Public health in British India: Anglo-Indian preventive medicine 1859–1914

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To my parents
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The foundations of public health in India: crisis and constraint

On account of the peculiar habits of the people, which, in most respects, are dirty in the extreme, amendment in the conservancy of a great portion of native towns is almost hopeless, and, under the most favourable circumstances, must necessarily be a very gradual process; but, with regard to the towns and villages in the vicinity of and adjoining European stations, immediate improvement should be strictly enforced. (Stewart Clark, Practical Observations on the Hygiene of the Army in India, London, 1864)

Public-health policy. Following the assumption of rule by the British Crown was dominated by the lingering shadow of the mutiny. The events of 1857–8 exposed the vulnerability of British troops in India to disease as well as to Indian hostility, but at the same time underscored their importance as the guarantors of British rule. The mutiny also demonstrated that the new administration ignored indigenous sensibilities at its peril, and fostered an understandable reluctance to interfere with Indian cultural practices in the name of public health. Herein lay the dilemma facing colonial administrators in the decades after 1858: how to sanitise those elements of the indigenous population which threatened the health of European troops without provoking a backlash which might threaten the stability of British rule. This chapter looks at the ways in which the colonial administration attempted to resolve this problem in several key areas of sanitary policy, and at the consequences of these attempts for relations with the indigenous population, and for competing concepts of government within the European community.

The military

Army hygiene in India was the beneficiary of the growing concern with the health of troops evident in Britain since the Crimean War and the findings of the Royal Commission in 1857, which reported that mortality rates in the British Army at home were greater than among the civilian population. Two years later, in the wake of the mutiny, a similar commission was set up to inquire into the health of the army in India. The effectiveness of British troops during the mutiny had been severely hampered by the ravages of epidemic disease, particularly cholera, which had also claimed many lives among European civilians besieged at Lucknow and in other north Indian towns. Medical officers noted that, after years of neglect, the East India Company’s board of directors were at last taking a proper interest in the health of their troops. However, it fell to the British government, rather than the Company, to rectify the defects of military hygiene in India. The Royal Commission on the Sanitary State of the Army in India, appointed in 1859, recorded a death-rate of 69 per 1,000 among British troops in the years running up to the mutiny (over three times as high as the worse death-rate of any regiment in Britain) and identified the underlying causes as inadequate sewerage and water supply, poor drainage, and ill-ventilated and overcrowded barracks. In its report of 1863, the commission recommended the creation of distinct areas of European habitation (military cantonments and ‘civil lines’) regulated by sanitary legislation similar to that in Britain, and situated in accordance with the topographic principles laid down by J. R. Martin, president of the India Office Medical Board and member of the commission. Martin, who we encountered in the previous chapter, advocated that troops should be sent in rotation to hill stations above 5,000 feet.

Discipline and disease

The location of British troops in India was a matter of some urgency for, as a consequence of the mutiny, it had been decided to increase the number of British in relation to Indian troops in the proportion of 3 to 1. The obvious flaw in the plan, as envisaged by Martin, was that, if British troops were stationed in the hills, it would be difficult for them to respond effectively to an uprising in the plains. Accordingly, the Indian government concluded that only a small proportion of the numbers contemplated by the commission should be garrisoned in the hills – no more than one third of the total force at any one time. There were also doubts about the salubrity of many hill stations: medical officers warned that there were ‘numerous examples of elevated positions being unfavourable to health’, especially those which rose abruptly from alluvial or jungle-covered tracts. In such places, malaria was ‘conducted upwards as if by a series of inverted funnels’. Darjeeling, Naini Tal, and Lantour, were all thought to be unhealthy in this respect, and with a similarly high incidence of diarrhoea and dysentery.

Relocation aside, it was believed that much could be done to prevent the worst ravages of the Indian climate. As discussed in chapter 2, Anglo-Indians attached great importance to diet and clothing in adapting to the Indian climate, and there
was no shortage of opinions ventured about such matters in manuals of military hygiene. One innovation was the heat reflective, ventilated cavalry helmet proposed by the army surgeon Julius Jefferys in 1858. The other principal concern when selecting garments was the avoidance of ‘chill’: a sudden change in temperature associated with the onset of gastric disorders, and most notoriously cholera. Every soldier in India was issued with a flannel waistband - or ‘chola belt’ - to protect his abdominal region from the vagaries of the climate; a practice which continued into the twentieth century. Uniform also varied according to season, and in the decades after the mutiny it became increasingly common for the British soldier to wear white clothes or khaki during hot weather, and a serge or cloth uniform during the cold season.

