

REPORT

OF AN

INVESTIGATION IN REGARD TO THE PREVALENCE

OF

"STEGOMYIA" AND OTHER MOSQUITOES IN KARACHI,

AND THE

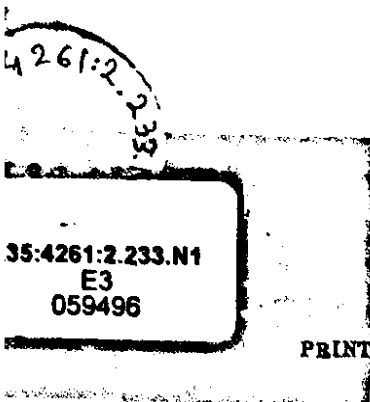
MEASURES NECESSARY FOR THEIR CONTROL.

BY

DR. K. S. MHASKAR, M.D., M.A., B.Sc. (Bombay),
D.P.H., D.T.M. & H. (Cant.),

Officer on Special Duty.

1913.



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No. 26 of 1913.

From

DR. K. S. MHASKAR, M.A., B.Sc., M.D., D. P. H.,
D. T. M. & H.,
Special Officer in charge of Stegomyia Survey, Karachi.

To

THE SURGEON-GENERAL WITH THE GOVERNMENT
OF BOMBAY,
Bombay.

Through The Principal Medical Officer, Sind District, Karachi.

Civil Hospital, Karachi, 20th February 1913.

Sir,

In presenting this report on "Investigation into the prevalence of Stegomyia and other Mosquitoes in the Port of Karachi and the measures necessary for their control," I wish to express my sincere thanks due to Dr. E. D. Shroff, M. R. C. S., D. P. H., for his kindness in placing his sanitary inspectors at my disposal from time to time, a favour which greatly facilitated the work, and also for the directions and help which have been of the greatest assistance.

The information given in Chapters I and II has been derived from Government Resolutions, Sind Gazetteer, the Municipal administration report and the annual report of the trade of Sind. But most useful of all has been Dr. Bentley's report on Malaria in Bombay on which the outlines of this report were based, as also the information obtained at the Malaria Conference, Madras, November 1912.

I have the honour to be,

Sir,

Your most obedient servant,

K. S. MHASKAR,
M.D., D. P. H.,

Special Officer in charge Stegomyia Survey.

Letter No. 1762, dated 18th April 1913, from the Director, Bombay Bacteriological Laboratory, Parel, Bombay, to the Personal Assistant to the Surgeon-General with the Government of Bombay.

With reference to your memorandum No. B/4192, dated 26th March 1913, I have the honour to submit the following remarks :—

2. I have read with very great interest Dr. Mhaskar's report on the *Stegomyia* Survey of Karachi ; in my opinion Dr. Mhaskar has done the work entrusted to him with care and promptness.

3. The first five chapters of the report require no further remarks from me, dealing, as they do, with observed facts, so that I pass on to the 5th chapter which is concerned with preventive measures.

4. Dr. Mhaskar does well in referring in Section I of this chapter to the comparative simplicity of a campaign against mosquitoes in a place like Karachi when compared with other places in India. He points out that most of the breeding places of mosquitoes in Karachi are artificial ; there are no water-courses, the rainfall is negligible, the soil is sandy and porous, the heat of the sun is great so that pools of water dry quickly. But in contrast to these natural advantages he draws vivid picture of the poverty, ignorance and carelessness of the people. He aptly closes this section by referring to the improvements which have been effected in the water-supply of the town within recent years and the still greater need for further improvement, especially for a more abundant and continuous water-supply, so as to enable the people to dispense with the use of gharras and wells which he had found were the most common breeding places of mosquitoes and which were used and continued to exist only because of the intermittent water-supply.

5. In Section II of this chapter he discusses the measures which are required to prevent multiplication of mosquitoes. These measures aim for the most part at the restriction, removal and protection of collections of water in which mosquito larvae are found. He classes these collections of water into temporary and permanent collections. Under the latter head he deals with wells, cisterns, garden and other tanks, fountains, tubs, etc., and in certain localities marshy ground :—

A.—He proposes in the future to restrict as far as possible these permanent breeding places and he expects to effect this—

(1) by prohibiting the construction of open wells ;

(2) by prohibiting the erection of cisterns except in special cases when they must be of approved pattern ;

(3) by restricting the use of garden tubs by imposing a license for their use.

