	Cujiveeram	42,543	1	4	...	1	48	14	17	2,850	994	9	24	...	22	9	...	...	...	376	163	...
Coimbatore	Coimbatore	46,007	3	1	1	7	76	28	27	900	460	15	27	5	14	4	10	...	...	...	83	1
Coimbatore	Erode	12,238	1	...	...	5	25	16	7	700	450	11	12	3	3	6	8	2	...	46	118	1
Cuddapah	Karur	10,740	2	...	1	3	30	12	6	520	320	2	7	1	4	...	11	...	...	25	60	...
Cuddapah	Cuddapah	17,211	2	...	1	6	30	25	17	...	945	4	12	1	22	2	7	5	...	183	12	...
Ganjām	Berhampur	25,493	5	...	4	...	61	23	26	...	616	1	11	11	2	5	17	...	§ 27	71	34	2
Ganjām	Chitacole	18,204	1	1	1	4	39	5	18	400	354	2	10	2	6	8	1	...	...	28	31	3
Ganjām	Purakimedi	16,379	1	...	1	3	29	7	20	400	150	...	7	1	...	10	...	...	...	...	63	4
Gajávati	Cocunala	40,068	3	...	...	6	49	40	35	...	950	7	12	3	8	...	...	...	...	...	135	9
Gajávati	Ellore	29,296	5	...	...	5	63	11	13	500	483	2	10	3	2	9	1	7	...	43	54	4
Gajávati	Rajthumndry	28,279	2	1	1	7	49	26	35	...	1,043	2	7	6	2	...	6	...	23	95	70	4
Kistna	Bozwada	20,611	1	6	1	6	33	20	14	700	550	7	14	6	2	...	...	...	...	...	179	...
Kistna	Guntur	23,267	1	...	4	6	44	35	23	1,194	1,145	24	24	3	21	...	...	...	...	...	78	...
Kistna	Masulipatam	38,667	2	1	3	2	75	7	13	1,000	367	5	31	3	5	8	...	...	...	3	...	...
Kurnool	Kurnool	24,306	1	...	1	8	40	17	16	1,763	830	3	5	1	40	...	...	...	...	255	...	...
Kurnool	Dindigul	20,115	1	...	2	1	23	19	10	532	382	5	15	6	2	...	...	...	...	24	17	6
Madura	Madura	37,121	10	...	...	12	68	76	29	12,500	1,934	30	67	...	...	...	...	...	...	54	340	...
Madura	Palni	16,940	1	...	...	3	9	6	10	1,272	861	3	8	...	1	6	1	...	...	...	...	...
Madura	Perivakulam	16,363	...	...	...	2	8	7	9	1,000	724	4	9	...	...	...	...	...	...	13	75	2
Malabar	Calicut	64,798	1	4	...	...	81	31	27	...	1,277	18	20	3	...	1	9	...	...	20	121	1
Malabar	Cannanore	26,653	1	2	...	2	48	17	14	...	527	9	23	...	12	...	...	...	...	20	14	...
Malabar	Cochin	16,147	1	4	...	2	23	24	16	...	299	...	23	...	8	...	...	...	...	24	14	...
Malabar	Palghat	39,367	1	...	...	2	48	18	20	1,000	885	12	27	...	10	...	...	...	...	24	14	...
Malabar	Tellicherry	26,631	1	...	4	...	23	14	20	...	525	5	4	...	4	...	...	...	...	...	161	...
Nellore	Nellore	29,128	2	...	9	...	54	27	21	1,275	942	10	18	4	...	...	...	...	...	66	189	1
Nellore	Ongole	19,832	1	...	1	2	20	8	8	...	300	1	3	2	...	7	...	...	...	52	29	1
Nilgiris	Coonoor	5,686	1	...	2	...	16	7	10	148	148	8	8	2	12	...	...	...	...	...	67	...
Nilgiris	Ootacamund	13,991	4	2	8	...	76	24	22	520	370	30	17	5	48	...	...	...	...	...	226	...

† Metal.
† Iron.
* Corrugated iron.

Table showing the conservancy establishment and plant available in each Municipality during 1898—cont.

Districts.	Municipalities.	Population as per census of 1891.	Sanitary inspectors.	Sanitary overseers.	Sanitary maistries.	Sanitary ponds.	Sweepers for cleaning roads, streets, &c.	Latrines for cleaning public latrines.	Toilets for private scavenging.	Private latrines.			Carts.			Public latrines.			Dust-bins.			
										Total number in town.	Number cleaned by the municipal bodies.	Night-soil.	Rubbish.	Sewage.	Puka built.	Brick-wall enclosures.	Mud wall enclosures.	Tatty.	Wooden.	Vasantry.	Iron.	
North Arcot	Guduvātam	18,745	1	...	5	...	19	17	4	439	439	3	12	...	8	4	2	...	...	100	74	
	Tirupati	11,238	1	...	3	...	36	13	7	510	197	4	16	...	3	1	...	...	145	35		
	Vellore	44,724	6	...	...	7	40	48	24	2,016	889	10	29	...	2	1	28	...	309	271		
	Wallajpet	10,455	1	...	1	...	1	19	9	8	1,000	550	3	6	...	9	...	...	440	...		
Salem	Salem	67,649	3	...	11	...	140	67	34	1,136	1,136	17	30	...	15	10	27	...	37	248	...	
	Tirupattūr	16,463	1	...	3	...	40	19	21	3,063	997	19	8	...	...	1	10	...	...	151	...	
	Vaniyambādi	15,538	2	...	5	...	44	12	14	3,500	629	22	17	...	...	1	6	...	...	150	...	
	Chidambaram	18,634	1	...	6	...	22	18	9	9	498	498	9	11	...	3	2	...	165	115		
South Arcot	Cuddalore	47,025	7	...	...	6	57	28	8	570	511	16	29	...	13	...	...	12	23	187	173	
	Tiruvannāmalai	13,613	1	...	...	8	28	1	3	1,000	106	10	6	...	1	...	...	...	10	82	...	
	Mangalore	40,620	1	...	8	...	1	30	8	29	4,234	2,413	5	5	...	1	8	...	73	78	...	
	Kumbakonam	54,254	5	...	...	15	36	21	57	...	1,679	19	35	...	...	21	...	...	308	...		
Tanjore	Mannārzudi	20,392	1	...	3	...	38	9	...	600	308	3	11	...	8	...	...	...	18	72	...	
	Mayavram	23,751	2	...	...	6	17	7	18	834	834	5	17	...	2	4	...	4	179	39	...	
	Negajpetam	58,573	6	...	1	...	15	103	20	103	5,000	2,557	11	17	...	18	9	14	498	135	...	
	Tanjore	54,258	2	...	4	...	18	53	65	24	1,150	1,150	16	30	...	...	...	...	173	69	...	
Tinnevely	Palmettāh	18,612	1	...	2	...	3	9	10	36	3,500	2,517	30	9	...	6	2	...	74	74	...	
	Srivillipattūr	21,541	1	...	2	...	4	24	9	6	1,000	451	3	3	...	4	1	...	28	26	...	
	Tinnevely	24,756	2	...	2	...	7	45	13	19	300	1,980	6	10	...	9	6	...	15	161	...	
	Tuticōm	21,964	3	...	...	...	5	32	9	20	1,222	1,222	12	10	...	6	7	...	15	178	...	
Trichinopoly	Srirangam	21,632	3	...	...	7	14	24	10	1,179	1,179	9	19	...	1	...	13	...	60	128	...	
	Trichinopoly	86,666	10	...	...	19	64	84	104	4,959	4,959	22	62	...	2	8	4	72	1	212	176	...
Vizagapatam	Anakāpalle	17,001	...	1	7	...	29	28	8	180	180	12	5	...	...	...	...	...	5	116	...	
	Amilipattam	9,695	1	...	...	2	42	6	20	320	300	...	...	...	...	...	...	...	29	1	...	
	Vizagapatam	33,961	3	...	...	...	119	57	53	1,414	1,163	14	21	...	...	5	36	...	180	191	...	
	Vizianagaram	30,735	4	...	11	...	46	101	28	1,320	1,000	5	30	...	2	30	...	...	11	310	...	
Total for 1896		1,687,563	136	60	127	294	2,534	1,265	1,261	74,238	51,261	580	947	124	477	280	265	183	83	1,776	5,918	154
Total for 1897		1,687,563	168	29	128	292	2,468	1,215	1,217	52,634	44,195	565	931	130	463	305	215	197	569	4,524	5,362	162
Madras City		486,375	7	20	49	183	1,820	275	22	...	13	408	292	215	135	90	...	...	...	714	76	...

• Sanitary Maistries or Ward Sub-Inspectors. † Slaughter-house Superintendents. ‡ Conservancy Inspectors. § Iron.

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Sanitary Maistries or Ward Sub-Inspectors.

† Slaughter-house Superintendents.

Inspectors. § Iron.

47. The following table shows the changes in staff and plant that have been secured since 1893 :—

Years.	Sanitary Inspectors.	Sanitary Overseers	Sanitary Maistries.	Sanitary peons.	Sweepers for cleaning roads, streets, &c.	Toties for cleaning public latrines.	Toties for private scavenging.	Private latrines.	
								Total number in town.	Number cleaned by the Municipalities.
1	2	3	4	5	6	7	8	9	10
1894	176	38	147	270	2,356	1,097	1,008	35,352	35,252
1895	166	47	116	305	2,390	1,104	982	59,650	38,310
1896	154	58	133	275	2,463	1,149	1,121	68,164	42,247
1897	168	29	128	292	2,468	1,215	1,217	52,634	44,198
1898	136	60	127	294	2,534	1,265	1,264	74,238	51,261

Years.	Carts.			Public latrines.				Dust bins.		
	Night soil.	Rubbish.	Sewages.	Puck built.	Brick-wall enclosures.	Mod-wall enclosures.	Tatty.	Wooden.	Masonry.	Iron.
	11	12	13	14	15	16	17	18	19	20
1894	404	772	97	424	261	220	256	516	4,453	4,332
1895	467	856	105	431	273	211	272	410	4,757	4,926
1896	509	875	123	451	288	233	199	700	4,744	4,977
1897	566	931	130	463	305	215	197	569	4,524	5,362
1898	580	947	134	477	280	265	183	83	4,776	5,918

It will be observed that there has been a decided advance in the essential matter of night-soil conservancy, as expressed by the larger staff employed for public and private scavenging, public latrine accommodation, and night-soil carts. The supervising staff of Sanitary Inspectors and maistries has been decreased in quantity, in favour of quality.

48. In my report for 1895, I drew attention to the advantage that would accrue to municipalities not provided with a sewerage system and not likely to be in a position to undertake a complete scheme, by introducing the Shone's system permanently for night-soil disposal by pail depots and, subsequently, by gradual extension, for receipt of sewage from areas within a reasonable distance of these depots. Since then, I have been in communication with Messrs. Ault & Sons, the patentees, who agree with me as to the practicability of the method. An estimate was framed for the town of Bellary showing that the total night-soil of a population of 59,467 could be discharged upon farms outside the town at an initial cost of annas 12 per head. This suggestion must not be confused with the use of the Shone's system for a complete sewerage scheme. The proposal looks solely to disposal of night-soil in a more cleanly and expeditious manner than at present by the cart system, whilst sewage can be added for section after section of the town as funds or inclination decide. Such a method, of course, ought not to be applied, when a complete scheme, intended to deal with night-soil as well as sullage water, can be afforded within a reasonable period. Its correct place would be the serving of towns which are in debt for water schemes, and are not likely to be able to find funds for complete sewerage during this generation.

49. In the sanitary history of municipalities, during the year, the "typhoid fever scare" at Ootacamund attracted some public attention. The cases were but few: the social position of the patients, however, induced considerable publicity. The fact that sporadic cases of typhoid fever are not unknown in Ootacamund, has been recognized for many years. This being so, I sought in my Inspection Notes in 1893 and in 1896, and, again, in discussions with the Collector, Chairman of the

Municipality, and Sanitary Board, in 1896, to force upon notice those improvements connected with the protection of the water-supply, night-soil conservancy, milk supply, and clothes washing, which the existence of this special disease obviously demanded. In face, however, of the good health of the station in those years, these warnings were regarded by some of the officials concerned as due to the theoretical tendencies of the votaries of sanitation. Nevertheless, Government took the matter into consideration, with the result that much data have been laboriously collected in regard to improvement of the water-supply, certain urgent defects as to the main sewer have been attended to, and a scheme for sewerage has been worked out. The lesson derived from the incident is that it is difficult for municipalities to comprehend that the function of the sanitarian is not solely to deal with epidemics that are existent, but to give timely warning of the defects that may bring them about. As stated under "Personal Proceedings," the investigation of the occurrence of typhoid fell to Major Thomson, I.M.S., who acted during my absence on leave. He submitted a valuable report on the subject, which confirmed the sanitary pleadings of myself and my Deputy during the preceding years.

50. The income derived by municipalities by the sale of night-soil is gradually undergoing an increase, as the utility of this form of manure is better appreciated; money realized by sales at the end of this decade has exceeded that at its opening by about Rs. 10,000. I regret that I can place on record no further advance as to sewage farming. It was practised in the following towns:—Madras, Erode, Tanjore, Anakápalie and Vizagapatam. Tinnevely purchased a plot of ground, but, beyond this, took no further step in the matter.

51. The question of improving the condition under which sewage farming shall be conducted at Tanjore, still engages the attention of the Sanitary Board.

52. Filtration of sewage is conducted at Vizianagram, Vizagapatam, Kumbakonam, Bezwada, Negapatam and Rajahmundry, and on a small scale at Bellary. A Sanitary Inspector engaged on plague duty has also informed me that he successfully introduced this method in certain villages for disposal of sewage, where no regular system for removal existed. Sewage filtration (by means of "filter trenches") is recognized in the official regulations as the method to be adopted in the health camps, during plague operations.

53. In Madras City, night-soil and rubbish disposal continued under the usual unsatisfactory conditions. The incinerator, which will deal with part of the rubbish, was under construction. In Mylapore, an under-ground sewerage system was completed. I regret to say the principle of receiving sullage water, to the exclusion of night-soil, was adopted.

DISTRICT BOARDS.

54. The Act for Local Fund areas is, I understand, in a state of revision that will shortly permit its appearance. If it embraces certain of the points I anticipate, it will bring about an enormous advance of sanitation in rural areas, and provide the requisite funds. At present, the necessity for husbanding funds for plague purposes, mentioned in reference to municipalities, was more marked in District Boards. The result was a fall off in the amounts allotted for sanitary purposes of a routine nature. The following table will show that the sums allowed by various districts differed within wide limits, the proportion of income allotted in certain of these being absolutely inadequate. The President of one of the Boards, which gave a contribution to which this term may be safely applied, has defended this position by pointing to some absurdities in the way of attempts at conservancy in villages; but, with the same breath, allows that such results are due to want of supervision, ignoring the simple fact that did his Board allot sufficient funds supervision could be obtained. Per head of population served, the total expenditure by District Boards upon sanitation during 1897-98 amounted to only 3.1 pies or about one farthing at current exchange:—

District Boards.	Population as per census of 1891.	Area in square miles.	Number of villages in the circle.	Number of villages conserved.		Estimated income of 1897-98.	Rate per cent. of allotment to estimated income.	Rate per cent. of sanitary expenditure to allotment.	1898-99.			
				Number of unions.	Number of villages.				Sanitary allotment.		Conservancy.	
									Allotment.	Expenditure.	Allotment.	Expenditure.
1	2	3	4	5	6	7	8	9	10	11	12	13
Anantapur ...	720,346	5,275	965	11	12	RS. 1,25,550	11.5	63.0	RS. 14,450	RS. 9,104	RS. 9,740	RS. 7,041
Bellary ...	806,489	6,136	795	21	...	2,22,380	8.3	68.2	18,530	12,640	14,830	11,190
Chingleput ...	1,147,595	2,812	2,134	18	6	2,37,650	9.7	70.2	23,139	16,239	11,586	8,248
Coimbatore ...	1,931,926	7,860	1,478	20	17	3,95,520	8.3	55.6	32,712	18,196	16,837	13,147
Cuddapah ...	1,254,510	8,722	1,276	17	35	2,50,820	6.7	61.6	16,710	10,298	11,730	8,838
Ganjām ...	1,836,234	8,370	6,037	15	7	2,97,250	4.5	61.2	13,270	8,125	9,760	6,688
Gōdāvari ...	1,980,215	7,857	2,603	26	92	7,38,530	10.8	42.2	79,560	33,571	26,620	20,057
Kistna ...	1,772,479	8,397	1,848	28	19	6,31,420	6.6	51.0	41,790	21,337	25,610	18,755
Kurnool ...	793,354	7,514	802	18	7	1,93,530	9.0	52.4	17,550	9,199	10,570	7,816
Madura ...	2,467,223	5,024	4,103	37	23	5,22,280	14.3	49.2	74,813	36,862	37,140	24,700
Malabar ...	2,163,078	5,585	2,215	...	18	4,59,090	0.9	60.0	4,348	2,611	838	1,341
Nellore ...	1,123,397	8,765	1,793	15	19	3,20,670	7.7	60.8	21,715	15,034	6,797	5,006
Nilgiris ...	77,188	957	52	...	6	1,52,630	2.2	61.7	3,343	2,062	1,920	1,377
North Arcot ...	2,025,393	7,616	4,328	21	41	4,14,990	7.7	56.8	32,034	18,207	18,046	12,835
Salem ...	1,861,813	7,529	3,811	34	12	3,74,530	13.2	68.6	49,445	33,937	26,147	18,599
South Arcot ...	2,083,034	5,217	2,897	21	8	4,05,640	12.2	62.9	49,414	31,074	22,320	15,673
South Canara ...	1,011,382	3,902	1,277	...	19	2,35,320	4.0	46.7	9,338	4,358	3,760	2,627
Tanjore ...	2,015,850	3,709	3,550	19	20	8,67,150	4.4	64.6	38,600	24,939	28,922	20,297
Tinnevelly ...	1,817,829	5,387	1,538	34	38	4,88,250	15.3	49.9	74,024	37,279	41,017	27,329
Trichinopoly ...	1,260,128	3,631	1,502	13	30	2,74,150	8.2	61.7	22,615	13,957	13,460	9,520
Vizagapatam ...	1,850,802	4,619	2,668	15	15	3,55,050	4.8	63.5	16,997	10,803	11,200	8,080
Total for 1898 ...	32,603,685	124,914	47,703	383	444	79,62,700	8.3	56.2	6,57,396	3,69,832	3,48,870	2,49,164
Total for 1897 ...	31,592,647	124,914	44,678	377	469	79,10,730	8.4	58.3	6,63,259	3,88,481	3,47,265	2,48,065