After 1858 there was also far more attention to the subject of military nutrition. Florence Nightingale described as ‘extraordinary’ the practice of giving soldiers in India the same diet (regardless of season) as in Britain. Every day, the British soldier in India received 1 lb of meat, 1 lb of bread, 1 lb of vegetables, 4 ozs of rice, tea or coffee, as well as his entitlement to beer and spirits. During the 1860s, however, this began to change, as the diet of British soldiers came to be regulated by the guidelines established by Edmund Parkes in his capacity as professor of military hygiene at Netley. Parkes advocated a diet balanced between nitrogenous substances, fats, carbohydrates, and salts. He also stressed the importance of inspecting cattle for the presence of diseases like anthrax, and of meat for the presence of parasites. The diet in India was generally more nitrogenous and less rich in starches than that of soldiers in Britain, but fresh vegetables were sometimes in short supply and scurvy was not unknown in some garrisons in India. There was some concern over this in the 1860s when, following the report of the American Army Sanitary Commission on the health of troops during the civil war, fresh vegetables were shown to be invaluable in protecting against wound infection and disease.

However, beyond these basic principles, there was little agreement as to what, exactly, should constitute the soldiers’ diet. Much depended on personal preferences and experiences. The army surgeon Charles Gordon, for instance, believed that soldiers in tropical countries should drink a cup of coffee before going on early morning duty to protect against chill. Robert Caldwell expressed the commonly held view that too much rich food or over indulgence in fruits could lead to intestinal disturbance and even dysentery, but E. C. Freeman thought that curry, ‘on account of the aromatic and antiseptic substances it contains’ was ‘a most wholesome article of diet’, the use of which should be encouraged as much as possible. He alluded to the widespread belief that there was ‘some connection between the comparative disuse of curry by Europeans in India and the increase in enteric fever’.

The most controversial component of the soldier’s diet was, by far, his allowance of beers and spirits. Soldiers were permitted up to a gallon of spirits every 20 days, a quart of strong beer every day, and one or two drams of rum or arrack (an Indian spirit). In addition, they were able to purchase arrack and other Indian liquors for a modest price in the local bazaar. The free availability of liquor, together with the boredom of barrack life, and the sense of isolation in an alien and often dangerous environment, were contributory factors in the extremely high incidence of alcoholism among British troops in India. ‘There is a good deal of intemperance among soldiers everywhere’, wrote Florence Nightingale, ‘but I very much doubt whether the same amount of tipping ever goes on in the British Army in this country as appears to be encouraged by the canteen system in India’. Drunkenness was still, according to Charles Gordon, the ‘most prevalent vice in India’ in 1866, and a major factor in the incidence of hepatitis, heat apoplexy, phthisis, and especially venereal disease, among British soldiers. Such concerns eventually led to restrictions on the issue of spirits in canteens, and the establishment of more alternative recreational facilities.

These reforms were accompanied by a decrease in the number of convictions for drunkenness in the early 1870s, but the reduction was short lived. The introduction of short service in 1875 put an end to the gradual decline in the proportion of young, unmarried men in the British Army in India, which had followed the mutiny. The percentage of under 25s in the army in India increased from 33 in 1877 to 55 in 1898. It had long been recognised that such men were more likely to acquire the vice of intemperance in India than their older fellows, and after 1875 the incidence of alcoholism in the British Army in India began once more to increase.

Rising alcoholism gave rise to grave concern among civilians, particularly in religious circles. In his Notes on Hygiene with Hints on Self-Discipline for Young Soldiers (1882), the Rev. J. G. Cole combined moral and medical sanctions in a crusade against alcoholism and promiscuity. ‘It is chiefly through our carelessness and neglect of personal management’, he warned, ‘that our whole system from the brain downwards gets out of condition. How soon is the body punished and the mind deranged by an intemperate habit!’ But such warnings had little effect: alcohol was still freely available in the bazaars and convictions for drunkenness in the army continued to increase until the turn of the century. From that time the incidence of alcoholism appears to have declined slightly, but largely as a result of the smaller number of new arrivals in India during and following the South African War of 1899-1902.