B.—With regard to the action which can be taken to remove existing permanent collections of water, Dr. Mhaskar makes the following suggestions :—

(1) *Wells*.—All foul and disused wells should be filled up and those that must be used should be permanently covered with reinforced concrete and a pump attached. If the owner cannot be persuaded or compelled to protect his well in this way he should be made to stock it with fish and keep the well clean.

(2) *Cisterns*.—In many cases these must be reconstructed and fixed in more accessible positions for inspection. In all cases where they must be used they should be properly protected from mosquitoes.

(3) *Garden tanks* should be licensed and subject to periodical inspection and cleaning.

C.—Dr. Mhaskar then passes on to consider the temporary breeding places of mosquitoes and he points out that the outstanding difficulty is the insufficient water-supply to every house and the consequent necessity for storing water in receptacles which vary in character according to the means of the inhabitants. To remedy these defects he recommends :—

(1) that an adequate supply of water should be available for every household;

(2) that periodical inspection should be made to ensure that water is not collected and stored in receptacles in such circumstances that mosquito larvae can develop in it;

(3) that the breeding of mosquitoes on any premises should be regarded as an offence subject to penalty;

(4) that a few mosquito breeding places should be selected and established under proper supervision and control to test the efficiency of anti-mosquito measures and to prevent mosquitoes taking to unusual breeding places.

6. In the next chapter Dr. Mhaskar considers the strength and cost of the staff to carry out his very excellent recommendations. He offers three schemes costing approximately one lách, half a lách and quarter of a lách of rupees per annum. He thinks that for an expenditure of nearly a lách of rupees per annum it would be possible to keep down all mosquitos in Karáchi. For half that sum he thinks it would be possible to control the breeding places of *Stegomyia* mosquitoes, while the third scheme, costing about quarter of a lách of rupees per annum, would only allow of the inspection and control of breeding places of mosquitoes which are situated outside of houses.

7. The expenditure proposed for these three schemes is so very different that it is essential to consider which scheme, if any, should be adopted from the point of view of (1) necessity, (2) expediency.

8. Let me first consider the necessity for adopting one or any of the schemes. The present enquiry was undertaken owing to the possible importation of Yellow Fever into Karáchi when the Panama Canal is opened. It is well to point out that Major S. P. James has visited Panama and other places with the object of studying the conditions which may lead to the introduction of Yellow Fever into India when the Panama Canal is opened; his report is at present under the consideration of the Government of India and until this report has been published the necessity for taking precautions other than those which already exist against the possible importation of this disease into Karáchi does not immediately arise. But mosquitoes are responsible for the spread of other diseases than Yellow Fever and Dr. Mhaskar's more expensive scheme aims at the destruction and control of all mosquitoes including the anopheles which spread malaria. The table given on page 15 of the report however shows that fevers account for only one-third as many deaths as are attributed to plague, so that the urgency or necessity of measures against malaria in Karáchi is less than the need for measures to combat the plague.

9. Passing on to consider the expediency for adopting one or any of Dr. Mhaskar's schemes, it is well to point out that the total expenditure on the Health Department amounts to Rs. 73,488 per annum, so that if either of Dr. Mhaskar's larger schemes were adopted, the expenditure on this department would be doubled, a proposal, which, I think, hardly requires consideration especially in view of the remarks I have made above regarding the necessity for the adoption of any measures against Yellow Fever and Malaria when Plague at present causes more than three times as many deaths.

10. I am of opinion that the attention and money of the Karáchi Municipality should be concentrated on effecting improvements in the water-supply, drainage and housing of the inhabitants of the town, that meanwhile measures should be taken to prohibit the construction of new open wells or the erection of cisterns, fountains, etc., disused wells should be filled up and arrangements made to supply pipe water at those places where wells are at present used so that these may be closed.

11. Every endeavour should be made to instruct the people how mosquitoes live and have their being and how they are responsible for the spread of disease.

12. The staff proposed in Dr. Mhaskar's third scheme seems to me sufficient for the present needs of the Municipality bearing in mind their financial resources and the necessity for considerable expenditure in connection with measures mentioned above. This proposed additional staff should be amalgamated with the present staff of the Health Department and the duties of the various officers re-arranged so as to include among their other duties the periodical inspection of houses, wells, etc., with the object of detecting and removing mosquito breeding places and the instruction of the inhabitants in the life history of mosquitoes.