District Boards.	1898-99—cont.									
	Improvement of village sites.		Improvement of water-supply, including cleansing, repairing, and construction of tanks and wells.		Sanitary arrangements during fairs and festivals.		Construction and repair of markets and slaughter-houses.		Other sanitary objects, including construction and repair of latrines, dust-bins, drains, &c.	
	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.	Allotment.	Expenditure.
	14	15	16	17	18	19	20	21	22	23
Anantapur ...	Rs. 930	Rs. 113	Rs. 1,990	Rs. 1,025	Rs. 300	Rs. 122	Rs. 173	Rs. 1,490	Rs. 630	Rs. 630
Bellary ...	420	...	1,450	970	220	170	170	1,470	140	140
Chingleput ...	3,596	2,245	4,404	3,551	1,350	780	231	1,912	1,314	1,314
Coimbatore ...	2,026	496	6,219	1,285	875	589	4,264	1,833	2,491	846
Cuddapah ...	470	106	3,140	835	340	97	720	96	310	326
Ganjām ...	1,400	431	1,070	854	320	15	...	...	700	137
Gōdāvari ...	9,800	5,114	19,220	4,134	1,510	324	19,730	3,573	2,680	369
Kistna ...	4,550	659	9,860	1,666	1,190	224	...	...	580	33
Kurnool ...	990	65	3,600	1,161	720	176	70	...	1,600	463
Madura ...	17,345	5,192	7,635	3,290	456	287	9,164	2,967	3,073	426
Malabar ...	90	...	1,430	206	290	213	1,150	821	550	30
Nellore ...	3,028	1,360	14,033	8,220	430	423	...	...	397	25
Nilgiris ...	800	78	423	282	...	...	...	...	200	325
North Arcot ...	936	1,142	6,503	2,619	1,938	1,148	1,670	192	2,940	271
Salem ...	7,470	4,209	6,503	3,810	515	208	7,161	6,418	1,649	693
South Arcot ...	3,122	934	22,224	13,638	769	239	...	...	979	560
South Canara ...	...	...	2,450	330	1,700	920	1,603	173	425	308
Tanjore ...	2,375	859	4,595	2,036	1,801	1,472	...	...	907	275
Tinnevely ...	13,804	3,003	8,395	2,406	1,826	1,557	3,904	857	5,078	2,127
Trichinopoly ...	1,396	864	4,052	1,979	388	182	2,437	1,132	882	280
Vizagapatam ...	562	...	2,925	1,250	460	164	706	614	1,144	479
Total for 1898 ...	75,110	26,956	1,32,211	55,547	16,798	8,988	52,950	19,120	31,457	10,057
Total for 1897 ...	79,413	30,872	1,23,672	67,724	17,400	11,005	64,469	16,974	31,040	11,835

	1897-98.		Rate per cent. of expenditure to total allotment.	1898-99.		Rate per cent. of expenditure to total amount.
	Amount sanctioned.	Amount expended.		Amount sanctioned.	Amount expended during nine months ending December 1898.	
	Rs.	Rs.		Rs.	Rs.	
For conservancy ...	3,49,406	3,10,256	88.8	3,48,870	2,49,164	71.4
For improvement of village or town sites ...	78,504	36,216	46.1	75,110	26,956	35.9
For improvement of water-supply, cleansing, repairing, and construction of tanks and wells ...	1,51,421	1,17,178	77.4	1,32,211	55,547	42.0
For sanitary arrangements during fairs and festivals ...	17,838	16,616	93.1	16,798	8,988	53.5
For construction and repair of markets and slaughter-houses ...	65,149	43,318	66.2	52,950	19,120	36.1
For other sanitary objects ...	32,730	23,194	70.9	31,457	10,057	31.9
Total ...	6,95,348	5,46,778	78.6	6,57,396	3,69,832	56.2

55. It is a maxim in sanitation that epidemics do not come to populations as unmixed disasters. They force upon the authorities responsible, facts that much report-making would not convince them of. Should, however, plague persist in this Presidency, before any advantage can take place, the chances are that routine sanitary improvements will be very materially decreased in number and value, owing to the demand for funds. Even the sanguine sanitarian finds at last that it is hopeless reporting to bodies that have no funds to bestow on the improvements he indicates. Not only is advance thus likely to be impeded in sanitary matters proper, but the prophylactic operation of vaccination is likely to receive material check. As will be further explained in the Vaccination Report, the people (more especially of rural areas) have confused anti-plague inoculation with vaccination, with the result that a very heavy decrease in operations has occurred throughout the Presidency. The result must be, in the end, a greater loss of lives by small-pox than can have been saved by anti-plague inoculation. In short, the maxim will doubtless remain true: as an effect of the "plague scare" sanitation in the presidency will advance, but when this will occur the future alone can show, and in the meantime, an approach to stagnation is the immediate result.

56. The following statement shows the extent to which the system of maintaining Village Sanitary Inspection Books has been followed in Unions:—

District.	Remarks by District Sanitary Officers.
Anantapur ..	Owing to the prevalence of plague in the district, there was no time to issue instructions for the maintenance of Sanitary Inspection Books. Steps will be taken to maintain them in the current year.
Chingleput ..	Village Sanitary Inspection Books were supplied to the various unions inspected during the year. These were duly filled in by Major J. C. Maraden, I.M.S.
Coimbatore ..	All union villages were supplied with a copy of Village Sanitary Inspection Book. Entries have been made in each of the books maintained by the union.
Cuddapah ..	The Village Sanitary Inspection Books are not maintained in all the villages. The Chairmen of smaller unions to whom they are supplied do not know English, and have hitherto made no entries whatever.
Ganjām ..	The unions have all been supplied with the Village Sanitary Inspection Book (edited for the first time) at Itchapur, Sompet, Baruwa, Tekkali, Chatrapur, Ganjām, Aska and Russellkonda. It is hoped that the remainder will be edited before the end of the current official year.
Kistna ..	The total number of Village Sanitary Inspection Books compiled during the year was 9. It is hoped that the remainder will be compiled in the course of this year.

District.	Remarks by District Sanitary Officers.
Kurnool	The Village Sanitary Inspection Books were all compiled by me and supplied to union villages only.
Madura	The Village Sanitary Inspection Books are maintained.
Nellore	The Village Sanitary Inspection Books have been maintained for 13 out of 15 unions. No entries have been made by the inspecting officers in the Village Sanitary Inspection Report Book, which is kept up by the Hospital Assistant. The fact has been invariably brought to the notice of the President, Taluk Board, and the President, District Board, in the Sanitary Report communicated to them.
Nilgiris	Village Sanitary Inspection Books in the new form were printed and supplied to the Civil Apothecaries, Gúdalúr and Kotagiri. Progress made in the preparation and maintenance of the Village Sanitary Inspection Book is satisfactory.
North Arcot ..	Owing to the outbreak of plague in the district, the preparation of the remaining Village Sanitary Inspection Book has been retarded. Steps, however, are being taken to edit them as soon as the towns are inspected.
Salem	After the information required by the headings has once been entered, very little care is taken to record any further particulars.
South Arcot ..	The Village Sanitary Inspection Books for Chinna Salem, which were not opened in the previous year, were completed this year. All the books are maintained properly.
Tanjore	The books for all unions are almost completed, and are being sent to the Union Chairmen.
Tinnevely	The Village Sanitary Inspection Book is maintained in only 25 unions. The remaining unions, many of which were newly constituted, have not yet been provided with books. The books were only recently received from the District Board, and will be supplied as soon as the required information is gathered from them.
Trichinopoly ..	Sanitary Inspection Books were provided for all union villages, and, as far as inspection was carried out, the results were satisfactory.
Vizagapatam ..	Village Sanitary Inspection Books have been prepared for all the unions in the district during the year. They will undergo revision during the current year.
Bellary	Owing to the stimulus given by plague, almost all the villages maintain Village Sanitary Inspection Book.

57. The following table exhibits the influence on public health of major sanitary works, as judged by the death-rates recorded in the towns noted therein :—

Statement prescribed by the Government of India in letter No. 10—326, dated 8th December 1894, Home Department (Sanitary), communicated with G.O., No. 2654 L., Mis., dated 20th December 1894.

Name of Municipality.	Date of completion of works of		Average annual death-rate since the introduction of drainage system or water-supply.	Average annual death-rate for the five-year period preceding the introduction of drainage system or water-supply.	Remarks.
	Drainage.	Water-supply.			
Coonoor	January 1893.	...	1893 ... 31.9 1894 ... 31.9 1895 ... 27.9 1896 ... 41.3 1897 ... 43.8 1898 ... 34.6	1888 ... 28.4 1889 ... 26.9 1890 ... 42.7 1891 ... 37.2 1892 ... 37.0	In proportion of total deaths, there is a decided decrease under "Fever," since the introduction of drainage; this is also exhibited under rate per mille of the population.
Cuddapah	...	July 1893.	1893 ... 46.9 1894 ... 33.9 1895 ... 32.9 1896 ... 21.7 1897 ... 28.5 1898 ... 29.7	1888 ... 31.7 1889 ... 30.5 1890 ... 43.0 1891 ... 27.0 1892 ... 38.3	

There is a marked decrease of deaths under cholera, and diarrhoea and dysentery, for the last three years.

Name of Municipality.	Date of completion of works of		Average annual death-rate since the introduction of drainage system or water-supply.	Average annual death-rate for the five-year period preceding the introduction of drainage system or water-supply.	Remarks.
	Drainage.	Water-supply.			
Kumbakonam ...	Oct. 1894.	...	1894 ... 37.5 1895 ... 31.2 1896 ... 34.2 1897 ... 39.9 1898 ... 30.0	1889 ... 34.8 1890 ... 31.6 1891 ... 33.1 1892 ... 29.1 1893 ... 36.2	The scheme did not hold sanitary requirements in view—so much as the "convenience" of the inhabitants. No result is perceptible on the death-rate.
Madura	...	April 1894.	1894 ... 32.6 1895 ... 26.1 1896 ... 23.2 1897 ... 25.6 1898 ... 25.1	1889 ... 31.2 1890 ... 32.7 1891 ... 35.7 1892 ... 29.3 1893 ... 29.9	There is a decrease under cholera.
Madras	...	1872	1872 ... 35.2 1873 ... 36.7 1874 ... 36.6 1875 ... 35.6 1876 ... 39.6 1877 (Famine year) ... 47 1878 ... 34.7 1879 ... 37.4 1880 ... 38.9 1881 ... 35.6 1882 ... 39.1 1883 ... 49.5 1884 ... 36.8 1885 ... 36.2 1886 ... 39.8 1887 ... 37.4 1888 ... 42.0 1889 ... 42.4 1890 ... 58.6 1891 ... 46.0 1892 ... 41.1 1893 ... 36.6 1894 ... 37.7 1895 ... 37.8 1896 ... 35.5 1897 ... 14.8	1867 ... 27.2 1868 ... 23.7 1869 ... 17.5 1870 ... 26.4 1871 ... 28.9	The water-supply and drainage systems of Madras are incomplete, and sanitarily faulty. They meet the "convenience" of certain sections of the community, but sanitarily are of little value.
Ádóni	...	Sept. 1895.	1895 ... 23.6 1896 ... 25.4 1897 ... 37.9 1898 ... 26.5	1890 ... 19.2 1891 ... 44.5 1892 ... 34.7 1893 ... 22.2 1894 ... 24.3	It is too early to pronounce an opinion as to results, as conditions have been complicated by the presence of famine.
Tanjore	...	Oct. 1895 ...	1895 ... 25.5 1896 ... 27.0 1897 ... 25.2 1898 ... 25.5	1890 ... 28.2 1891 ... 29.1 1892 ... 29.2 1893 ... 35.7 1894 ... 26.9	The supply is used side by side with erroneous sources. No utility is as yet discoverable.
Dindigul	...	August 1896.	1896 ... 23.1 1897 ... 22.1 1898 ... 18.9	1891 ... 41.4 1892 ... 20.5 1893 ... 23.5 1894 ... 23.7 1895 ... 21.7	The supply is too small for it to be hoped any influence can be expected.
Trichinopoly ...	...	December 1896, but water supplied from April 1896.	1896 ... 30.4 1897 ... 23.1 1898 ... 30.4	1891 ... 31.6 1892 ... 25.6 1893 ... 36.6 1894 ... 24.4 1895 ... 23.6	There is a decrease under "diarrhoea and dysentery," mixed supplies are still employed.
Conjeeveram ...	...	July 1897 ...	1897 ... 28.3 1898 ... 29.4	1892 ... 32.5 1893 ... 33.0 1894 ... 30.6 1895 ... 33.6 1896 ... 33.3	The period since construction is too short for definite statements, but so far there would appear to be a decrease under "cholera" and "fevers."
Kurnool	...	Oct. 1897	1897 ... 53.2 1898 ... 24.6	1892 ... 55.2 1893 ... 30.2 1894 ... 31.3 1895 ... 30.5 1896 ... 30.4	Period too short to form an opinion.

MECCA PILGRIMAGE.

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MECCA PILGRIMAGE.

58. The Collectors of the Maritime Districts of this Presidency, the British Resident in Travancore and Cochin, and the British Consular Agent at Pondicherry and Karikal, were requested by a circular letter to report if any pilgrims embarked from any of their ports for the Haj at Mecca, in 1898. With the exception of Malabar, all rendered *nil* returns. The information furnished by the Collector of Malabar is abstracted below:—

Name.—S.S. "Cashmere."

Tonnage.—1,695·27.

Date of departure.—8th March 1898.

Number of pilgrims—

Men including 10 passengers treated as pilgrims under the Act	169
Women	33
Children	5
Total	207

Quantity of water allowed per head.—One gallon per head daily.

Amount of floor and air space allowed for each pilgrim.—Ninety-six cubic feet and 16 superficial feet of space for each pilgrim.

All pilgrims and passengers had their own rations; the ship had also rations sufficient for the whole number of crew and pilgrims to last for the voyage, and the same had been inspected by the local Port officer.

SECTION X.

PERSONAL PROCEEDINGS AND GENERAL REMARKS.

59. At the beginning of the year, the Government Order requiring me to devote my attention to plague and famine matters, instead of routine sanitation (G.O., No. 1545 L., Mis., dated 13th August 1897) continued in force. Famine work terminated with attendance at the Famine Conference at Waltair, except that I carried out a tour near Panem and Dhône, Kurnool district, with the object of ascertaining the condition of agriculturists at the termination of famine operations. In February, at the request of the Inspector-General of Prisons, I was deputed by Government to report on the unhealthy condition of the Rajahmundry Jail. The prisoners seemed to me to be suffering from sub-acute beri-beri. The recommendations then made have, I understand, been acted upon with good results. During March, I proceeded to Tungabhadra and, in consultation with the Local Fund Engineer and Collector, advised as to the erection of a railway inspection plague camp. In consultation with Mr. Moss, the officer in charge of the Public Works Workshops, the supply of temporary steam disinfecting machines for present and future requirements of plague was arranged for, and their effectiveness was tested. In this month also, I inspected the railway inspection plague camp at Arkonam. References, at this period, from Government were of a frequency and nature that it was considered advisable by Government I should not undertake touring until further orders; especially as in the state of uncertainty as to future demands on the funds of Local Bodies, practically no good could result from a series of reports on the routine sanitary requirements of localities.

60. In the first week of June, I was granted privilege leave for a period of three months. During this time, Major Thomson, D.P.H. (Camb.), acted for me. Towards the end of June, the presence of typhoid fever in Ootacamund having excited public alarm, Major Thomson proceeded there, and rendered a full report for the information of Government. He was then directed to proceed to Hubli, with the object of examining methods for combating plague, and, at the same time, to ascertain how far suitable measures were being taken to guard the frontier stations of this Presidency. He, consequently, visited Hospet, Adóni and Hubli. In August, plague having appeared at Guntakal, this officer was directed to proceed thither. He inspected the villages of Tiruvallam and Jungalpalli of North Arcot, where plague had been imported from the Mysore Province. He also selected the site for a plague camp at Jalarpet.