An equally important factor in the health of troops in India was the sanitary condition of barracks. Here, the sanitary commission had revised an issue which had lain dormant since the early 1850s, when it had been raised by the inspector-general of hospitals Sir John Hall. Hall had complained that rules regulating the space allotted to each soldier in barracks were rarely followed and were, in any case, inadequate. He recommended a surface space of 50 square feet and that
beds be arranged singly to give each soldier more private space. Yet the plans of medical officers were quashed by the indifference and parsimony of the military authorities.

Too often, historians have accepted uncritically Florence Nightingale’s condemnation of army medical officers in the Crimea and in India. In some cases her criticisms were justified, but more often the efforts of medical officers were eclipsed by the testimonies of Nightingale and members of official commissions, who attributed sanitary progress to their own intervention. Nightingale was able to succeed where army medical officers had failed only because of the public clamour for sanitary reform which followed the Crimean War and the mutiny. As Charles Gordon, deputy inspector-general of hospitals for the British Army in Bengal put it in 1866, medical men had long ‘raised their voice in condemnation’ of sanitary conditions in military cantonments in India, but ‘their warnings, so often uttered, continued to be disregarded until a few years back, when the public demanded inquiry into the various causes of the sickness and mortality that prevailed in our army’.

Following the commission’s report, the new cantonment authorities established under the Military Cantonments Act of 1864 began to rebuild barracks to allow for 1,000 cubic feet of space for each soldier – 400 more than in Britain. Barracks were to be supplemented by separate ablution rooms and latrines, whereas formerly both functions had been performed within a single building. But the issue of barrack construction was not without problems, there being some dispute between the Indian and British governments over the amount of floor space to be allocated to each soldier. The former, presumably for reasons of economy, felt that 90 square feet per man was sufficient for barracks in the plains, whereas the latter insisted on 100, though agreeing to a proposal by the Indian government to reduce this to 77 square feet in hill stations. Married quarters were also to be improved: instead of existing provisions for married soldiers and their families in shared barracks, each family was now to be allocated two rooms of its own wherever possible.

A central concern in the construction of new barracks was ventilation: the lack of windows and air vents in existing barracks and the inefficiency of the punkah were thought to be contributory factors in the high incidence of cholera and malaria among British troops. Better ventilation was a key feature of the new barrack architecture, and bullock- or steam-operated fans were introduced in a few cantonments to replace the traditional punkah. Another innovation in barrack architecture was the regulation that each new construction should have two stories (the upper one being reserved for sleeping) in the belief that air at low level was damper, and more liable to be malarious.

The construction of new barracks made considerable headway in the decade after the commission’s report. According to J. L. Ranking, sanitary commissioner of Madras, ‘vast advances’ had been made in this direction by 1868,
the new barracks being ‘palatial in their accommodation when compared with
the old class of buildings’. However, the continuing vulnerability of British
troops is demonstrated by the fact that they still suffered mortality rates far
higher than their Indian counterparts. During the cholera epidemic which swept
northern India in 1867, European troops experienced a cholera mortality rate of
almost 14 per 1,000, whereas Indian troops died at the far lower rate of 3 per
1,000. In fact, the death-rate from all diseases except fever was lower among
Indian troops than among Europeans.

These stark differences almost certainly reflect the different living conditions
of British and Indian troops. While the former inhabited overcrowded and
insanitary barracks, the latter generally lived in separate accommodation with
their families. Indian troops were given a hutting allowance with which to
construct their own dwellings; and which, as Florence Nightingale put it, was ‘no
doubt a most excellent thing for their health’. But it is important not to
idealise conditions in ‘native lines’; these huts were often ill-ventilated and badly built
(owing to the pittance allowed for their construction), and often with little or no
provision for sanitation.