13. Although not relative to the present inquiry, I think it is necessary to draw attention to the large number of deaths which occur each year from plague in Karáchi and to suggest that measures to combat this disease are called for more urgently than for any other disease; it seems that familiarity with plague has bred some contempt for it.

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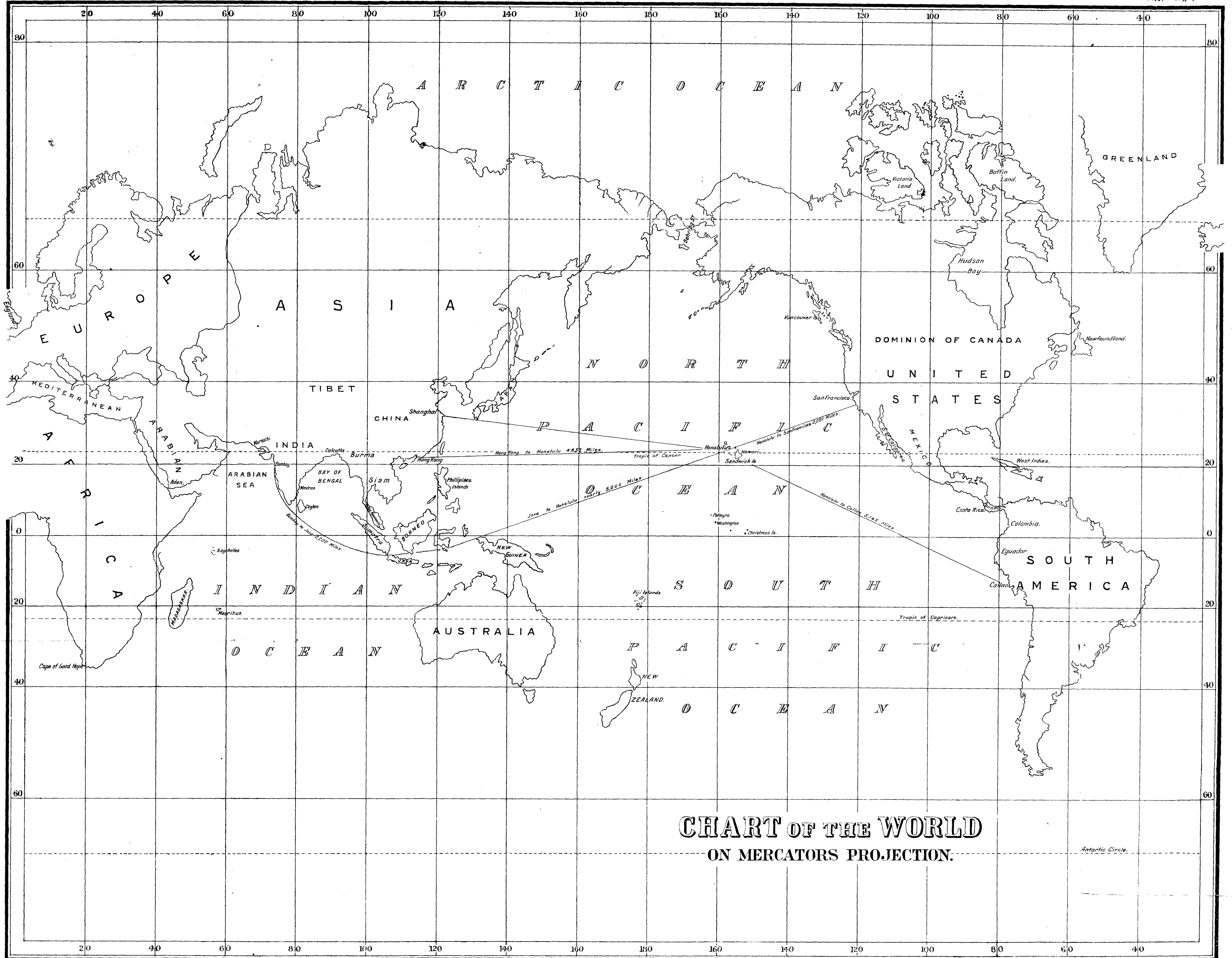


CHART OF THE WORLD
 ON MERCATORS PROJECTION.

APPENDICES.

TABLE 1.

Mean Maximum and mean Minimum Temperature—monthly averages taken in Karachi for five years 1908—1912.