61. I resumed charge of the office from Major Thomson in the first week of September. I found Government had directed that a special inspection of Madras City should be conducted, in reference to an unexplainable increase of mortality under the head of "fever," which it was feared might imply that plague had become epidemic, without its being recognized. In conjunction with the Health Officer of the Municipality (Lieutenant Cornwall, I.M.S.), I conducted a house-to-house inspection in various typical localities. This inspection occupied several days: its result is referred to under "Fever." On the 14th September, I proceeded to the villages of Guntakal and Timmancherla in the Anantapur district, and Chippagiri in the Bellary district. In these, indigenous plague had appeared. This occupied up to the 25th of that month. During September, a position of this office with respect to the Plague Commissioner is thus defined, in the Government Order directing his appointment (G.O., No. 1122 P., dated 20th September 1898):—"The Sanitary Commissioner and the officers in his Department shall give every possible assistance to the Plague Commissioner in the conduct of his duties, lending him their assistance and advice to the utmost of their power, and carrying out his orders."

62. In October, I was directed by Government to supply a scheme for the defence of the City of Madras against plague, in consultation with the President, and subsequently was desired by the Plague Commissioner to report on various sites intended for Municipal plague hospitals and camps, and caste hospitals. During this month, it being found, in respect to the personnel for the scheme for maintaining a system of observation in districts "imminently threatened" with plague, that the Certificated Sanitary Inspectors available were insufficient in numbers, with the sanction of Government, I trained and examined 59 men as Temporary Sanitary Inspectors, in reference to the legal and sanitary requirement and methods in respect to plague, and sufficiently as to general sanitation to enable them to grasp the main particulars as to conservancy, water-supply, and the hygiene of dwellings, etc. On November 10th, I returned to the plague-infected areas round Guntakal, and remained there till the 14th. On that date, at the special request of the Collector of South Arcot, I proceeded to Tiruvannamalai, with reference to preparations against importation of plague at the important annual festival at that place. On the 25th November, I proceeded to inspect the railway inspection station at Hospet, and the frontier road stations in the district of Bellary, as the Bellary district seemed threatened by invasion from H.H. the Nizam's territory. I proceeded to Kopbal in the Nizam's territory, and ascertained the extent to which plague was prevalent. Kamalapur, Hosur and Taliari ghat were inspected. The town of Bellary was carefully examined in reference to its preparations against plague, and the Municipal Council was met and conferred with. On the 1st December, I proceeded to Bangalore to give evidence before the Plague Commission. On the 16th December, I proceeded to Guntakal, and accompanied the Plague Commission during its inspection. By this time, Mr. Buckley, I.C.S., had been appointed Plague Commissioner; with him I inspected Maddikera, a village in the Kurnool district, where plague had appeared. From thence I proceeded to Gooty, where I met the Union Panchayat and the chief inhabitants of the town in reference to plague preparations. I then inspected the railway inspection camp at Tungabhadra. For the rest of the month, I was occupied in inspecting the plague-infected areas of Peddahotur and Molagavalli. During my inspection of Gooty, Hospet and Bellary, I undertook plague inoculation.

63. In accordance with the usual custom in this Presidency, a written report was submitted on the result of each inspection made. In addition to this and routine sanitary and vaccination correspondence, special references for sanitary opinions from Government and local authorities (Collectors, Municipalities and District Boards) were frequent, and exceptionally large in number.

64. Practically, Major Bannerman, the incumbent of the office of Inspector of Vaccination and Deputy Sanitary Commissioner, was not available for duty within the Presidency longer than four and half months, in the aggregate, during the whole year. He, however, during his absence, conducted his usual share of office work, in connection with the Vaccination Department. He continued to attend the laboratory of M. Haffkine for instruction in the making of plague prophylactic serum until 19th April 1898, when, after a temporary stay in Madras, he was placed at the disposal of the Government of India, for duty in Calcutta. He returned to Madras on the 31st August 1898, when he was placed on special duty in the town of Madras for the introduction of anti-plague inoculation. He devoted himself to this work with much zeal, and, by means of popular lectures and demonstrations of the method, he did work of great importance in persuading the people to submit to this operation. The people displayed particular confidence in his methods. Three medical officers specially engaged for plague duty were also placed at his disposal, together with one lady Civil Apothecary. With this staff from September to the end of the year, 5,655 cases had been inoculated in the City of Madras.

65. The endeavour to provide an educated class of Certificated Sanitary Inspectors in this Presidency, in lieu of the so-called "Sanitary Inspectors" of the old type, whose comprehension of their functions usually extended no further, in sanitary matters, than to see that the conservancy staffs were at their posts, whilst even this useful duty was interfered with by Chairmen requiring of them the duties of tax-collectors, has progressed favourably. Gradually, under the ruling that those who had no more than five years' service must qualify or leave their posts,

men who have undergone a fair training in theoretical and practical hygiene have replaced them. Inspection of their diaries (which form their media of communication with Chairmen of Municipalities) shows that many thoroughly sound suggestions have been excogitated. They now form a distinct factor in the sanitary advance of the Presidency, in that, having adopted sanitation as a profession, they have influence amongst the inhabitants in bringing hygienic truths home to them. But, whilst this advance has been secured in Municipalities, it seems most unreasonable that Local Fund areas should, with few exceptions, be unprovided with any staff that can deal with sanitary matters. It is to be hoped that the introduction of the revised Local Boards Act (Madras Act No. V of 1884) will secure the necessary funds and organization. The movement has attracted a well-educated and respectable class of young men, and, if nothing occurs "to put back the hands of the clock," the profession of a Certificated Sanitary Inspector in this Presidency should be one which should carry with it much respect. From the class assembled in 1898, not less than 55 Matriculates were rejected, on account of the want of sufficient accommodation. In the meantime, there is a tendency for men of still better educational status to undertake sanitary work, who find themselves debarred from obtaining any qualification other than that of the Licentiate of Sanitary Science of the Madras University, which can only be given to medical men. Whilst I hold that for the post of administrative Health officers, it is essential that a medical education should be undergone, I do not see that it is requisite where executive sanitary work is required. Given a good general education as a foundation, an excellent executive staff could be evolved, by demanding a special course of study from those who have not been put to the unnecessary toil of being qualified as medical men in the first place. In this connection, it must be remembered that there are large numbers of well-educated young men available,* whose services could be secured at a considerably smaller sum than qualified medical men—possessed of the same general educational status. Under these circumstances, I have placed myself in communication with the Director of Public Instruction (owing to whose liberal views of matters educational, it has been possible to adapt existing examinations for the requirement of Sanitary Inspectors) with the object of ascertaining whether it is not possible to place before Government a scheme for a higher grade of sanitary executive officers. My suggestion is that candidates should have passed the F.A. examination, and that thereafter they should undergo a course of twelve months' training in subjects that would go towards making the necessary ideal standard. I believe, in this period, it would be possible to impart to them the main truths of theoretical and practical chemistry, bacteriology, physiology, pathology, medical diagnosis (human and veterinary), sanitary engineering, and general sanitation, that would render them valuable acquisitions to the sanitary service of the Presidency. Such a movement demands, on the one hand, that it should be possible to give a special diploma, and, on the other, that Government will insist on Local Fund bodies following the example of Municipalities by employing sanitary staffs. My report embodied in G.O., No. 435, Public, dated 17th April 1897, shows that a Vaccine Institute could be maintained and a complete sanitary and vaccination staff be organized, at an increase over present demand upon municipal income of 1.82 per cent., and a total cost for District Boards that would be covered by 4.85 per cent. upon their incomes.

66. Up to the end of the year, 64 Certificated Sanitary Inspectors were employed in Municipalities, 12 in District Boards, and 69 were on special plague duty. In not a single instance was any complaint received as to the conduct of any Certificated Sanitary Inspector. Of the 98 temporary Sanitary Inspectors on plague duty, it cannot be said that all were equally efficient, or that no complaints were received as to them. Nevertheless, considering the hasty manner in which it was necessary to select and train them, I think they proved of very great utility. Six Certificated Sanitary Inspectors were, after two months' training in the Mysore Government Vaccine Institute, admitted to the Vaccination Department as Deputy Inspectors of Vaccination.

* During the last five years the Madras University conferred the degree of B.A. in 2,120 instances.

67. In reference to plague administration, Government adhered to the principles of "Observation" as opposed to quarantine, alluded to in paragraph 75 of the Personal Proceedings of the preceding year's report.

68. Following the heavy incidence of plague in the Mysore territory, during the last five months of the year, the disease was imported in 96 separate localities, in a total of eleven districts of this Presidency. In 95 localities, plague was imported 223 times. In 11 of these, importation was repeated from four times to over thrice that number of times. Thus, in Madras * 12 separate instances of importation were detected. Yet, the City of Madras remained free from plague, and in only 20 localities of 5 districts was it reported as indigenous, up to the end of the year. It is fair to argue that the progress of plague, so long at least as it is confined to human beings, can be absolutely checked by a correctly worked "surveillance system," backed up by isolation of the sick, and the prompt application of sanitary measures. This is, of course, nothing but what might be expected. But, it is possible to argue that we are not acquainted with how many instances of plague may have been imported, and yet no indigenous plague has followed. This argument is tenable; but, having regard to the certainty with which plague slowly but surely spreads where concealment has been effected, the chances are greatly in favour of the supposition that the system really effectively kept touch of all arrivals from infected areas. I refer to this subject, as the natural tendency is to point to the heavy expenditure necessary for the support of the staff required to work such a method, and, secondly, to show that of so many thousands of cases that were inspected, so few really turned out to be plague. But it seems to me that the chances would have been 100 to 1, that each case detected would, if it had been undiscovered, have led to indigenous plague in the locality concerned, and that, consequently, not only have the people in these places been spared an unnecessarily early visitation from the disease, but they have been spared the loss of lives and money that must follow its appearance, compared to which the expenditure necessary for the staff must be insignificant. It is apt to be felt too that perhaps this escape of localities was not so much due to the precautions taken as to some fortuitous circumstances, depending upon the inability of the plague microbe to accommodate itself to its environment. This factor undoubtedly does modify the chances of spread and, probably, the virulence of the microbe; but it obviously is very methodical and persevering in its efforts to overcome all difficulties, and it seems to me that, given time and season, there is no place in this Presidency that can be regarded as safe from the possibility of plague importation, and subsequent spread. In no instance has a case of plague been reported as having originated from infected articles received from any locality outside the Presidency. The origin of the disease has always been found to be due to human beings suffering from the disease, arriving from an infected locality. Evacuation of indigenously affected areas has been found, as in all epidemics of this disease that history has recorded, the best sanitary measure. M. Haffkine's anti-plague prophylactic has also its sphere of utility, and Government has done its best to encourage its use. I have, however, consistently opposed advice tendered to Government from time to time by other officers to neglect, or abolish, necessary sanitary measures in favour of solely practising inoculation. A total of 5,685 anti-plague inoculations was performed in the Madras town and 10,532 in the Presidency generally, up to the end of December 1898. I have not put on record any sanitary experiences in this report as to plague, as I understand these will be dealt with by the Plague Commissioner: indeed, had I wished to do so, it would have been practically impossible to correctly trace facts on which such remarks should be based, owing to the operation of G.O., No. 1440, Public, dated 30th November 1898.

69. There has been a decided falling off since 1896 in the total number of localities reported upon by District Medical and Sanitary Officers, notwithstanding the continued provision in each district of an Assistant Surgeon, capable of undertaking their duty at head-quarters, whilst on tour—*vide* Appendix B.

1896 ...	284
1897 ...	261
1898 ...	254

* Since the first appearance of the disease in Bombay up to May 1899, 18 cases have been imported, and have been duly isolated.

It is impossible for me to ascertain how far this falling off is due to the absence of permanent incumbents in districts, owing to plague and other exigencies. It is desirable that District Medical and Sanitary Officers should be reminded of the necessity for greater activity. Irrespective of current sanitary requirements of their districts, seeing that this office is provided with but one Deputy, it is specially necessary in the present critical state of vaccination, that in districts where plague is not existent, better attention be devoted by them to their sanitary duties beyond their head-quarters.

70. My Manager and Assistant M.R. Ry. Balasundra Mudaliyar and staff worked with their usual zeal during the year. A recent calculation of receipts of genuine official communications, that is, excluding all mere forms or documents of a routine nature, shows that since the last re-organization of my office, the staff fulfils more than four times the amount of work it was calculated to be capable of effecting. The consequence is that work is often produced far more slowly than I could wish.

71. The condition of stores, &c., in this office has been duly checked as required by G.O., No. 920, Financial, dated 18th September 1893.

72. The service registers of my office establishment have been regularly maintained and kept up to date.

W. G. KING, M.B., C.M., D.P.H., Lt.-Col., I.M.S.,
Sanitary Commissioner for Madras:

EGMORE,
25th May 1899.

APPENDICES
TO
GENERAL SANITATION REPORT.

APPENDIX A.

Tables showing places visited by Sanitary Commissioner and Deputy Sanitary Commissioner during 1898.

MUNICIPAL TOWNS AND RURAL AREAS INSPECTED BY							
Sanitary Commissioner.				Deputy Sanitary Commissioner.			
Districts.	Municipalities.	Date of inspection.	Date of report.	Districts.	Municipalities.	Date of inspection.	Date of report.
			G.O. on report.				G.O. on report.
Nil.							

APPENDIX B.

Statement showing the Number of Towns and Villages inspected by the District Medical and Sanitary Officers during the year 1898.

Districts.	Number of towns and villages inspected and reports received.	Number of towns and villages inspected, but no reports received.	Total number of towns and villages inspected.
Anantapur	8	...	8
Bellary	2	...	2
Chingleput	11	11	22
Coimbatore	10	4	14
Cuddapah	11	4	15
Ganjám	36	1	37
Górávari	7	15	22
Kistna	16	11	27
Kurnool	17	32	49
Madura	32	25	57
Malabar	1	...	1
Nellore	16	8	24
Nilgiris	2	...	2
North Arcot	12	11	23
Salem	21	5	26
South Arcot	4	7	11
South Canara	...	...	...
Tanjore	4	9	13
Tinnevely	21	5	26
Trichinopoly	11	...	11
Vizagapatam	14	...	14
Total	256	148	404

APPENDIX C.

Statement showing Statistics of Sickness and Mortality in the Lawrence Asylum, Ootacamund, during the year 1898, as required in G.O., No. 2100 L., dated 4th November 1895.

Lawrence Asylum	Average strength.		Total number of admissions to hospital.		Number of deaths.		Rate of sickness (per 100 of average strength).		Death-rate (per 100 of average strength).	
	1897.	1898.	1897.	1898.	1897.	1898.	1897.	1898.	1897.	1898.
Lawrence Asylum	379	380	137	227	1	1	51.9	59.7	0.26	0.26

APPENDIX D.

VITAL STATISTICS OF THE GENERAL POPULATION.
No. I.—Showing the Births registered in the districts of the Madras Presidency during the year 1898.

Districts.	Population (exclusive of Europeans and Eurasians) as per census of 1891.		Population (exclusive of Europeans and Eurasians) for which returns were received.		Number of births registered (exclusive of Europeans and Eurasians and still-births).		Ratio of births per 1,000 of population.		Excess of births over deaths per 1,000 of population.		Mean ratio of births per 1,000 during previous five years.	
	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.	Males.	Females.
1	372,034	355,285	727,319	727,319	9,032	9,032	12.4	12.4	248	102.0	14.1	28.5
2	453,537	436,948	890,485	890,485	13,806	12,840	14.9	14.4	293	103.9	16.7	32.9
3	604,816	595,085	1,199,901	1,199,901	21,845	20,951	18.2	17.5	367	104.5	18.8	38.9
4	581,234	1,022,678	2,003,911	2,003,911	27,108	27,452	13.6	13.7	273	99.0	13.3	26.1
5	646,132	625,589	1,271,721	1,271,721	14,390	14,082	11.8	11.5	233	102.1	13.8	27.9
6	925,199	973,400	1,898,400	1,898,400	16,200	14,357	12.1	10.8	229	112.8	10.9	21.0
7	1,026,632	1,061,226	2,077,858	2,077,858	27,806	26,517	13.4	12.8	262	105.2	12.5	24.4
8	338,057	316,567	1,656,084	1,656,084	32,210	31,333	17.3	16.9	342	102.8	16.8	33.0
9	414,035	403,025	817,060	817,060	10,725	10,356	13.1	12.7	268	103.6	13.2	20.1
10	217,089	218,685	435,774	435,774	9,410	8,690	21.6	19.9	41.5	108.3	20.8	40.8
11	1,251,317	1,355,515	2,607,782	2,607,782	24,422	23,290	11.6	11.1	22.7	104.9	13.1	29.4
12	1,306,782	1,329,027	2,636,874	2,636,874	25,327	23,065	9.6	9.0	18.6	107.0	11.3	21.9
13	736,391	726,933	1,463,324	1,463,324	17,670	17,452	12.1	11.9	24.0	101.2	13.2	26.9
14	514,485	42,280	556,765	556,765	13,314	1,371	13.6	14.1	27.7	95.8	14.8	26.6
15	1,090,273	1,053,312	2,143,585	2,143,585	28,680	27,541	13.6	13.0	26.8	101.1	14.4	29.3
16	961,199	1,000,585	1,961,784	1,961,784	31,306	30,348	16.3	15.5	31.8	105.4	16.2	31.6
17	1,078,835	1,083,461	2,162,296	2,162,296	32,311	30,961	15.0	14.3	29.3	104.4	15.8	31.0
18	508,970	543,032	1,052,002	1,052,002	13,968	13,279	13.3	12.6	26.9	105.2	16.5	32.1
19	1,045,450	1,161,631	2,207,081	2,207,081	36,619	34,818	16.4	15.6	32.0	105.2	14.6	28.4
20	933,222	982,180	1,915,702	1,915,702	30,501	28,936	15.9	15.1	31.0	105.4	16.2	29.6
21	633,035	708,601	1,341,736	1,341,736	21,248	20,548	15.5	15.0	30.5	103.4	14.3	28.1
22	955,912	982,253	1,938,165	1,938,165	18,566	17,869	12.1	11.7	23.8	103.9	13.7	27.0
Grand Total for the Presidency.	16,433,931	16,811,219	33,245,150	33,245,150	465,518	446,224	14.0	13.4	27.4	104.3	14.6	30.6
Total of Town circles in the Presidency.	1,241,394	1,296,639	2,538,033	2,538,033	43,081	40,744	17.0	16.0	33.0	105.7	16.9	33.0
Total of Rural circles in the Presidency.	15,192,537	15,514,580	30,707,117	30,707,117	422,437	405,480	13.7	13.2	26.9	104.2	14.4	27.1

* Increase due to the inclusion for the first time of the statistics of Kodaikanal Taluk and some of the Zemindaries of the district.