Improvements to barracks continued – absorbing a high proportion of military
sanitary expenditure – throughout the 1870s and 80s, although aggregate
expenditure fell over these years. From the mid-1870s, however, concern over
military accommodation was eclipsed by concern over water supplies and
sewage disposal within cantonments. The Army Sanitary Commission and other
observers such as Florence Nightingale expressed grave reservations about
the purity of water supplies in cantonments. Arrangements for raising and
distributing water from wells were little different from 1,000 years before: water
was raised in leather sacks by bullocks, emptied into troughs, and then conveyed
by Indian water carriers – or ‘bheesties’ – to the barracks. This procedure
exposed the water to contamination at several points, and, without filtration, the
water was often cloudy and unappetising, and regarded in some cantonments as
undrinkable.

In 1870, with the construction of new barracks well under way, the Indian
government ordered the supply of new pumps and filters for wells in military
cantonments. Initially, these measures were confined to selected wells in
European lines, but were eventually extended to stations housing Indian troops.
The filters were developed by the IMS officer Francis MacNamara, and
constructed from alternate layers of sand and charcoal. Their effectiveness,
however, was questionable, and they were found to corrode very quickly,
leading to their replacement by similar filters made of stone in the mid-1870s.
By this time, the military authorities acknowledged that there was a strong link
between the spread of cholera and water supplies. In 1877 the commander-in-
chief of the British Army in India, Major-General F. Roberts, issued orders for
the prevention of cholera which stressed that ‘the utmost attention must be paid

Plate 4 An Indian water carrier of ‘Bheestie’, from Florence Nightingale’s Sanitary
state of the army in India
to the drinking water' and that temporary wells should be sunk if necessary during a cholera epidemic. 44

But it was clear that such regulations could do little to prevent the spread of cholera among troops on the march. The high mortality shown in figures 3.1 and 3.2 for the years 1877–80, during which time the British and Indian armies were on active service in Afghanistan, reveal that troops were extremely vulnerable to disease outside the protective environment of the cantonment. This was a fact often alluded to in the personnel accounts of medical officers. James Thornton, IMS, recalled that his regiment of 750 men recorded over 3,000 admissions from disease and 100 deaths during operations in Bhutan in 1866–7. Over 20 years later on the North-West Frontier his regiment again succumbed to cholera, which appeared to have spread from the indigenous population. 45

Substantial improvements in the water supply did not, in fact, occur until the 1890s, when there was a marked increase in expenditure on new schemes. 46 Another important development at this time was the introduction of new water-filters, such as the Pasteur-Chamberland, with much denser filter beds capable of preventing the passage of micro-organisms. With growing acceptance of microbial theories of disease causation advanced by Koch and others, there was a corresponding move away from chemical to bacterial analysis of water supplies, although there was still a feeling that bacterial analysis could not entirely replace a sound geological knowledge of a water course. 47 The practice of boiling water during cholera epidemics also became standard. 48 Yet, as figures 3.1 and 3.2 demonstrate, these measures appear to have made little impact on the health of British troops until the turn of the century.

The problem of drainage in military cantonments was equally pressing and perhaps more intractable, given that drainage depended greatly on conditions outside of military stations. In 1863, when Nightingale made her observations on the evidence given to the royal commission, she noted that, in many cantonments, there was 'no drainage whatever, in any sense in which we understand drainage'. At Fort St George in Madras the main drain of the town was 80 yards distant, and the fort itself 'swamped in offensive effluvia'. 49 In 1868 the fort's drainage was still 'indifferently provided for', being left largely to natural means, except in the immediate vicinity of barracks. 50 By the turn of the century, however, drainage schemes had been completed in several cantonments with favourable results, 51 but in some stations effective drainage was apparently 'out of the question'. In Delhi, the river Jumna annually washed the walls of the fort during the rainy season and, as the flood receded, many miles of the surrounding country were left covered with stagnant pools in which mosquito larvae 'bred by the millions'. 52
Drainage did begin to improve in some cantonments in the 1880s, but the more favourable mortality and morbidity trends evident among British troops around the turn of the century are probably due to specific measures designed to control the spread of enteric fever. In the 1900s, in the light of research conducted by Robert Koch, it was generally acknowledged that 'in all probability water plays only a minor role in the dissemination of enteric fever', and that the priority should be to 'deal effectively with the earliest patients'. This meant isolation of patients in separate wards, thorough disinfection or destruction of contaminated linen, and the burning of faeces from infected persons. The early identification of cases was the key to this new system of military hygiene, with bacteriological diagnosis playing an important part. In the early 1900s, each cantonment acquired a small 'laboratory' in which blood samples could be tested for the presence of typhoid or the newly discovered paratyphoid bacilli.