Months.	1912.		1911.		1910.		1909.		1908.	
	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.	Maximum.	Minimum.
January ...	77.3	61.1	72.8	57.4	74.8	57.5	73.5	55.7	77.1	55.3
February ...	80.7	63.2	77.5	61.6	80.0	62.5	78.9	60.5	80.5	56.6
March ...	84.0	66.5	79.0	66.6	81.7	66.5	83.7	66.7	85.6	63.8
April ...	86.2	75.6	84.3	72.6	85.8	72.8	85.8	74.5	90.2	73.3
May ...	89.1	79.0	87.9	78.4	86.7	77.0	91.2	76.4	94.2	77.7
June ...	91.8	83.6	88.5	80.6	90.8	81.5	91.0	83.1	95.0	82.6
July ...	89.6	82.1	86.6	79.3	87.5	80.2	88.6	80.4	88.8	79.8
August ...	87.8	79.5	85.1	77.8	85.3	77.3	83.4	75.2	85.8	77.6
September ...	86.1	75.7	85.3	77.0	85.0	75.6	86.1	75.2	85.7	75.6
October ...	88.3	73.0	85.4	73.4	86.3	72.1	86.5	73.3	85.4	72.2
November ...	84.7	66.0	83.2	65.0	84.5	66.2	85.3	70.2	83.0	65.1
December ...	78.9	59.6	78.8	58.9	77.9	59.1	77.6	60.5	78.8	59.5

TABLE 2.

Vapour tension mean and Humidity mean at 8 a.m.—monthly averages for five years 1908—1912.

Months.	1912.		1911.		1910.		1909.		1908.	
	Vapour.	Humidity.	Vapour.	Humidity.	Vapour.	Humidity.	Vapour.	Humidity.	Vapour.	Humidity.
January ... ..	.399	65	.384	62	.337	61	.338	63	.369	72
February ... ..	.455	66	.465	73	.441	68	.384	61	.370	63
March ... ..	.509	64	.564	76	.538	68	.525	66	.552	66
April ... ..	.838	82	.736	80	.697	73	.759	78	.725	70
May ... ..	.930	81	.877	81	.891	86	.774	68	.848	72
June ... ..	.980	77	.948	84	.965	80	.981	80	1.004	77
July ... ..	.975	82	.873	82	.920	82	.934	84	.989	88
August ... ..	.893	82	.839	83	.865	86	.815	88	.899	88
September ... ..	.820	81	.833	83	.795	82	.781	80	.821	83
October ... ..	.719	74	.764	81	.728	79	.747	79	.798	76
November ... ..	.463	59	.454	59	.494	66	.636	73	.541	73
December ... ..	.333	58	.291	50	.344	57	.341	60	.363	62

TABLE 3.

Monthly averages of rainfall from 1908 to 1912 and monthly averages of wind in 1912.

Months.	Rainfall 1908-1912.										Wind 1912.				
	1912.		1911.		1910.		1909.		1908.		Components of the wind.	Nature of wind.	Maximum No. of miles in one day of the month.	Minimum No. of miles in one day of the month.	Mean velocity in miles per hour derived from 24 hourly observations.
	Rainfall in inches.	No. of rainy days.	Rainfall in inches.	No. of rainy days.	Rainfall in inches.	No. of rainy days.	Rainfall in inches.	No. of rainy days.	Rainfall in inches.	No. of rainy days.					
January ...	...	...	0.50	2	0.87	1	0.68	2	0.85	2	S.W.; N.E. ...	Light breeze ...	590	119	9.9
February ...	...	...	0.02	...	...	...	0.01	...	...	...	S.W.; N.W. ...	Light to moderate ...	612	146	13.0
March ...	...	...	3.88	6	...	...	...	...	...	...	W.N.W. ...	Moderate ...	614	157	18.8
April ...	...	...	...	...	...	...	...	...	...	...	W.S.W. ...	Moderate and strong .	682	264	15.7
May ...	...	...	...	...	...	...	...	...	...	...	W.S.W. ...	Do. ...	602	235	17.1
June ...	...	...	...	...	2.20	2	...	...	...	...	S.W. ...	Do. ...	674	277	20.9
July ...	2.77	2	...	...	8.14	3	5.03	3	5.11	4	W.S.W. ...	Do. ...	690	321	20.2
August ...	0.88	1	0.09	...	1.78	3	0.63	1	0.49	1	W.S. ...	Do. ...	786	193	19.2
September ...	0.02	...	0.12	1	...	...	0.02	...	0.01	...	W.S.W. by W.N. ...	Do. ...	609	160	16.1
October	N.N.E.; N.N.W. ...	Light ...	389	160	9.8
November	0.28	1	N.E. ...	Do. ...	512	134	7.8
December	0.10	...	0.72	2	N.E. ...	Do. ...	524	53	9.5
															14.4

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TABLE 4-A.