No. XI.—Statement showing the chief Sanitary defects in the Municipalities of the Madras Presidency during the year 1898—cont.

District.	Name of Municipality.	Population according to census of 1891.	Total death-rate per 1,000 of population.	Chief sanitary defects.	Remedial measures adopted.
Ganjām ...	Berhampur.	25,493	24.8	<i>Drainage</i> of streets and of houses defective. The street drains get choked with earth. Drainage of houses empties into cess-pools which are either mere holes dug in the ground or kerosine tins or chatties which are too old and tumble down and could not be properly cleaned. <i>Water-supply</i> . Drinking water is obtained chiefly from two tanks which are fed by Rushikulyn reservoir through an open channel subject to pollution during its course. The surroundings of the tanks are used as latrines. <i>Conservancy</i> . The tatti dust-bins are in a very bad state of repair. Most of the latrines are mere enclosures without drains or trenches; hence the liquid portion of the excreta soaks into the ground and emits a very bad smell. The ground near the latrines and the approaches to them are used as latrines and urinals.	The council intend having a complete drainage system after the water-supply scheme which is now being prepared by the Sanitary Engineer is completed. Some dust-bins were constructed at a cost of Rs. 93. Rs. 61 were spent in erecting two urinals.
Do. ...	Chicaole ...	18,204	26.5	<i>Drainage</i> . The street drains are not properly constructed; hence they are not suited to carry off sewage. <i>Water-supply</i> . The river water is open to contamination.	Two tanks and five wells were repaired (Rs. 18 and 70, respectively).
Do. ...	Parlākimedi.	16,379	24.5	<i>Drainage</i> . There is no proper system of house drainage; sewage soaks mostly into the sub-soil. Most of the existing cess-pools are in very bad order. They should be rebuilt. <i>Water-supply</i> . During the rainy season faecal matter of men and pigs is washed away into drinking water tanks from the hill sides. The surroundings of most of the private wells are unsatisfactory. They are constructed of earthen rings which allow of easy percolation of spilt water. <i>Conservancy</i> . Most of the existing latrines are mere tatty enclosures. The flooring of these is much cut up and allows of soakage of urine. More latrines and dust-bins are required.	A well was sunk (Rs. 31). Twenty-three dust-bins were constructed (Rs. 121) and fourteen public latrines repaired (Rs. 18). A slaughter-house was constructed (Rs. 10).
Gódvāri ...	Cocanada ...	40,068	20.4	<i>Drainage</i> . With the exception of a sewer which extends from the market to the canal, there is practically no drainage. Some streets have side cuttings. The sewer still remains an eye sore. <i>Conservancy</i> . More latrines are wanted.	Twelve wells were sunk and four tanks repaired (Rs. 251 and 77, respectively). Rs. 721 were spent in carrying out improvements to water-supply. Eight latrines were repaired (Rs. 89). Rs. 545 were spent in executing certain repairs to drains.
Do. ...	Ellore ...	29,296	24.6	<i>Drainage</i> . No system. Sewage water from houses soaks into the ground. <i>Conservancy</i> . Some of the latrines require repair.	Two public latrines were constructed and three others repaired (Rs. 245 and 12, respectively). The town was surveyed by the Sanitary Engineering department for proper drainage of the town, but the scheme had to be postponed for want of funds.

No. XI.—Statement showing the chief Sanitary defects in the Municipalities of the Madras Presidency during the year 1898—cont.

District.	Name of Municipality.	Population according to census of 1891.	Total death-rate per 1,000 of population.	Chief sanitary defects.	Remedial measures adopted.
Gódvāri ...	Rajahmundry.	28,279	28.2	<i>Drainage</i> . No regular system. Side cuttings and indifferently constructed masonry drains exist. Cess-pools exist which are not thoroughly cleaned. <i>Water-supply</i> . The River Gódvāri, which is the principal source of supply for the well-to-do inhabitants, is subject to contamination, as dhobies are permitted to wash clothes upstream. <i>Conservancy</i> . Removal of night-soil in cavadies is still in force.	A slaughter-house was constructed (Rs. 886). Two public latrines were repaired (Rs. 134). Drains and two markets were repaired (Rs. 133 and 267, respectively).
Kistna ...	Bezwađa	20,611	26.1	<i>Drainage</i> . No system. Except in houses, where there are cess-pools, elsewhere sewage soaks into the ground in backyards. <i>Water-supply</i> . Unsatisfactory.	Estimates and plans for water-supply are being revised. Four wells were repaired (Rs. 45). A drain was made (Rs. 60). Ten latrines and a market were repaired (Rs. 170 and 70, respectively).
Do. ...	Guntūr ...	23,267	39.3	<i>Drainage</i> . There is no proper system of drainage. <i>Water-supply</i> . The black tank, one of the drinking water sources, is subject to contamination.	Plans and estimates for supplying the town with water are under preparation. Four wells were sunk (Rs. 488) and seven others repaired (Rs. 420). Twelve dust-bins were constructed (Rs. 100). Four public latrines, a market and two slaughter-houses were repaired (Rs. 145, 115 and 346, respectively).
Do. ...	Masulipatam.	38,667	23.1	<i>Drainage</i> . No regular system, except ordinary side cuttings. In most houses there being no arrangement for the proper disposal of sewage it soaks into the ground. <i>Water-supply</i> . Unsatisfactory. <i>Conservancy</i> . The existing latrines are not provided with receptacles for storage of night-soil before removal. The cinerators in use are not in working order. The number of toties at present employed is insufficient.	Rs. 461 were spent on the construction of dust-bins. A public latrine, six drains and a market were repaired (Rs. 28, 211 and 25, respectively).
Kurnool ...	Kurnool ...	24,306	24.6	<i>Drainage</i> . No system.	For want of funds no drainage scheme has been prepared. A market was constructed (Rs. 870). Repairs to latrines, drains and slaughter-house were made (Rs. 160).
Madura ...	Dindigul ...	20,115	18.9	<i>Drainage</i> . No system. <i>Water-supply</i> . Quantity available is insufficient.	A well was sunk (Rs. 210). Two tanks and three wells were repaired (Rs. 128 and 20, respectively).
Do. ...	Madura ...	87,121	25.1	<i>Drainage</i> is as bad as can be. The sanitary condition of the town cannot be improved unless a drainage scheme is introduced.	Arrangements are being made to introduce a drainage scheme for a portion of the town. Three latrines on the standard design were erected.
Do. ...	Palni ...	16,940	31.4	<i>Drainage</i> . No system. <i>Water-supply</i> . Drinking water is subject to pollution.	Nd.

No. XI.—Statement showing the chief Sanitary defects in the Municipalities of the Madras Presidency during the year 1898—cont.

District.	Name of Municipality.	Population according to census of 1891.	Total death-rate per 1,000 of population.	Chief sanitary defects.	Remedial measures adopted.
Madura	Periyakulam.	16,363	31.9	<i>Drainage.</i> No system. Sewage from houses soaks either in front or back of the houses. Cess-pools which are either mud pots or chatties buried in the ground are not properly and regularly cleaned. <i>Water-supply</i> very unsatisfactory being subject to very great pollution. <i>Conservancy.</i> The staff and plant need strengthening. The existing mud-wall latrines should be replaced by substantial ones.	<i>Nil.</i>
Malabar	Calicut	64,798	34.7	<i>Drainage.</i> No system. Sewage from houses flows into cess-pits and there soaks. <i>Water-supply.</i> Wells of which there is one in the compound of every house are not provided with parapet walls. The quality of water obtained is exceedingly bad.	Owing to the scattered condition of the houses in many places, it is not possible to introduce a regular system of drainage. A drain was repaired at a cost of Rs. 253. Two wells were sunk (Rs. 115), and a tank and a well repaired, (Rs. 19 and 12, respectively).
Do.	Cannanore.	26,653	23.2	<i>Drainage.</i> No proper system in old town. The cess-pools here are rarely kept clean. <i>Water-supply.</i> Wells in old town are shallow and are subject to contamination being near latrines, house drains and burial grounds.	Drains were repaired at a cost of Rs. 66. A well was repaired (Rs. 123). Fourteen dust-bins were constructed (Rs. 91). A public latrine and a slaughter-house were repaired (Rs. 16 and 158).
Do.	Cochin	16,147	34.6	<i>Drainage.</i> Is still very defective especially in Kalvetty where, owing to an imperfect fall in the drains, sewage does not freely escape. The masonry drains only serve to carry rain water. <i>Water-supply.</i> Quality bad being brackish. The surroundings of tanks are bad and are subject to pollution. No wells or tanks are conserved.	The proposed improvements to the drainage of the town are yet held in abeyance for want of funds. The attempt to supply artesian well water has proved a failure. A drain was made (Rs. 496). Four tanks were repaired (Rs. 20). Six public latrines, seven drains and two markets were repaired (Rs. 68, 153 and 115, respectively).
Do.	Palghat	39,367	31.5	<i>Drainage.</i> Very defective. Except in Big Bazaar and Sultanpet streets where there are masonry drains, elsewhere side channels are dug which become closed after one or two showers. Sewage of houses is drained off to backyards.	The consideration of a drainage scheme has been indefinitely postponed (G.O., No. 1668, L. and M., dated 8th November 1894). A drain was made (Rs. 260) and four latrines were repaired (Rs. 24).
Do.	Tellicherry.	26,631	30.0	<i>Drainage.</i> No system. The stone-built drains in chali being constructed without principle are more a source of nuisance than advantage to the locality. House drains where they exist are defective. <i>Water-supply.</i> The wells here of which there is one in each house or in small group of three or four houses are shallow and are subject to pollution during the monsoon being without parapet walls.	Rs. 81 were spent in the repair of drains. A market was repaired (Rs. 24).
Nellore	Nellore	29,128	33.8	<i>Drainage.</i> Very bad especially in the western portion of the town. The drains on the eastern portion of the town are connected with cess-pools which emit noxious odours.	Two wells and four tanks were repaired (Rs. 10 and 111 respectively). Rs. 10 were spent in repairing drains.

No. XI.—Statement showing the chief Sanitary defects in the Municipalities of the Madras Presidency during the year 1898—cont.

District.	Name of Municipality.	Population according to census of 1891.	Total death-rate per 1,000 of population.	Chief sanitary defects.	Remedial measures adopted.
Nellore	Onzole	10,832	28.5	<i>Drainage.</i> None of the existing drains are intended to carry sewage water from houses.	Two wells and two public latrines were repaired (Rs. 197 and Rs. 150, respectively).
Ootacamund.	Coonoor	5,586	34.3	<i>Water-supply.</i> Water is brought into the town by an open channel from a catchment area. This is highly defective being subject to pollution both by human beings and animals. House drains also empty into it.	Rs. 67 and Rs. 75 were spent in the repair of certain drains and wells. A market was repaired (Rs. 696).
Do.	Ootacamund.	13,991	39.3	<i>Drainage.</i> Many of the houses have no connecting pipes with street drains. <i>Water-supply.</i> The Marimund reservoir, one of the drinking-water sources, is open to surface contamination, the catchment area being under tea cultivation. Wells of which there are many in compounds of houses also supply drinking water, but they are exposed to surface impurities of all kinds as they are not provided with parapet walls and platforms.	Rs. 62 were spent in repairing drains. Rs. 783 were spent in the execution of repairs to water-supply.
North Arcot.	Gudiyattam.	18,745	28.9	<i>Drainage.</i> No proper system.	.....
Do.	Tirupati	14,238	29.6	<i>Drainage.</i> No proper system.	.....
Do.	Vellore	44,724	24.0	<i>Drainage.</i> Sewage stagnates in some places owing to the faulty construction of drains. House drains in some cases flow into streets and form filthy stagnant pools. The existing cess-pools are not often cleaned. <i>Water-supply.</i> Unsatisfactory. Suringunta, one of the drinking-water sources, is fed by a channel from the hill. It is subject to much pollution during its course.	Rs. 221 were spent in making the drains. Two tanks and some wells were repaired (Rs. 333). A latrine was repaired (Rs. 14).
Do.	Wallajapet.	10,485	25.0	<i>Drainage.</i> No system. House drains find their way into backyards where the sewage is allowed to stagnate and ultimately seep into the soil.	A tank and nine wells were repaired (Rs. 202).
Salem	Salem	67,640	24.4	<i>Drainage.</i> Except in Salem proper, Agraharam and Shevapet where there are masonry drains, elsewhere drainage is very bad. Sewage from houses empties into side ditches in streets and there soaks. Cess-pools abound, but no system of cleaning them exists. <i>Water-supply.</i> The river which is one of the sources of supply is polluted in every conceivable way.	Five wells and five public latrines were repaired (Rs. 34 and Rs. 128, respectively).
Do.	Tiruppattur.	16,463	29.5	<i>Drainage.</i> The streets are mostly provided with earth drains into which the house drains empty their contents and form pools of mud and sewage. Cess-pits abound which are seldom cleaned out. <i>Water-supply.</i> The supply from Chetti tank is unsatisfactory, as the channel which feeds it is unprotected.	V-shaped drains with burnt slab stones were constructed in two lanes. Levels were taken under the supervision of the Sanitary Engineer in 1893 for the introduction of drainage and water-supply schemes. A drain was made (Rs. 30) and sixteen dust-bins were constructed (Rs. 31).

No. XI.—Statement showing the chief Sanitary defects in the Municipalities of the Madras Presidency during the year 1898—cont.

District.	Name of Municipality.	Population according to census of 1891.	Total death-rate per 1,000 of population.	Chief sanitary defects.	Remedial measures adopted.
Salem ...	Vaniyam-bādi.	15,838	37.1	<i>Drainage.</i> Side cuttings exist, but in places where there are masonry drains they are neglected and allowed to become obstructed by rubbish. House drains empty into cess pits which are numerous and are seldom cleaned. <i>Water-supply.</i> The river is the chief drinking-water supply, but its bed is highly polluted during the dry season. <i>Conservancy.</i> The existing latrines are small and insufficient in number.	A public latrine was constructed (Rs. 184) and six others were repaired (Rs. 101). Twenty-four dust-bins and a slaughter-house were constructed (Rs. 230).
South Arcot.	Chidambaram.	18,634	34.0	<i>Drainage.</i> There are no specially built drains. House drains discharge their contents either into backyards or cess-pools. <i>Water-supply.</i> The tanks receive their supply of water from an irrigation tank ten miles distant through a channel which undergoes pollution during its course.	Two tanks were constructed (Rs. 379). A latrine was constructed and three others were repaired (Rs. 221 and Rs. 28, respectively).
Do. ...	Cuddalore ...	47,025	34.3	<i>Drainage.</i> Some of the streets have badly constructed masonry drains without regular outlets, while others have mere temporary side channels.	Two tanks were repaired (Rs. 541). Rs. 58 and Rs. 670 were spent in executing certain repairs to latrines and drains, respectively.
Do. ...	Tiruvannamalai.	13,643	28.2	<i>Drainage.</i> Most of the streets have side channels cut in them. <i>Water-supply.</i> All the drinking-water tanks are not guarded by watchmen.	The council will soon concert measures for carrying out one of the three water-supply schemes recommended by Government with the approval of the Sanitary Board. Four tanks and twelve wells were repaired (Rs. 333 and Rs. 348, respectively). Seven dust-bins were constructed (Rs. 50).
South Canara.	Mangalore.	40,620	29.9	<i>Drainage.</i> Unsatisfactory. Some of the large drains which are water courses during rains are used as latrines. <i>Water-supply.</i> Some of the private wells have neither platforms nor parapet walls with the result that surface water finds its way into them during rains. In some cases these wells are situated near nullahs or water courses which are used as latrines.	.....
Tanjore ...	Máyavaram.	23,754	27.1	<i>Drainage.</i> No system. Some of the existing cess-pools are mere pits in the ground. <i>Water-supply.</i> The two tanks reserved for drinking purposes derive their supply from the Cauvery through irrigation channels and their surroundings are anything but satisfactory. <i>Conservancy.</i> Most of the latrines are mere enclosures. They are not much resorted to.	.....
Do. ...	Mannārgudi.	20,392	27.5	<i>Drainage.</i> No system. Cess-pools exist, which are ever overflowing and never cleaned. <i>Water-supply.</i> Except wells one of the sources of drinking-water supply, all others are subject to contamination. <i>Conservancy.</i> The existing latrines are not freely resorted to.	.....
Do. ...	Negapatam.	58,573	31.8	<i>Drainage.</i> No system. The condition of cess-pools is unsatisfactory. <i>Water-supply.</i> Well water is subject to pollution. The quality of water in tanks is suspicious. <i>Conservancy.</i> The number of existing sewage carts is insufficient.	Sixteen wells were repaired (Rs. 54). Some dust-bins were constructed.