There was also greater attention to the preparation of food, since it was now thought that poor food hygiene was one of the principal reasons for the high incidence of enteric fever (or typhoid as it was increasingly known) in army camps. Many British regiments soon dispensed with their Indian cooks and domestic assistants in the belief that their 'disregard for hygiene was at the root of the problem'. "Nothing seems more right and suitable to the native mind", wrote Captain E. C. Freeman, RAMC, in 1899, 'than that the same man and the same brough should attend to the cookhouse and the latrine'. Europeans were generally sceptical that they would see 'any appreciable change' in the habits and customs of Indians, especially their apparent 'disregard for ordinary acts of cleanliness', and their 'indifference to the most suitable locality for compliance with certain natural wants'. Robert Caldwell's experience as a military medical officer in the North West Provinces had convinced him that lower-class Indians were 'walking disseminators of the most repulsive forms of filth'. 'The European in India', he wrote in 1905,

is constantly exposed to the risk of either swallowing or inhaling excremental refuse conveyed by dust, flies, water, or food, or which clings to the clothing and person of his immediate attendants, and which is transferred from fetid fingers to all kinds of articles of intimate use.

Bacteriological theories of disease causation, then, served to particularise, and perhaps to heighten, European anxieties about the medical dangers of the Indian people. An increasing fatalism was also evident during the 1900s. The general belief that there was little prospect of Indians being educated out of their 'filthy habits', and that they were 'saturated with infection', even cast doubt on the effectiveness of measures to control disease within the vicinity of cantonments. Surgeon-Captain A. E. Grant, professor of hygiene at Madras Medical College, noted with regret that years of daily contact with a people, the mass of whom, rich and poor, regard such matters [as sanitation] with perfect composure or indifference have inoculated these officers with the fatalistic virus to such a degree that they have been known to imply ... that the attempt to sanitise Indian towns is a mistake, an interference with the laws of nature.

The development of inoculation against typhoid, however, seemed to offer the possibility of protection against the disease regardless of sanitary conditions in military stations. The vaccine had been developed and tested by Almroth Wright, professor of pathology at the Royal Army Medical School, Netley. Having unsuccessfully attempted to persuade the British Army to introduce inoculation on a trial basis in 1896, Wright induced soldiers in India to come forward for inoculation while serving as a member of the Indian Plague Commission. The experiment, if Wright's data is to be believed, was a success, with only 44 cases of typhoid appearing among the 4,502 who volunteered for inoculation. But Wright had failed to secure first the permission of the military and colonial authorities, who were outraged at his action.

There appears to have been deeply ingrained resistance to the new measure in government circles and in the IMS. Despite promising, if not conclusive, trials in British mental hospitals and, later, during the South African War, the Medical Advisory Board of the War Office continued to be suspicious of inoculation and refused to introduce it, even on a voluntary trial basis, until 1904. In the wake of high mortality from typhoid in the South African campaign, the board's reluctance to introduce inoculation precipitated a national outcry. The Times denounced the decision as 'a serious example of the ignorance of ... scientific methods ... against which the public services of this country are condemned to strive'. Wright resigned from his chair at Netley in 1902, and continued his campaign from his new post at St Mary's Hospital in London.

Antipathy towards Wright had several roots. Among British army officers, and even at Netley itself, Wright was regarded with suspicion since he was not, himself, a military man. Wright had been a civil servant before joining the Army Medical School in 1892, and continued in that capacity throughout his period at Netley. Moreover, while he gained the affection and loyalty of his students, Wright was intolerant of the school's restrictive rules, and soon alienated himself from its military administration. Also, in the days before a standardised dosage had been agreed upon, inoculation could often be a painful experience, and for this reason was generally unpopular among troops. An ex-pupil of Wright's — Colonel L. W. Harrison — wrote to him of his 'great difficulty' in persuading soldiers of a cavalry regiment in India to undergo inoculation. The attitude of troops towards inoculation was an important consideration given the recruitment problems experienced by the services at this time.