Census of 1911.

Group.	Quarter.	Area in acres.	Number of occupied houses.	Total number of persons.			Density per acre.
				Male.	Female.	Total.	
A	1. Civil Lines	505.96	252	1,563	795	2,358	4.66
	2. Frere Town bath Island and Clifton.	254.82	260	843	529	1,302	5.38
	3. Railway and Queen's Road...	258.96	34	166	58	225	0.86
	4. Serai	172.17	1,653	5,055	2,605	7,660	44.48
	5. Rambagh	161.15	1,343	3,664	2,250	5,914	36.68
	6. Preedy	64.69	347	765	526	1,291	19.99
	7. Garden quarter	940.30	2,711	7,259	5,345	12,601	13.41
	8. Ghizri, etc.	156.10	63	218	183	401	2.56
B	9. Old Town	32.83	1,235	2,450	2,078	4,528	137.95
	10. Napier	45.80	1,987	5,611	4,315	9,926	216.55
	11. Market	37.88	963	3,169	2,409	5,578	163.94
	12. Bunder	30.25	291	1,203	292	1,495	49.42
	13. Jail	91.53	1,459	3,698	2,571	6,269	68.25
	14. Bunchore	204.54	4,559	10,519	6,731	17,250	84.34
	15. Ramswami and Begarikkatta.	66.58	1,252	2,332	1,736	4,068	61.11
	16. Soldier Bazar	44.98	346	654	487	1,141	25.36
C	17. Sadar Bazar	126.26	1,769	5,310	3,560	8,870	74.12
	18. Lyari... ..	918.27	7,118	17,378	14,571	31,949	34.79
	19. Machimiani	70.48	1,265	3,521	2,762	6,283	89.14
	20. Kiamari	172.17	1,220	3,566	1,961	5,527	32.11
	21. Manora, Baba bhit	24.37	121	411	330	741	30.40
	22. Maurypur and Shawapir and scattered hamlets.	84.93	1,130	2,674	2,371	5,045	59.40
	Total ...	4,465.30	31,433	82,026	58,435	140,511	...
	Add that of Railway limits ...	...	...	3,841	1,283	5,124	...
	Harbour ... ..	...	...	2,148	69	2,217	...
	Cantonment—Military charge ...	...	...	4,680	954	5,634	...
	Cantonment „ ...	...	...	3,529	2,231	5,760	...
	Grand Total ..	...	...	96,265	63,005	159,270	...

TABLE 4-B.

Total Number according to Groups.

Groups.	Area in acres.	Number of occupied houses.	Total Population.	Density per acre.
Group A (1 to 8) ...	2,514.15	6,668	31,821	12.25
Group B (9 to 17) ...	680.93	13,861	59,145	88.33
Group C (18 to 22) ...	1,270.22	10,904	49,545	39.05
Total ...	4,465.30	31,433	140,511	.....

TABLE 5.

Population according to race in 1911.

Names.	Males.	Females.	Total.
Mahomedans ...	38,996	31,548	70,544
Hindus ...	38,582	23,840	62,428
Christians ...	2,434	1,524	3,958
Parsis ...	981	931	1,912
Jains ...	434	213	647
Others ...	599	423	1,022

TABLE 6.

Causes of death.	1911-1912.		1910-1911.		1909-1910.	
	Number of deaths.	Death rate per 1,000.	Number of deaths.	Death rate per 1,000.	Number of deaths.	Death rate per 1,000.
Fever ...	828	5.64	668	4.51	696	6.40
Small-pox ...	11	0.07	24	0.16	12	0.11
Cholera ...	9	0.06	38	0.35	...	0.00
Accidents ...	31	2.20	23	0.15	20	0.18
Stomach and Bowel complaints...	123	0.83	83	0.56	88	0.18
Plague ...	2,768	18.71	1,681	11.36	2,069	19.04
Other causes ...	2,818	19.05	2,799	18.92	2,283	21.01