No. XI.—Statement showing the chief Sanitary defects in the Municipalities of the Madras Presidency during the year 1898—cont.

District.	Name of Municipality.	Population according to census of 1891.	Total death-rate per 1,000 of population.	Chief sanitary defects.	Remedial measures adopted.
Tanjore ...	Kumbakonam.	54,254	30.0	<i>Drainage.</i> There is no street drainage for the town. Sewage from some of the houses is allowed to run into streets or to stagnate and soak into the ground in backyards. <i>Water-supply.</i> Unsatisfactory. The surroundings especially of private drinking-water wells are insanitary. <i>Conservancy.</i> Most of the latrines are small and their number is not equal to requirements.	Three drains were made (Rs. 234). A well was sunk (Rs. 179) and two tanks were repaired (Rs. 458). Ten public latrines and three drains were repaired (Rs. 255 and Rs. 925, respectively).
Do. ...	Tanjore ...	54,258	25.4	<i>Drainage.</i> With the exception of the Fort which is well provided with drains, elsewhere it is very defective. Some of the streets in Manambachavady have masonry drains with bad gradient. They are not also of proper size and form. <i>Water-supply.</i> People prefer tank water to that distributed by pipes, as the former is soft. Sivaganga, one of the drinking water tanks, is fed by an open channel. <i>Conservancy.</i> The contract system is in force. The bullocks supplied being ill-fed and old are unable to remove the rubbish collected daily. The rubbish carts are not of proper size and capacity.	Nine drains were made (Rs. 613). Two public latrines and four drains repaired (Rs. 45 and Rs. 144, respectively).
Tinnevely...	Palamcottah.	18,612	20.2	<i>Drainage.</i> No proper system. House drains in some cases discharge their contents into streets. The existing cess-pools are not of the standard plan. <i>Water-supply.</i> The Paliani channel which is the chief source of water-supply is subject to much pollution during its course, dirty clothes, mats and cattle being washed in it.	Seven wells and six public latrines repaired (Rs. 77 and Rs. 59, respectively).
Do. ...	Srivilliputūr.	29,541	19.6	<i>Drainage.</i> Main streets have side cuttings. Refuse water from houses soaks into the soil or is allowed to run out into the streets or lanes. The existing cess-pools are not equal to requirements. <i>Water-supply.</i> Water is obtained from two tanks which get their supply from a large rain-fed tank. People are allowed to bathe and wash clothes in one of these tanks though guarded by a watchman. Several of the wells need proper platforms and drains. <i>Conservancy.</i> The practice of storing in backyards house refuse with cow-dung, &c., is still in vogue. The number of latrines at present in use is too inadequate for the needs of the people.	Four drains and three wells were repaired (Rs. 30 and Rs. 35, respectively).
Do. ...	Tinnevely.	24,756	28.0	<i>Drainage.</i> Very defective both of houses and of streets. There are no properly-constructed drains anywhere except in the main streets of the town. <i>Water-supply.</i> Bad in quality and insufficient in quantity; channels and tanks which form the chief source of water-supply are contaminated with drainage and other kinds of filth.	.....

No. XI.—Statement showing the chief Sanitary defects in the Municipalities of the Madras Presidency during the year 1898—cont.

District.	Name of Municipality.	Population according to census of 1891.	Total death-rate per 1,000 of population.	Chief sanitary defects.	Remedial measures adopted.
Tinnevely.	Tuticorin ...	24,964	36.9	<i>Drainage.</i> No system. The existing cess-pools are insufficient for the requirements of the town and are not on the standard plan. <i>Water-supply.</i> During the hot weather people obtain their drinking water from wells dug in sandy topes which are used as "places d'aisance." The wells have neither platforms nor drains.	Water-supply scheme prepared by the Sanitary Engineer is still under the consideration of Government. A drain was constructed (Rs. 54) and three others were repaired (Rs. 166). Seven wells were repaired (Rs. 210). Two public latrines were constructed (Rs. 200) and three others repaired (Rs. 138).
Trichinopoly	Trichinopoly	89,666	30.5	<i>Drainage.</i> There is no system of drainage. <i>Water-supply.</i> Unsatisfactory as a portion of the town is still supplied by the river Cauvery and its channels.	Some dust-bins were constructed (Rs. 216) and public latrines repaired (Rs. 383).
Do.	Srirangam...	21,632	32.2	<i>Drainage.</i> No system. Side channels exist to carry off storm water. Cess-pools abound which are cleaned once or twice in a year at the option of the owner. <i>Water-supply.</i> No tank or well is set apart for drinking purpose.	Nil.
Vizagapatam.	Anakápallo.	17,001	21.8	<i>Drainage.</i> The existing pukka-built drains are a nuisance not being properly sloped and no proper outlet having been arranged for the final disposal of the sewage.	Four wells and a drain were repaired (Rs. 45 and Rs. 47, respectively).
Do.	Bimlipatam.	9,696	19.0	.....	Rs. 33 were spent in the repair of certain drains.
Do.	Vizagapatam.	33,961	23.4	.....	.....
Do.	Vizianagaram.	30,735	27.5	<i>Drainage.</i> No regular system of drainage.	.....

No. XII.—Births registered according to months and classes in the districts of the Madras Presidency during the year 1898.

Number.	Districts.	Births registered according to months.												Ratio of births per mille of population.			
		1			2			3			4			Births registered according to classes.			
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total births.	Native Christians.	Muslims.	Hindus.
1	Anantapur	1,374	1,194	1,289	1,203	1,185	1,261	1,308	1,684	1,764	2,017	1,919	1,787	16,045	21	1,205	16,818
2	Bellary	1,479	1,432	1,647	1,647	1,704	2,292	2,425	2,682	2,679	2,675	2,742	2,407	26,106	96	2,870	26,139
3	Chingleput	3,432	2,705	2,851	2,675	3,289	3,671	4,135	4,243	4,139	4,202	3,820	3,615	42,847	309	600	41,865
4	Coimbatore	4,571	4,143	4,374	4,247	4,319	4,946	4,763	4,323	4,782	4,813	4,811	4,708	54,650	583	806	53,580
5	Cuddalore	2,084	1,757	1,930	1,867	1,892	2,049	2,441	3,100	3,367	3,867	3,826	2,931	29,672	279	2,831	28,402
6	Ganjām	1,531	1,104	1,141	1,364	1,759	2,063	2,758	3,526	3,960	3,880	3,812	3,729	30,357	80	85	30,433
7	Godavari	3,060	3,729	3,636	2,658	3,208	4,878	4,934	4,944	5,800	6,805	6,376	6,285	54,413	189	738	53,516
8	Kistna	3,362	2,665	2,962	3,884	4,031	5,162	5,960	6,842	6,877	7,007	6,567	6,815	63,545	1,436	3,048	58,459
9	Kurnool	1,231	1,045	1,246	1,243	1,243	1,467	1,445	1,518	1,768	1,917	1,666	1,542	21,034	518	2,850	17,676
10	Madras	1,278	1,027	1,243	1,354	1,556	1,467	1,445	1,518	1,768	1,917	1,666	1,542	18,100	108	2,283	14,846
11	Madura	3,302	3,248	4,005	4,008	4,379	4,565	5,007	3,897	3,931	3,788	3,800	3,661	47,712	1,158	2,132	44,420
12	Malabar	3,246	2,704	3,114	3,389	3,916	4,913	5,062	4,791	4,673	4,627	4,334	4,394	48,962	889	14,753	33,324
13	Nellore	2,835	2,178	2,451	2,696	2,732	2,978	2,968	3,448	3,680	3,381	3,082	3,092	35,122	257	1,169	33,756
14	Niduvuru	209	217	220	295	245	263	256	221	219	240	170	189	2,085	273	164	2,508
15	North Arcot	4,635	3,664	3,658	3,525	4,063	4,585	5,671	5,635	5,546	5,504	4,867	4,857	56,221	101	2,214	53,892
16	Salem	4,901	4,256	4,762	4,964	5,325	5,242	5,646	5,301	5,370	5,672	5,417	5,168	62,344	363	2,073	59,878
17	South Arcot	4,495	3,826	3,747	3,969	5,001	5,404	6,421	6,433	6,125	6,280	5,680	5,112	63,502	870	1,025	61,570
18	South Canara	2,016	1,621	1,829	1,876	1,966	2,341	2,674	2,382	2,405	2,210	2,405	2,257	27,247	1,029	2,541	22,489
19	Tanjore	4,726	4,045	4,916	4,847	4,846	5,270	5,281	6,746	7,426	6,631	6,514	6,514	71,432	2,120	3,254	65,998
20	Tinnevely	4,425	4,102	4,859	4,747	4,846	4,996	5,223	5,154	5,102	5,346	5,325	5,544	59,437	4,163	3,239	52,905
21	Trichinopoly	3,112	2,762	3,392	3,425	3,640	3,614	3,965	3,897	3,566	3,614	3,509	3,603	41,796	1,974	1,965	38,817
22	Vizagapatam	1,762	1,065	1,212	1,442	1,756	2,434	3,216	4,129	4,905	5,209	4,692	4,688	36,425	36	963	36,141
Total, Madras Presidency.		63,545	54,712	55,665	61,212	66,992	75,682	85,278	88,714	89,775	91,583	87,131	86,356	911,742	18,251	61,534	841,458
Ratio per mille of population.		1.9	1.6	1.8	1.9	2.1	2.3	2.6	2.7	2.7	2.7	2.6	2.6	27.4	2.6	2.6	27.4

No. XIII. — Births and Deaths registered among Europeans and Eurasians from different causes in each district of the Madras Presidency and the number of born dead among all classes during the year 1898.

1	2	3	4	5	6	7	8	9	10	11	12	13	14																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
Number.	Districts.	Population for which returns were received.		Cholera, p.v.		Small-pox.		Dysentery, Fevers, Diarrhoea.		Injuries.		All other causes.		Deaths from all causes.		Total Deaths.		Ratio per 1,000 of population.		Born dead among Europeans and Eurasians.		Total Births.		Total Deaths.		Total.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
		Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.	Males.	Females.	Total.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	

* Increase due to the inclusion, for the first time, of the population of Kodakātal taluk and some of the Zamindaries of the district.

Return showing the Births and Deaths registered in the Municipalities of the Madras Presidency during the year 1898.

PART II.

SANITARY ENGINEERING.

SANITARY ENGINEERING DEPARTMENT.

J. A. JONES, M.I.C.E., F.R.S.E.,

Sanitary Engineer to Government.

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1898

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THE NINTH ANNUAL REPORT

OF THE

SANITARY ENGINEER TO THE GOVERNMENT OF MADRAS,
1898.

THE Sanitary Engineer, having returned from privilege leave of absence for a period of three months, resumed charge from Mr. A. S. Russell, Acting Sanitary Engineer, on the forenoon of 6th April 1898. Mr. Hormusji Nowroji, Assistant Sanitary Engineer to Government, availed himself of one month's privilege leave from 1st June 1898.

2. The following statement shows the surveys in regard to the water-supply of municipal towns and one taluk board undertaken during 1898 :—

No.	Towns.	For what purpose.	Completed or in progress.	Remarks.
<i>Municipal Towns.</i>				
1	Berhampur	Water-supply	In progress	Since completed.
2	Bezawada	Do.	Completed	Additional surveys and levels.
3	Chidambaram	Do.	Do.	Further survey will be required.
4	Guntur	Do.	Do.	
5	Kumbakonam	Do.	Do.	
<i>Taluk Board.</i>				
6	Chatrapur	Do.	In progress	Since completed.

3. The following schemes prepared by the Sanitary Engineer were submitted during the year :—

No.	Towns.	Water-supply or drainage.	Date of submission.	To whom sent.	Estimated cost.
1	Vizianagram	Water-supply	30th Mar. 1898 ...	Sanitary Board ...	Rs. 2,82,000
2	Tanjore	Do. (Extension) ...	26th April 1898 ...	Do. ...	27,000
3	Bezawada	Do.	5th Aug. 1898 ...	Do. ...	3,75,400
4	Tiruvannamalai *	Do.	10th Aug. 1898 ...	Government ...	3,56,000
5	Kumbakonam	Drainage of Putnool Block.	22nd Aug. 1898 ...	Sanitary Board ...	or 1,55,000
6	Kurnool	Water-supply (Extension).	7th Dec. 1898 ...	Government ...	43,800
7	Pudukkottai	Do.	7th Nov. 1898 ...	Political Agent for Pudukkottai.	5,820
					46,300
					77,700

* Preliminary reports and estimates.
† Prepared and submitted by the Assistant Sanitary Engineer to Government.

4. Of the above schemes and of those submitted during previous years, the schemes for the extension of water-supply pipes in Tanjore, for the drainage of the Tanjore Fort and for the extension of the water-supply of Trichinopoly have been sanctioned during the year with the exception of the last project which was sanctioned in January 1899, whilst item No. 5 above has been referred to the Sanitary Engineer for revision of the estimate with reference to the recommendation of the Sanitary Board to substitute a sewage farm for the filter beds proposed. The drainage scheme for Tanjore Fort has been ordered to be executed by the Public Works Department.

5. The following table shows concisely the amount of work done and to be done with reference to water-supply and drainage schemes in the municipal towns in the Presidency at the end of 1898:

Number of municipalities	Water-supply.	Drainage.
...	58	58
Deduct—		
Towns not surveyed	22	33
	— 22	— 33
Towns surveyed up to 1897	36	25
Towns surveyed in 1898	— 36	— 25

(Neglecting, for purposes of this statement, the four towns, namely, Berhampur, Bezwada, Chidambaram and Kumbakonam, in respect of which additional surveys have been undertaken, and the town of Guutár which has been re-surveyed for its water-supply scheme.)

Schemes abandoned or still in abeyance.	5	4
Schemes under consideration or revision.	6	1
Surveys made, but schemes not prepared.	13	16
	— 24	— 21
Balance—		
Schemes sanctioned, works for which have been completed	9	3
Schemes sanctioned, works for which are in progress	3	
Schemes sanctioned, but execution not commenced		1
	— 12	— 4

6. The following paragraphs have reference to the preparation of schemes and the maintenance of works in the towns mentioned:—

Town.	District.	Population, 1891.
BERHAMPUR.	GANJAM.	25,653.

7. Surveys and levels were taken during the year in this town, with the view of preparation of a water-supply scheme, but the work was not completed before the year closed though very little remained to be done.

Town.	District.	Population, 1891.
BEZWADA.	KISTNA.	20,741.

8. The scheme for a water-supply to the town, on the preparation of which a fair progress was made before the end of 1897, was completed during the year and plans and estimates amounting to Rs. 3,75,400 were forwarded to the Sanitary Board in August last and are still under its consideration.

The scheme, when summarised, is as follows:—

To sink three infiltration wells each 15' diameter on the bank of the Kistna above the anicut, in each of which wells will be placed an hydraulic motor pump; to construct a pumping station consisting of an engine and boiler-house, engine drivers' quarters and stores, on high ground between the wells and service reservoir; the engine and boiler-house accommodates, in addition, the accumulator and tanks for the reserve water for the hydraulic pumping; to construct a service reservoir on the highest point available between the pumping station and Bezwada. The motor pumps will be actuated by the engines at the pumping station and will raise the water from the infiltration wells into the service reservoir through a 12" main. The quantity thus to be raised is 625 gallons per minute and will equal the supply required at 15 gallons per head for the increased population of 30,000 allowed for in the scheme; the service reservoir will hold more than a day's supply; to distribute the supply finally by gravitation through pipes to fountains in the usual manner. The scheme is estimated to cost as stated before, Rs. 3,75,400. On the assumption that one-half of it would be contributed by Government, the interest

and sinking fund are estimated at Rs. 11,187, and the annual working charges at Rs. 12,918 or a total Rs. 24,105.

Town.	District.	Population, 1891.
CALICUT.	MALABAR.	66,078.

9. The trial well referred to in last year's report was inspected and reported upon and a scheme for the water-supply to the Moplah quarters will be prepared in 1899 as desired in G.O., No. 1548-M., Mis., dated 5th September 1898. Water was pumped from the well but the supply was unsatisfactory as to quantity; it has been analysed by the Chemical Examiner who is of opinion that the well water is fit for drinking purposes but not for cooking owing to the presence of magnesium salts and that the tank water is better suited if the water could be purified and possible sources of organic pollution prevented. A further reference and revised proposals have been made through the Sanitary Board.

Town.	District.	Population, 1891.
CHIDAMBARAM.	SOUTH ARCOT.	18,640.

10. The investigation of a water-supply scheme for this town was commenced in January 1898. Two of the three available sources of supply, viz., (1) a spring known as Ponnu Kuttai near Lalpuram, (2) (a) a spring known as Sivapuri Vadapathy Avayar, and (b) Sivapuri Trupathi Government well were investigated, but the results were unsatisfactory. A further investigation will be made in 1899.

Town.	District.	Population, 1891.
CONJEEVERAM.	CHINGLEPUT.	42,548

11. The construction of the additional works, viz., (1) fencing the pumping station, (2) construction of a service reservoir, and (3) extension of the pipe lines, sanctioned out of the savings from the original estimate, was undertaken during the year with the result that works Nos. 1 and 3 were nearly completed, while about 19 per cent. of the work in service reservoir remained incomplete at the end of the year.

The following are particulars of pipes, fountains, hydrants, &c., laid in the town:—

	Diameter of pipes in inches.												Valves.			Fountains.					
	16	12	10	9	8	7	6	5	4	3	2½	2	Sluice valves.	Air valves.	Relief valve.	Hydrants.	Single wall tap.	Double wall tap.	Pillar.	Masonry pillar.	Jet.
Original works	7,015	4,818	984	4,936	3,626	903	2,533	11,734	4,128	21,526	1,004	768	50	7	1	27	30	16	16	14	1
Extension works				794			30	498		21,326	198	933	26			3	34				
Total	7,015	4,818	984	4,936	4,420	903	2,572	12,232	4,128	42,852	1,202	1,701	76	7	1	30	64	16	16	14	1

Appendix, table No. 2, gives the cost of work done during the year.

Town.	District.	Population, 1891.
CUDDAPAH.	CUDDAPAH.	17,379.

12. The extension of the infiltration gallery at the Bugga, which was estimated to cost Rs. 1,600 and the necessity for which was felt in April 1898, was not carried out by the Council for want of funds.

Town.	District.	Population, 1891.
DINDIGUL.	MADURA.	20,203.

13. The proposal for an extension of the infiltration gallery for augmenting the town supply sanctioned in G.O., No. 14-M., Mis., dated 8th January 1897, has been

dropped, on the ground that the expectations as to obtaining the additional quantity of water required for the town might not be realized. Two other sources of supply were, however, proposed, but the investigations to test the yield of water thereof were not completed before the end of the year and can be undertaken only in coming hot weather.

Town.	District.	Population, 1891.
ELLORE.	GÓDÁVARI.	29,382.

14. The application of the Council for the preparation of a water-supply scheme was forwarded to the Sanitary Board with the remark that the investigation cannot be undertaken in 1899-1900, unless one of the schemes proposed in the Sanitary Engineer's programme for that year is omitted.

Town.	District.	Population, 1891.
GUNTÜR.	KISTNA.	23,359.

15. Plans and estimates for water-supply scheme for the town were under preparation, but not quite complete at the end of the year. The scheme will be completed early in 1899.

Town.	District.	Population, 1891.
KUMBHAKONAM.	TANJORE.	54,307.

16. *Water-supply.*—During the year the Municipal Council allotted funds for the investigation of a water-supply scheme. The surveys and additional levels required in connection with the proposed scheme have been completed. Two experimental wells to test the yield of water were sunk at a cost of Rs. 580. The preparation of the scheme is included in the proposed programme of work for 1899.

17. *Drainage.*—Government having in G.O., No. 1253-M., Mis., dated 12th July 1898, directed that small schemes of drainage of the worst parts of the town should be taken up and carried out as funds become available, plans and estimates amounting to Rs. 43,800 for the sewerage of a portion of the town called Putnool block were prepared and sent to the Sanitary Board on 22nd August 1898, and have been approved by that body with a suggestion that a sewage farm be substituted for the filter beds. The scheme covers an area of about 27½ acres with five streets and a population of 1,215 persons in 296 houses. In the estimate are included Rs. 8,600 for compensation for property, the acquisition of which is necessary to the carrying out of the works. The proposed sewers are all of 6" diameter. There are 6 subsidiary sewers and one main sewer having a velocity of 2 feet per second. The total length of branch sewers will be 6,093 feet laid at a depth of between 8 and 13 feet. The main intercepting sewer is 1,567 feet in length and ends in a well from which the sewage will be lifted on to a filter bed. This bed is of two compartments, each of which will hold 420 cubic feet of sewage. After discharge from the filter the sewage is intended to run along a channel 400 feet long and empty itself into the South Branch Channel.

An alternative estimate was also framed for the construction of lanes with boundary walls at the back of and between the houses to be drained. This estimate amounted to Rs. 27,000.

At the instance of the Executive Engineer, Tanjore Division, the scheme for the drainage of Soliappa Mudaly Street was further considered and reported upon. The Public Works Department has been ordered to execute the work when funds are placed at its disposal by the Municipal Council.

Town.	District.	Population, 1891.
KURNOOL.	KURNOOL.	24,376.

18. On completion of water works in the town it was found that there remained an unspent balance of Rs. 5,820 out of the amount allotted for the works. The Municipal Council was of opinion that this sum could be utilized in fixing additional taps and requested the Sanitary Engineer to prepare detailed estimates for the work. This was accordingly done and the estimate amounting to Rs. 3,197 was sent to Government for sanction. Government disapproved of same and

considered that the unexpended balance would be better utilized in extending the pipes to a district where there were no pipes than in the manner proposed. An estimate amounting to Rs. 5,820 was accordingly prepared and forwarded to Government for sanction.

Town.	District.	Population, 1891.
MADURA.	MADURA.	87,428.

19. At the request of the Municipal Council the Sanitary Engineer furnished it with detailed and abstract estimates amounting to Rs. 3,260 for extending the pipe lines to the District Jail from the Lutheran Church.

Town.	District.	Population, 1891.
OOTACAMUND.	THE NILGIRIS.	15,053.

20. *Drainage.*—In G.O., No. 1989 M., Mis., dated 25th November 1898, the Sanitary Engineer was requested to revise, with reference to the remarks of the Sanitary Commissioner and his own, the plans and estimates submitted by the Executive Engineer on special duty for the drainage of one of the blocks of the Ootacamund Main Bazaar and also to submit complete estimates for the whole project, remodelling it, where necessary. The plans and sections not having been received before the close of the year nothing was done during the year. The matter is now receiving attention.

Town.	District.	Population, 1891.
PALAMCOTTAH.	TINNEVELLY.	18,686.

21. Government in G.O., No. 1349 M., Mis., dated 28th July 1898, requested the Sanitary Engineer to investigate a joint scheme for the water-supply of Palamcottah and Tinnevely when his other duties permitted him. The joint scheme had been, to a great extent, investigated, but time has not allowed of the preparation of a scheme for these towns, nor can it be placed on this year's (1899-1900) programme.

Town.	District.	Population, 1891.
PARLAKIMEDI.	GANJAM.	16,390.

22. The investigation of a scheme for the water-supply of this town ordered in G.O., No. 318-M., dated 3rd February 1898, has been put aside by order of Government in favour of schemes for Berhampur and Chatrapur which have been taken in hand.

Town.	District.	Population, 1891.
SRIHANGAM.	TRICHINOPOLY.	21,632.

23. On the recommendation of this department the proposal to draw water from the main belonging to the Trichinopoly water works for the water-supply of Srirangam has been ordered to be dropped, and the Sanitary Engineer was, in G.O., No. 488-M., Mis., dated 3rd March 1898, requested to prepare a scheme for the town with independent head works with a suggestion that the Coleroon might, with advantage, be adopted as a source for the supply instead of the Cauvery. Pressure of other work has prevented any attention being given to the preparation of this scheme.

Town.	District.	Population, 1891.
TANJORE.	TANJORE.	54,390.

24. *Water-supply.*—Government in G.O., No. 1365-M., Mis., dated 2nd August 1898, approved of the estimate amounting to Rs. 27,000 for the extension of the water works and ordered its execution by this department. Contracts for the supply of the water works materials and for laying and jointing pipes, &c., have been arranged, and the work will be put in hand on arrival of the materials in February 1899.

25. *Drainage.*—The scheme for the disposal of the sewage of the Fort described in the report for 1897 has been approved and ordered to be executed by

the Public Works Department as soon as the necessary funds are provided by the Council (G.O., No. 2176-M., dated 16th December 1898).

Town.	District.	Population, 1891.
TIRUVANNAMALAI.	SOUTH ARCOT.	13,650.

26. In response to a reference from Government and the Sanitary Board the town was inspected by the Assistant Sanitary Engineer to Government and a report made as to the feasibility or otherwise of the various proposed sources of supply with an approximate cost of execution and maintenance. The Sanitary Engineer in forwarding the report to Government remarked that the cheapest of the three schemes investigated, viz., the Samoodram valley scheme, was high in annual cost. Even if Government made a grant of one-half of the cost, it would be beyond the means of the Council to carry out; should Government concur in this opinion he suggested that the Hill Reservoir scheme should further be investigated with the view of obtaining a moderate or partial supply and that the Municipal Council should be requested to make available Rs. 400 or 500 for taking the necessary contours and making a survey of the town.

Town.	District.	Population, 1891.
TRICHINOPOLY.	TRICHINOPOLY.	90,609.

27. On 24th January 1898 the Chairman reported that pumping to the town was impossible owing to quantities of sand being thereby drawn into the well. The Acting Sanitary Engineer Mr. Russell inspected the works and, after certain experiments made, thought that the inlet pipe laid between the screening chamber and suction well had broken and that the sand was coming through it. He then sent a report to the Sanitary Board on the subject describing the arrangements made to give the town temporarily an adequate supply of water and detailing the recommendations regarding the permanent repairs to the water works. These were—

- (1) That the suction well be abandoned and filled in.
- (2) That a new suction well be sunk outside the engine-house or the screening well be used as a suction well after removing the screens from it as they are not required.
- (3) That the construction of the three proposed additional infiltration wells be put in hand at an early date.

Plans and estimates amounting to Rs. 12,380 for the proposed alterations to the suction pipes of the engines were also forwarded to Government through the Chief Engineer, Public Works Department, for sanction.

The works were inspected by the undersigned on return from leave and after examination it was ascertained that the inlet pipe had not broken and that the sand found in the pump well was the sand that came from the infiltration wells which had been drawn through the pipe by over-pumping. Pumping from the screening chamber was discontinued as unnecessary and the expensive proposals made under the erroneous impression that the inlet pipe had been broken were set aside. The estimate for Rs. 12,380 has therefore been held in abeyance, but the proposals for a service reservoir and for a balance valve on the delivery main as also the improvements to the pumps and engines suggested by Messrs. James Simpson and Company, the suppliers of the engines, were concurred in by the Public Works Department. Government have called for detailed plans and estimates for these improvements.

The Chairman, Municipal Council, Trichinopoly, in July 1897, reported to Government that the collecting wells, the screening chamber and the engine and boiler house at the head works were unsatisfactorily constructed. The Government, after obtaining the remarks of the Sanitary Engineer on the points noticed by the Chairman, requested the Public Works Department to direct the Superintending Engineer, VI Circle, to inspect the works and to give his opinion on their state. An inspection was accordingly made, and the report and the Chief Engineer's views thereon were before Government, but no orders were passed before the year closed.

A suggestion was made by the Municipal Council to dig a spring channel in the Cauvery in the hot weather before sinking the three additional infiltration wells proposed by this department, the channel being made to discharge into the screening chamber. This was to be an experimental measure at first, but to become permanent, if it proved a success. The proposal was carefully considered by the Sanitary Engineer who was unable to approve of it especially on sanitary grounds and as also likely to affect the utility of the works.

Town.	District.	Population, 1891.
TUTICORIN.	TINNEVELLY.	25,107.

28. During the year the Municipal Council of Tuticorin urged upon Government the necessity of deciding, without further delay, upon some particular water-supply scheme suitable to the financial and sanitary position of the town. The Government on hearing the views of the Sanitary Board on the various schemes presented by the Sanitary Engineer, said that, as the adoption of any particular scheme of water-supply must depend mainly on the amount of contribution or aid which it can afford to give to the Municipal Council, nothing could be done until its financial position was clearer.

The Sanitary Engineer in answer to an enquiry from Government said that he was unable to suggest any cheaper scheme than the one he had already sent to Government. There is, however, before Government a proposal of the President of the Sanitary Board to expend a lakh of rupees in the construction of a conduit and water-tight reservoirs in different parts of the town.

Town.	District.	Population, 1891.
VIZIANAGRAM.	VIZAGAPATAM.	30,881.

29. A scheme for the water-supply of the town was prepared and submitted to the Sanitary Board during the year.

The scheme, in brief, is as follows:—

To construct an infiltration gallery or trench 1,700 feet long parallel to, and about 100 feet from, the Ootaigedda a perennial stream about a mile and a half to the north of the town; to pump the water so obtained into a reservoir at a sufficient elevation on the adjoining hill and finally to distribute the supply from the reservoir by pipes and fountains in the usual manner. The scheme provides for a population of 40,000 at 15 gallons per head, and is estimated to cost Rs. 2,82,000. The annual pumping and maintenance charges are estimated at Rs. 9,000. The scheme is now under the consideration of the Board.

30. *Chatrapur Water-supply.*—At the request of Government, surveys and levels were taken in this town with the view of the preparation of a water-supply scheme, but the work was not completed before the year closed.

31. *Pudukkottai Water-supply.*—The water-supply of Pudukkottai was investigated by the Assistant Sanitary Engineer, and in November 1898 report, plans and estimates for two schemes were forwarded to the Political Agent for Pudukkottai. One is a pumping scheme with the Pudukolam tank as its source of supply, and the other a gravitation scheme having, as its source of supply, a new tank to be formed to the north-west of the town. The former is estimated to cost Rs. 46,300 with the annual working charges of Rs. 2,700 against an initial cost of Rs. 77,700, and annual working charges of Rs. 700 for the latter. The scheme recommended for adoption is the Pudukolam scheme as the tank is in existence and the available supply can be accurately gauged, whereas in the case of the other scheme there is an element of doubt as the tank is one to be formed hereafter. The Pudukolam scheme would provide $6\frac{1}{2}$ gallons per head per diem for the entire population of 16,855. The scheme provides for the filtration of water and distribution in the usual manner by pipes and fountains.

32. *Miscellaneous.*—At the request of Government the Sanitary Engineer forwarded certain proposals in view to the protection of the Secretariat buildings

ADMINISTRATION REPORT OF THE

in the Fort from fire. The cost was estimated at Rs. 3,360. The matter was then referred to a committee consisting of the Consulting Architect, the Sanitary Engineer and the Executive Engineer, Military Works. The committee's report is now before Government.

33. *Execution of Major Sanitary Works.*—The Sanitary Engineer requested Government to retransfer to him the work of executing the water and drainage schemes designed by him. The subject is under the consideration of Government.

34. At the request of Government copies of town plans showing pipe lines and fountains in the municipalities of Madura, Dindigul, Tanjore, Trichinopoly, Adóni, Kurnool, Conjeeveram and Cuddapah were furnished during the year.

35. The following statement shows the papers on which advice was given to the Sanitary Board during the year :—

I.—MINOR DRAINAGE WORKS—

The Municipality of—
Nellore.
Palghat.
Tanjore.

The Taluk Board of—
Rajahmundry.

II.—MINOR WATER-SUPPLY WORKS—

The Municipality of—
Cannanore.
Ellore.
Kumbakónam.
Palni.
Srivilliputtúr.
Tiruvannámalai.

The District Board of—
Kistna.
Madura.
Nellore.
Trichinopoly.

The Taluk Board of—
Bezwada.
Chidambaram.
Ellore.
Erode.
Guntúr.
Kumbakónam.
Madura.
Mangalore.
Mannargudi.
Masulipatam.
Narasaraopet.
Negapatam.
Penukonda.
Proddatur.
Pattukottai.
Tindivanam.
Wynaad.

III.—HOSPITALS—

The Municipality of—
Bellary.
Bezwada.
Coonoor.
Erode.
Kumbakónam.
Madras.
Masulipatam.
Palghat.
Tirupattur.
Váníyambádi.

III.—HOSPITALS—cont.

The District Board of—
Ganjám.
Górávari.
Kistna.
Madura.
North Arcot.
Salem.
Vizagapatam.

The Taluk Board of—
Arni.
Chingleput.
Hospet.
Hosur.
Kumbakónam.
Námakkal.
Proddatur.
Tinnevely.

IV.—MARKETS—

The Municipality of—
Palghat.

The District Board of—
Madura.

The Taluk Board of—
Calicut.
Dindigul.
Hosur.
Palghat.
Pattukottai.
Rajahmundry.
Tinnevely.

V.—SLAUGHTER-HOUSES—

The Municipality of—
Nellore.

The District Board of—
Salem.

The Taluk Board of—
Proddatur.

VI.—LATRINES—

The Municipality of—
Chidambaram.
Palghat.

The District Board of—
The Nilgiris.

VII.—EXTENSION OF VILLAGE SITE—

The Municipality of—
Cocanada.

VIII.—FILTERS.

36. The following type plans from Nos. 47 to 66 were prepared by the Consulting Architect to Government :—

47. Site plan of hospital with fifty-two beds.
48. Administrative block.
49. Administrative block for a hospital.
50. Store block for a hospital.
51. Hospital kitchen.
52. Ward for fourteen beds.
53. Ward for eight beds.
54. Ward for four beds.
55. Lying-in ward or isolation ward for sceptic cases, &c.
56. Hospital laundry.
57. Mortuary and post-mortem room for hospitals below twenty beds.
58. Mortuary and post-mortem room for hospitals of twenty beds and above.
59. Matrons' quarters.
60. Hospital Assistants' quarters.
61. Out-houses for matrons' and hospital assistants' quarters.
62. Compounders', hospital servants' and midwives' quarters, also caste wards for both males and females.
63. Dispensary.
64. Dispensary (sections).
65. Ambulance shed for wheeled ambulances.
66. Ambulance shed for doolies or dandies.

37. The following type plans were prepared by the Sanitary Engineer during the year and were approved of by the Sanitary Board :—

67. Type design for a semi-permanent ward for four beds (suitable for general diseases).
68. Type design for a semi-permanent ward for four beds (suitable for isolation cases).
69. Type design for a choultry.
70. Type design for a weekly market for mofussil stations.
71. Alternative type design for a weekly market for mofussil stations.
72. Type design for a weekly market for mofussil stations (with Mangalore tiled roofing supported by iron rail standards).
73. Type design for a ward for caste patients.
74. Type design for a ward for four beds also suitable for venereal cases (females) alternative to type design No. 54.
75. Type design for a house latrine.
76. Type design for a single latrine with twelve seats.
77. Type design for a double latrine with twelve seats.
78. Type design for a double latrine with twenty seats.
79. Type design for an iron water-tight conservancy cart.

PERSONAL PROCEEDINGS.

38. Table No. 1 of the appendix shows the towns visited during 1898. It will be observed that the Sanitary Engineer during nine months in the year visited the following municipal towns in addition to the town of Chatrapur :—

- | | |
|-------------------------------|---------------------------|
| (1) Berhampur, | (3) Kumbakónam, |
| (2) Conjeeveram (four times), | (4) Trichinopoly (twice). |

The Acting Sanitary Engineer visited ten towns, viz., Adóni, Bezwada, Chidambaram, Conjeeveram, Dindigul, Guntúr, Parlákimedi, Trichinopoly (twice), Vizagapatam and Vizianagram; the Assistant Sanitary Engineer to Government visited the following towns :—

- | | |
|--------------------------------|-----------------------------|
| (1) Bezwada, | (7) Madura, |
| (2) Calicut, | (8) Tanjore, |
| (3) Conjeeveram (eight times), | (9) Tiruvannámalai, |
| (4) Dindigul, | (10) Trichinopoly (thrice), |
| (5) Guntúr (four times), | (11) Vizagapatam, |
| (6) Kumbakónam, | (12) Vizianagram. |

39. The following is a record of the travelling done during the year :—

	By the Sanitary Engineer.	By the Acting Sanitary Engineer.	By the Assistant Sanitary Engineer.
Number of visits to towns	9	11	24
Number of miles by sea	..	374	..
Do. by rail	3,756	4,366	9,419½
Do. by canal	..	..	..
Do. by road	60	233	309
Total Miles ..	3,816	4,973	9,728½
Number of days on tour ..	25	30	75

MAINTENANCE OF WATER WORKS.

40. The works in operation at Adóni, Cuddapah, Kurnool, Madura, Dindigul, Trichinopoly, Tanjore and Conjeeveram were maintained in charge of the respective Municipal Councils throughout the year.

41. During the year the Sanitary Engineer visited Trichinopoly and the Assistant Sanitary Engineer visited Madura, Dindigul and Tanjore.

42. The Inspector of Steam-boilers and Prime-movers visited the under-mentioned pumping stations during the year under review and made a complete inspection of the engines, boilers and pumps :—

Kurnool (twice),	Cuddapah (twice),
Conjeeveram (twice),	Tanjore (thrice),
Dindigul (twice),	Madura (thrice).
Trichinopoly (five times),	

43. In regard to these inspections, details will be given by the Inspector of Steam-boilers and Prime-movers in his report.

44. The Inspector, after completing the survey of each station's plant, forwarded reports, which were sent to the respective Municipal Chairmen for their information and guidance, with the request that repairs, additions and alterations, as mentioned, be carried out as early as practicable.

45. It was reported on the second inspection that repairs advised in two cases were still incomplete; this neglect will involve a larger amount of unnecessary expenditure to put the parts in repair than would have been necessary if such had been carried out as soon as they arose; moreover engines in bad repair require much more fuel and oil to work them.

46. Indicator diagrams were taken from the engines, and the indicated power of each engine determined. Fuel trials were conducted by the Inspector for the purpose of ascertaining the amount of fuel expended per pump horse-power throughout an ordinary day's work; the expenditure of fuel compares favourably with the results of the inspection of 1897, but reductions were made at only two stations. The price of coal was higher this year than during the last year; should the price of coal be lowered as it might be by the opening of the East Coast Railway, it will be advisable for most municipalities to use it in place of wood for generating steam at their respective pumping stations.

47. The Inspector reports that the general condition and working of each station's plant are good.

CONCLUDING REMARKS.

48. Inventories of valuable stock have been maintained in this office.
 49. The service registers have been duly maintained and kept up to date.
 50. The conduct of the staff has been satisfactory.

J. A. JONES, M.I.C.E., F.R.S.E.,
Sanitary Engineer to Government.

OFFICE OF SANITARY ENGINEER TO GOVERNMENT,
 PEONAMALLEE ROAD, (PARK TOWN),
 Madras, 28th February 1899.

APPENDIX

TABLES NOS. 1 AND 2.

TABLE

Statement showing progress made in respect of Water-supply

District.	Serial number of Municipalities.	Town.	Date of inspection of town.	Date of preliminary report (1) Water-supply. (2) Drainage.	Whether Council has sanctioned funds for surveys and levels.	Under survey or not.	Water-supply Estimate under preparation or not.
1. Anantapur	1	Anantapur	S.E. 21/22-9-92	(1) 26-9-92			
2. Bellary	2	Adoni	Ag. S.E. 11-3-98				Water works
	3	Bellary	A.S.E.—24 to 29-2-96; 22/23-3-96; 10/11-4-96; 11/16-5-96 and 1 to 26-6-96.	(1) 15-10-90	Yes	Completed	Prepared.
3. Chingleput	4	Chingleput					
	5	Conjeevaram	Ag. S.E.—4-3-98; S.E.—14-6-98; 23-6-98; 18-8-98; 20-10-98. Aest. S.E.—4-3-98; 5/6-5-98; 4/5-7-98; 5-8-98; 26-8-98; 16-9-98; 29-9-98; and 13-12-98.	(1) 19-12-90	Yes		Water-works
	6	Coimbatore	A.S.E.—17 to 20-3-93	(1) & (2) 21-11-90.	Yes	Completed	Prepared.
4. Coimbatore	7	Erode	A.S.E.—16 to 19-12-91.		Yes		
	8	Karur	A.S.E.—11 to 13-6-93		Yes		
5. Cuddapah	9	Cuddapah	A.S.E.—14/15-4-97	(1) 3-9-90; (2) 17-9-94.	Yes		Water-works
	10	Berhampur	S.E.—20, 26-9-98	(1) & (2) 20-2-91		In Progress.	
6. Ganjam	11	Chicacole	S.E.—26-2-92	(1) & (2) 2-3-92			
	12	Parlakimedi	Ag. S.E. 20/22-3-98				
	13	Cocanada	S.E.—5 to 7-3-92	(1) & (2) 31-1-91; (1) 2-2-91.	Yes	Completed	Prepared.
7. Gólkávari	14	Ellore	A.S.E.—27/28-6-92	(1) & (2) 7-2-91	Yes		
	15	Rajahmundry	A.S.E.—26/27-7-94	(1) 9-2-91	Yes	Completed	
	16	Bezwađa	Ag. S.E.—23-3-98; A.S.E.—20/21-3-98.		Yes	Completed	Prepared.
8. Kistna	17	Guntúr	Ag. S.E. 16/21-2-98; A.S.E.—16/25-2-98; 22/24-3-98; 16/22-5-98; and 8/13-8-98.	(1) & (2) 15-2-91	Yes	Completed by Local Fund Engineer.	
9. Kurnool	18	Masulipatam	S.E.—18/19-2-91	(1) 25-2-91			
	19	Kurnool	S.E.—15/19-3-97; 3 to 6-8-97; 12 to 15-10-97.	(1) 10-4-91			Water-works
10. Madura	20	Dindigal	Ag. S.E.—17/18-1-98	(1) 15-9-90			Water-works
	21	Madura	A.S.E.—22/23-11-98				
	22	Palni	A.S.E.—24-11-98; S.E.—23, 24-10-91	(1) 8-4-90; (1) & (2) 27-10-91.	Yes	Completed	Water-works

No. 1.

and Drainage of District Municipalities during 1898.

supply.		Drainage.				Remarks.
Date on which scheme was forwarded.	Amount of estimate sent in or anticipated cost.	Under survey or not.	Estimate under preparation or not.	Date on which scheme was forwarded.	Amount of estimate sent in or anticipated cost.	
...	RS.				RS.	Preparation of a water-supply scheme ordered to be dropped in G.O., No. 2108 M., Mis., dated 22nd December 1892.
completed in 1895.						Drainage scheme is under contemplation of the Council.
29-7-96	8,00,000					Hagri scheme, estimated to cost 8 lakhs of rupees, has been approved by Government, but its execution has been abandoned on financial grounds (G.O., No. 1463 M., dated 21st June 1897).
completed in 1897.						Constituted into a Municipality in October 1896. Extension of the water-works is nearly completed.
1-10-92	(1) 4,01,000 (2) 3,72,000	Completed.				This scheme has been allowed to lie over pending revision of the District Municipalities Act of 1884, which provides for extended powers of taxation.
		Completed.				Temporary measure to improve the water-supply of the town suggested by the Sanitary Commissioner is under consideration. The Council is anxious to go on with a complete scheme. Scheme for drainage not yet drawn up.
		Completed.	Prepared	28-11-93	95,853	A water-supply scheme has been ordered to precede the drainage scheme. Pressure of other works delayed its preparation.
completed in 1893.		Completed.	Prepared	31-5-97	5,40,000	A scheme for drainage has been submitted and is under consideration by the Sanitary Board.
						Levels are now being taken for water-supply scheme.
						Council has not taken any steps to improve its drainage.
						The investigation for a water-supply scheme has been put aside by order of Government (G.O., No. 1078 M., Mis., dated 13th June 1898.)
7-11-92	3,74,396					Water-works are being executed by the Public Works Department.
15-2-97	(1) 1,70,000 (2) 1,28,000	Completed.				Council requests that a water-supply scheme may be prepared and submitted to Government.
						Preparation of the water-supply scheme has been delayed owing to the proposed change of pumping station site which involves further investigation and survey.
5-8-98	3,75,400	Completed.				A water-supply scheme has been submitted and is under the consideration by the Sanitary Board.
		Completed by Local Fund Engineer.				A water-supply scheme is under preparation. Surveys and levels have been taken for drainage scheme.
						No progress has been made in regard to drainage or water-supply.
completed in 1897.						An estimate for the extension of works is under the consideration of Government.
completed in 1896.						Other sources for augmenting the town supply are being investigated.
completed in 1894.		Completed.				Scheme for drainage not yet drawn up.
		Completed.				Schemes for water-supply and drainage not yet drawn up.

TABLE

Statement showing progress made in respect of Water-supply

District	Serial number of Municipalities.	Town.	Date of inspection of town.	Date of preliminary report— (1) Water-supply. (2) Drainage.	Whether Council has sanctioned funds for surveys and levels.	Water.	
						Under survey or not.	Estimate under preparation or not.
10. Madura—cont.	23	Periyakulam	S.E.—20/21-10-91	(1) & (2) 23-10-91.	...	...	...
	24	Calicut	A.S.E.—17-21-10-98	(1) & (2) 12-10-96.	Yes	Completed	...
	25	Cannanore	S.E.—26 to 28-7-91	(1) & (2) 30-7-91	...	...	...
11. Malabar	26	Cochin	S.E.—6 to 14-9-95	(1) & (2) 3-9-91.	...	...	Prepared.
	27	Palghat	S.E.—18/19-9-97	(1) & (2) 6-8-91	Yes	...	...
	28	Tollicherry	S.E.—29/31-7-91	...	...	...	...
	29	Nellore	A.S.E.—21/23-10-92	...	Yes	Completed	...
12. Nellore	30	Ongole	S.E.—17 to 20-3-91	(1) 7-4-91	...	Completed	Prepared.
13. Nilgiris	31	Coonoor	S.E.—23 to 28-8-96	...	Yes	Completed	Prepared.
	32	Ootacamund	S.E.—3 to 8-4-95 and 8 to 30-6-95.	(1) 3-9-90	...	Completed	...
14. North Arcot	33	Gudiyattam	A.S.E.—14 to 16-7-96; 27 to 29-7-96; and 27-10-96.	(1) 18-12-95	Yes	Completed	Prepared.
	34	Tirupati	A.S.E.—15/16-1-97; 25/26-2-97.	(2) 1-7-90	Yes	Completed	Prepared.
	35	Vellore	A.S.E.—6 to 8-12-95	(1) & (2) 12-5-90.	Yes	Completed	Prepared.
	36	Wáájapet	...	...	...	...	...
15. Salem	37	Salem	Ag. S.E.—14 to 19-5-94. A.S.E.—14 to 23-5-94.	(1) 30-9-91	Yes	Completed	...
	38	Tiruppattūr	A.S.E.—20 to 22-7-93.	(1) & (2) 26-12-91.	Yes	...	...
	39	Vániyambádi	A.S.E.—21/22-12-91	(1) & (2) 26-12-91.	Yes	...	...
16. South Arcot	40	Chidambaram	Ag. S.E.—14/16-1-98	...	Yes	Completed	...
	41	Cuddalore	A.S.E.—6 to 8-12-94, and 21 to 25-12-94.	(1) & (2) 17-11-91.	Yes	Completed	Prepared.
	42	Tiruvannámalai	A.S.E.—11/18-7-98	...	...	...	...
17. South Canara	43	Mangalore	S.E.—20 to 28-9-97	(1) & (2) 9-10-96	Yes	Completed	...
18. Tanjore	44	Kumbakonam	S.E.—19 to 21-6-98. A.S.E.—10 to 12-3-98.	...	Yes	Completed	...

No. 1—continued.

and Drainage of District Municipalities during 1898—continued.

supply.		Drainage.				Remarks.
Date on which scheme was forwarded.	Amount of estimate sent in or anticipated cost.	Under survey or not.	Estimate under preparation or not.	Date on which scheme was forwarded.	Amount of estimate sent in or anticipated cost.	
...	Rs.	...	...	...	Rs.	Scheme for water-supply will be investigated during 1899-1900.
...	...	Completed.	...	...	...	Scheme for water-supply is under investigation.
...	...	...	...	...	...	Council has not taken any steps to improve its water-supply, which is urgently needed principally to the Moplah quarters.
...	...	...	...	...	...	Deep well-boring has been abandoned. The other schemes proposed are, owing to their cost, impracticable and the question of water-supply is therefore postponed for the present (G.O., No. 65 M., Mis., dated 11th January 1896).
...	...	...	...	...	...	Drainage scheme not yet drawn up.
...	...	Completed.	...	...	...	Works of water-supply or drainage not urgent to this town.
...	...	Completed.	...	...	...	These schemes have been allowed to lie over pending the revision of the District Municipalities Act, which provides for extended powers of taxation.
22-4-92	(1) 1,20,000 (2) 49,700	...	...	...	...	The new Act recently passed may allow of one of the schemes already prepared being carried out.
29-4-97	1,13,800	Drainage works completed in 1893.				A water-supply scheme is under consideration by Government.
...	35,700	Kandal drainage completed in 1892.				A portion of the water-supply scheme drawn up by Mr. G. T. Walsh is sanctioned for execution by the Public Works Department (G.O., No. 15 M., Mis., dated 4th January 1898). Plans and estimates prepared by Mr. Somers-Eve for the drainage of Ootacamund Main Bazaar are under revision.
4-12-96	51,500	...	...	...	...	Government has ruled that if the Municipal Council cannot carry out the work without the assistance of Provincial finances, which the Government is unable to promise, the question of a water-supply for the town must stand over for the present (G.O., No. 1772 M., Mis., dated 13th August 1897).
1-4-96	2,31,000	Completed.	Prepared ...	7-9-91	96,000	Drainage scheme sanctioned but execution deferred. Water-works are being executed by the Public Works Department.
9-12-91	3,13,000	Completed.	Prepared ...	...	2,11,000	Water-supply scheme abandoned as being too costly. Drainage works executed piecemeal were ordered to be stopped (G.O., No. 1302 M., Mis., dated 5th August 1896).
...	...	...	...	...	...	No major scheme proposed.
...	...	Completed.	...	...	...	Public Works Department is investigating a water-supply scheme.
...	...	Completed.	...	...	...	Scheme for drainage not yet drawn up.
...	...	Completed.	...	...	...	The Council has allotted funds for survey and levels for drainage scheme, but the Sanitary Commissioner considers that water-supply should precede drainage. Neither of them could be dealt with until other towns, that are urgently in need of improvements, are done with.
...	...	...	...	...	...	Further investigation for the water-supply scheme of the town will be made early in 1899-1900.
8-1-95	3,71,200	Completed.	...	...	...	The financing of the water-supply scheme is still under the consideration of the council.
10-8-98	3,56,000 1,55,000	...	...	...	...	A report on the preliminary investigation of a water-supply scheme is now under the consideration of Government.
...	...	Completed.	...	...	...	Surveys and levels have been taken for water-supply and drainage schemes.
...	...	Completed.	Prepared ...	19-12-95 22-8-98	6,250 43,800	Surveys and levels have been taken for the water-supply scheme and a scheme is under preparation. Public Works Department has been requested to execute the sewerage works of Soliappa Moodelly Street costing Rs. 6,250 when the Council allots funds for the purpose. Plans and estimates amounting to Rs. 43,800 for the drainage of Putnool block have been approved by the Sanitary Board with a suggestion that a sewage farm be substituted for the filter-beds.

TABLE

Statement showing progress made in respect of Water-supply

District.	Serial number of Municipalities.	Town.	Date of inspection of town.	Date of preliminary report-- (1) Water-supply. (2) Drainage.	Whether Council has sanctioned funds for surveys and levels.	Under survey or not.	Estimate under preparation or not.
18. Tanjore—cont.	15	Mannārgudi	...	...	...	...	...
	46	Māyavaram	...	...	...	...	...
	47	Negapatam	S.E.—17/18-2-90 A.S.E.—2 to 4-2-96.	(2) 16-12-90	Yes	Completed	Prepared.
	48	Tanjor	A.S.E.—25-11-98	(1) 2-6-90	Yes	...	Water-work
19. Tinnevely	49	Palamcottah	A.S.E. 27 to 29-1-96	(1) 25-11-91	Yes	Completed.	...
	50	Srivilliputtūr	...	...	...	...	...
	51	Tinnevely	A.S.E.—24-8-95	(1) 25-11-91	Yes	Completed.	...
	52	Tuticorin	S.E.—8 to 12-8-92	(1) 30-11-91	Yes	Completed.	Prepared.
20. Trichinopoly	53	Srirangam	S.E.—16/17-9-90	...	...	Completed.	Prepared.
	54	Trichinopoly	Ag. S.E.—25/27-1-98; 4/7-2-98. S.E.—13/15-4-98; 12/15-7-98. A.S.E.—25/28-1-98; 6/8-4-98; 19/24-4-98.	(1) 21-4-90	...	...	Water-work
	55	Anakāpalle	...	...	...	...	...
21. Vizagapatam	56	Bimlipatam	...	...	...	...	...
	57	Vizagapatam	Ag. S.E.—14/17-3-98. A.S.E.—14/17-3-98.	(1) & (2) 31-1-91.	Yes	Completed.	Prepared.
	58	Vizianagram	Ag. S.E.—18/19-3-98. A.S.E. 17/19-3-98.	...	Yes	Completed.	Prepared.

No. 1—concluded.

and Drainage of District Municipalities during 1898—concluded.

Supply.		Drainage.				Remarks.
Date on which scheme was forwarded.	Amount of estimate sent in or anticipated cost.	Under survey or not.	Estimate under preparation or not.	Date on which scheme was forwarded.	Amount of estimate sent in or anticipated cost.	
...	Rs. ...	...	...	...	Rs. ...	No major scheme proposed in regard to these towns.
11-2-97	(1) 9,89,680 (2) 7,22,720	Completed.	Prepared	8-2-92	4,13,000	
completed in 1895.	...	Completed.	Prepared	18-9-97	33,440	Water-supply scheme is under the consideration of the Sanitary Board. Drainage scheme sanctioned in 1893, but execution held in abeyance, as the Council desired that water-supply scheme should precede the drainage scheme.
...	...	...	...	...	...	Arrangements are being made to carry out the extension of the water-works estimated to cost Rs. 27,000, sanctioned in G.O., No. 1365 M., Mis., dated 2nd August 1898. A scheme for the disposal of sewage of the fort by gravitation is sanctioned for execution by the Public Works Department (G.O., No. 2176 M., dated 16th Dec. 1898).
...	...	...	...	...	...	Surveys and levels for a joint water-supply scheme with the Municipality and the District Board of Tinnevely have been completed.
...	...	Completed.	...	...	...	Constituted into a Municipality in October 1894.
...	...	...	...	...	...	Surveys and levels for a joint water-supply scheme with the Municipality of Palamcottah and the District Board of Tinnevely have been completed.
28-7-96	(1) 2,73,140 (2) 3,30,800	...	...	...	...	Several schemes are before Government.
10-2-96	1,75,000	...	...	...	...	This is a preliminary estimate for supplying from the head works of Trichinopoly. An independent scheme has been ordered to be prepared (G.O., No. 488 M., Mis., dated 3rd March 1898).
completed in 1896.	...	...	...	...	...	Plans and estimates amounting to Rs 2,08,200 for the extension of water-supply to Worraiyur and Pattur, have been sanctioned for execution (G.O., No. 54 M., dated 11th January 1899).
...	...	...	...	...	...	No major scheme proposed in regard to these towns.
...	...	...	...	...	...	
23-7-96	4,21,000	Completed.	...	...	...	Water-works are being executed by the Public Works Department.
30-3-98	2,82,000	...	...	...	...	Scheme for water-supply is under the consideration of the Sanitary Board.

TABLE No. 2.

CONJEEVERAM WATER WORKS, INCLUDING EXTENSION.

Statement of work done during the year 1898.

1 No.	2 Main head.	3 Work done previously.		4 Work done during 1898.		5 Work to be done.		6 Total estimated cost.		7 Remarks.
		Percent- age.	Value.	Percent- age.	Value.	Percent- age.	Value.	Percent- age.	Value.	
1	Infiltration works	100	Rs. 13,588	...	Rs. ...	...	Rs. ...	100	Rs. 13,588	
2	Collecting chamber	100	1,412	...	...	...	...	100	1,412	
3	Suction well and valve house	100	2,582	...	...	...	...	100	2,582	
4	Engine and boiler house.	100	10,647	...	...	...	...	100	10,654	
5	Store shed	100	1,958	...	...	...	...	100	1,958	
6	Engine Drivers' quarters	100	4,098	...	...	...	...	100	4,098	
7	Compensation for land, metalling and fencing.	31	1,177	69	2,528	...	...	100	3,765	
8	Engines, pumps and boilers	100	22,404	...	...	...	...	100	22,405	
9	Supply and delivery of pipes, &c.	86	1,19,754	12	17,405	2	1,741	100	1,38,900	
10	Laying and jointing pipes, &c.	81	21,887	18	4,976	1	137	100	27,000	
11	Service reservoir	...	...	81	17,360	19	3,940	100	21,300	
12	Tools and plant	78	400	...	...	...	...	100	513	
13	Establishment and office contingencies	74	* 6,513	14	† 1,268	12	1,046	100	8,827	
Total		80	2,06,420	17	43,537	3	6,864	100	2,57,000	

Materials at site.		Rs.
1	Departmentally collected and paid for	...
2	Departmentally collected and unpaid for	...
3	Supplied by contractors and paid for	...
4	Supplied by contractors and unpaid for	...
Total value of materials collected for the works (items 1, 2, 3 and 4) and remaining unused on 31st December 1898.		...
Total value of work done up to 31st December 1898 (as per table above columns 3 and 4 'work done').		2,49,957
(a)	Grand Total	2,49,957
(b)	Total estimated cost	2,57,000
† Percentage of work done (inclusive of materials at site, viz., items 1, 2, 3 and 4)		97 per cent.

* This includes Rs. 3,114 met from Provincial Revenues on account of pay, &c., of the Supervisor in charge of the works.

† This includes Rs. 860 met from Provincial Revenues on account of pay, &c., of the Supervisor in charge of the works.

‡ As (a) to (b), i.e., percentage (a) bears to (b).

No. 1409 L., 15th JULY 1899.

GOVERNMENT OF MADRAS.

LOCAL AND MUNICIPAL DEPARTMENT.

Read—the following paper :—

Proceedings of the Sanitary Board, No. 299-S., dated 10th June 1899.

Read—the following papers :—

Report of the Sanitary Engineer to the Government of Madras for the year 1898.

" " Commissioner for Madras for the year 1898.

" " Board for the year 1898.

From the Sanitary Commissioner, No. 1505-S., dated 19th May 1899.

Resolution—No. 299-S., dated 10th June 1899.

Submitted to Government with reference to rule 20 of the "Rules for conducting the business of the Sanitary Board."

2. With reference to paragraph 1 of G.O., No. 1475 L., dated 13th August 1898, it is explained that the delay in the submission of these reports is due to the late receipt of the report of the Sanitary Commissioner, which reached the Sanitary Board only on the 5th June 1899.

ORDER—No. 1409 L., dated 15th July 1899.

With the proceedings read above, the Sanitary Board submits the reports of the Sanitary Commissioner and the Sanitary Engineer on the administration of their departments in 1898, and a separate report regarding the work done by the Board itself during the year. These reports were due in the Government office on the 15th May 1899 and the delay of one month in their submission was due to the late receipt, in the Board's office, of the report of the Sanitary Commissioner. The circumstances under which the report last named was not submitted in proper time, notwithstanding the resolution of the Government of India communicated with G.O., No. 599 L., dated 28th March 1898, should have been explained.

GENERAL SANITATION.

2. *Rainfall.*—The average quantity of rain registered during the south-west monsoon fell from 34.35 to 25.70 inches, while that during the north-east monsoon rose from 8.19 to 21.07 inches, the total average rainfall for the whole year being 51.32 inches or 3.18 inches more than in the previous year. The rainfall of the south-west monsoon was, however, very nearly up to the average for the ten years ending 1895, although there were considerable variations in South Canara (+ 9.54 inches), Vizagapatam (—6.43), Cuddapah (—4.40) and Anantapur (—4.38). On the other hand, the rainfall during the north-east monsoon was in excess of the average by 6.13 inches, the excess being considerable in Chingleput (23.52), South Arcot (22.83), Madras (19.24), Tanjore (15.39) and Trichinopoly (10.53). In Ganjám, Vizagapatam, Kistna, Kurnool, Bellary and Anantapur the rainfall was below the average.

3. *Prices of Food Grains.*—The prices of the principal food grains are compared below with those of the preceding two years and with the average for the ten years ending with 1895:—

	Number of seers for the rupee.			Average for the ten years ending with 1895.
	1898.	1897.	1896.	
Rice	10.1	9.9	12.7	13.0
Ragi	17.2	17.2	25.8	25.3
Cholam	16.1	14.5	22.6	23.4

As a result of the favourable rainfall, there was a slight decrease in the price of rice and a more appreciable reduction in that of cholam, although the prices were still much below the average for the ten years ending with 1895. The average price of ragi, however, continued unaltered owing apparently to stocks not having been fully replenished after the unusual depletion which must have occurred in consequence of the abnormal demand for it during the famine of 1897 in the districts in which the staple grain, namely cholam, had failed. The Sanitary Commissioner considers that the appearance of plague and the belief of the native population that the year 1899-1900 would be a disastrous one have made the ryots unwilling to part with their grain and have thus prevented an appreciable fall in the prices of food-grains.

4. *Vital Statistics* *.—There was no change in the system of registration. Returns of births and deaths were received in respect of a population of 33,288,122 according to the census of 1891. The increase of 649,879 persons brought under registration in 1898 in Madura, Ganjám and Vizagapatam has not been explained.

5. *Births.*—The number of births registered during the year was 911,742 or 27.4 per mille of the census population against 935,845 or 28.7 per mille in the previous year, the rates for the urban and rural areas being 33.0 and 26.9 against 32.7 and 28.4, respectively, in that year. The decrease in the total number of births is ascribed partly to marriages having been as far as possible deferred during the past three years in consequence of the expectation of "evil times" by the native population, and partly to the prevalence of famine in Bellary, Kurnool, Cuddapah, Ganjám and Vizagapatam and to defective registration chiefly in Madura. Excluding Madras, the highest birth-rate was recorded in the Chingleput district (35.7 per mille) and the results were also fair in Kistna, Salem, Tanjore, Tinnevely and Trichinopoly, the rate being more than 30 per mille. The lowest rates were recorded in Malabar (18.6), Madura (22.7) and Ganjám (22.9); in Malabar there has been a retrogression for three years in succession and in Ganjám for two years, notwithstanding the fact that the attention of the Collectors concerned was specially drawn to this matter in the review of the report for the previous year. These officers are now requested to report the steps which they propose to take, to effect an improvement in this direction. Amongst Municipalities, Vaniyambádi headed the list with a rate of 54.5 and the rate exceeded 40 per mille in Guntúr, Cuddalore, Tiruvannámalai, Periyakulam, Adóni, Gudiyáttam, Tiruppattúr, Coimbatore, Erode, Karúr and Palghat. In 31 towns it ranged between 40 and 30 and in fourteen others between 30 and 20, while in Cuddapah, it was only 17.6 per mille against 27.1 in the previous year, thus indicating neglect on the part of the municipal executive. It is a matter for regret that notwithstanding the remark in paragraph 5 of G.O., No. 1475 L., dated 13th August 1898, the compulsory provisions of the Act in regard to the registration of births and deaths were resorted to in only 38 out of the 58 Municipalities in the Presidency. The Government must therefore again impress upon the Municipal Councils concerned the necessity for greater energy in enforcing obedience to the provisions of the law in this respect.

* The figures given in this paragraph include Europeans and Eurasians numbering some 40,000; the succeeding paragraphs give statistics relating to natives only. Full particulars regarding Europeans and Eurasians will be found in appendix XIII.

6. *Deaths.*—The annexed statement exhibits the number of deaths per mille of the population during the year under review as compared with the figures of the preceding five years:—

	1893.	1894.	1895.	1896.	1897.	1898.
Cholera	1.0	1.3	0.6	1.6	4.4	2.0
Small-pox	0.8	0.3	0.1	0.3	0.7	0.6
Fever	7.7	8.0	8.3	8.6	9.0	7.5
Dysentery and diarrhoea	0.7	0.7	0.7	0.7	1.2	0.9
Injuries	0.3	0.4	0.3	0.3	0.3	0.3
Other causes	8.8	9.3	9.6	9.8	9.8	9.7
Total	19.3	20.0	19.6	20.6	25.4	21.0

7. The total number of deaths registered in 1898 was 699,108 or 128,417 less than in the previous year, the decrease occurring chiefly in Ganjám and Malabar, where the deaths registered were only 22.7 and 17.5 per mille of the population against 50.1 and 30.2, respectively, in 1897. The causes which led to these results should have been explained by the Sanitary Commissioner. The mortality among infants under one year of age in the rural tracts was 163.3 per mille of the registered births of the year or 1.2 per mille less than in the previous year, but the rate for Municipalities rose from 223.1 to 229.5. Infantile mortality was very high in the City of Madras (297.7) and in the Nilgiris (257.3), while in 27 municipal towns it was more than 200 per mille, Bellary heading the list with a rate of 324.9 per mille followed by Ootacamund (304.5). The average rate of infantile mortality for 33 "great towns" in England being only 167 per mille against 229.5 for the Municipalities in the Madras Presidency, the Sanitary Commissioner considers that this heavy mortality is to be ascribed in part at least to the ignorance of the poorer classes of natives of the most simple ideas of sanitation in connection with child life, while the higher rate in Municipalities as compared with the rate in rural tracts, he considers, is the result of more accurate registration and of the more insanitary conditions prevailing in municipal towns, inefficiently protected as they are in the matter of water-supply and rubbish and night-soil removal, and unprovided with sewage systems.

8. The highest death-rate (45.2) was, as usual, recorded in the City of Madras, a result which may be attributed partly to the insanitary condition of the city and partly to greater accuracy in registration. Although no material improvement was made during the year in the sanitary condition of the city, yet several measures of reform were being carried out. The scheme for the drainage of Mylapore was completed. An incinerator for the destruction of rubbish and a new general market were in course of construction. Some objectionable burning and burial grounds, situated in the midst of inhabited areas, were closed and others opened in their stead and a *paracherry* was improved by the opening of a street. But until adequate provision is made for the effective drainage of the whole city, for the supply of more wholesome water and for other sanitary improvements of prime importance, the health of the city cannot be expected to make an advance on the unsatisfactory state in which it is at present.

9. The death-rate registered in rural villages was 20.3 per mille against 24.8 in the previous year and evidences defective registration. It was highest in the Nilgiris (29.2) and was above 20 per mille in eleven other districts, while in the remaining ones it was below 20, being lowest in Madura (14.8). The rates for rural towns with a population of over 10,000 inhabitants ranged between 33.7 in Tiruválúr and 8.1 in Samalkot and thus clearly show the untrustworthy character of the returns. The rates were also very low in the rural towns named in the margin. The Collectors concerned, except that of Salem, who has already reported on the subject, are requested to state what steps they propose to take towards the improvement of registration.

10. The average rate for Municipalities, where, as a rule, more trustworthy statistics are obtained, was 31.9 per mille or 1.4 less than in the previous year, while

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19. The extension of the water-works at Conjeeveram at an estimated outlay of Rs. 50,401 was undertaken during the year and more than 86 per cent. of the allotment was spent before its close.

20. Four surveys in connection with water-supply were completed during the year and one drainage and five water-supply schemes were prepared and submitted either to the Sanitary Board or to Government. The schemes for improving the water-supply of Ootacamund, for the extension of that of Tanjore and for the drainage of the Tanjore Fort were sanctioned by Government during the year, the first and the third for execution by the Public Works Department and the second by the Sanitary Engineer. The water-works in Trichinopoly were visited by the Sanitary Engineer and those in Madura, Dindigul and Tanjore by the Assistant Sanitary Engineer, while the pumping stations at Kurnool, Conjeeveram, Dindigul, Trichinopoly, Cuddapah, Tanjore and Madura were inspected and reported upon by the Inspector of Steam Boilers and Prime Movers. Thirteen type designs for sanitary works were prepared by the Sanitary Engineer and his advice was obtained by the Sanitary Board in 73 cases.

SANITARY BOARD.

21. The constitution of the Sanitary Board remained the same as in the previous year; but the rules for the conduct of its business were slightly modified by the addition of a rule making it incumbent on Collectors to consult the Sanitary Board whenever, in laying out house-sites near railway stations, there arise special difficulties not provided for in any general rules which the Board of Revenue may issue. The Board scrutinised plans and estimates for 36 Municipal and 78 Local Fund works, estimated to cost Rs. 4,89,525 in the aggregate. Schemes for the water-supply of Vizianagram, for the extension of the water-works at Kurnool and Tanjore and for the drainage of a portion of the Kumbakonam town were examined and laid before Government and proposals in connection with nineteen other schemes, for which however estimates had not been prepared, were considered by the Board. The Board also approved for issue thirteen type designs and sent a circular to all local bodies requiring that proposals for repairing and improving tanks hitherto used indiscriminately for bathing, washing and drinking should include separate provision for drinking purposes so as to secure to the populations concerned a supply of pure drinking-water.

(True Extract.)

C. J. WEIR,
Ag. Secretary to Government.



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