Another reason for opposition to inoculation was the fear of pursuing too exclusive a sanitary policy, compounded by the additional cost of supplying and
The contagious diseases acts

One of the most persistent problems facing the military authorities was the high incidence of venereal disease among British troops. Vying with malarial fever, venereal disease was one of the two most important causes of admissions to hospital among British troops in India throughout the nineteenth century. In 1870, for example, there was an admission rate from venereal disease of 52.5 per 1,000 troops, with each soldier spending on average 22 days in hospital in the course of the year. Venereal disease was an important drain on manpower in Britain too, but in India the situation was even worse since the vast majority of men and around two-thirds of officers were unmarried, with prostitutes providing a vitally important form of relaxation. The military authorities recognised the inevitability of this behaviour and felt that to forbid access to prostitutes would, to borrow Ronald Hyam’s phrase, turn cantonments into ‘replicas of Sodom and Gomorrah’. Yet the problem posed by venereal disease had clearly to be addressed.

In the late eighteenth and early nineteenth century, concern over venereal disease led the East India Company to give its guarded approval to the establishment of ‘lock hospitals’ for the compulsory treatment of ‘diseased women’. However, the civil authorities charged with administering these hospitals found their duties distasteful, recognising that the system of inspection was degrading and that the standard treatment which used mercury was extremely hazardous. By 1835 the system had been discontinued throughout India. However, abolition of the hospitals was accompanied by an increase in venereal disease among troops and, in 1852, after much protest from the military authorities, a scheme of inspection and compulsory treatment of hospitals was introduced in Madras city. But other areas resisted pressure from the military and, even in Madras, the local magistrates were often unwilling to allow medical officers to examine women.

The military authorities were more successful after 1858 in the light of fears generated by the mutiny. The Royal Commission recommended that the lock hospital system be introduced with a greater degree of compulsion than hitherto, and the secretary of state endorsed this opinion. The Contagious Diseases Act made provision for the medical-inspection and regulation of brothels and, in 1868, the system was formalised and extended under the Contagious Diseases Act (CD Act), modelled on similar legislation passed in Britain 2 years earlier. The act could be introduced in any locality specified by a local government, providing it had the sanction of the governor-general. Outside of cantonments executive responsibility for the enforcement of these measures lay with civil surgeons, municipal health officers, or specially appointed superintendents of lock hospitals. Overall responsibility for lock hospitals lay with the provincial sanitary commissioner.

The enforcement of the CD Act varied greatly from one area to another and opinions differed as to its severity. In his report of 1870, the superintendent of lock hospitals in Calcutta concluded that the ‘Indian Act was more stringent than the British one’ since it applied to the ‘whole civil population of Calcutta where the military element is very small’ whereas, in England, the act was confined to garrison towns such as Aldershot. Moreover, in England, the police were entirely interdicted from interference, and the Act is worked only by a limited special establishment sent down from the metropolitan police for the purpose... In Calcutta, on the other hand, the administration of the Act is entrusted to ordinary local police and every police officer is authorized to arrest, without warrant, any common prostitute who has failed to register or to attend for examination.

Six years later, however, the lieutenant-governor of Bengal expressed his approval of the fact that the commissioner of police for the presidency did not, as a rule, enforce the penal provisions of the Act, but found it sufficient, in most cases, to warn and to discharge. Of 2,359 women arrested for failure to register in 1870 only 301 were brought before magistrates. Yet there is little doubt that the superintendent’s fears were justified, since the Indian subordinate police were notorious for extortion and other abuses of power. Indeed, the City of Bombay went so far as to employ women to mingle among the prostitutes and act as ‘spies’ in order to detect attempts at extortion by the police. The health officer himself was firmly of opinion that ‘no native subordinate to [his] Department ought to have anything whatever to do with the working of the provisions of the Act’, while the superintendent of lock hospitals in Calcutta felt that its administration should be entrusted to a special force rather than the ordinary police. Thus, the Indian CD Act may have been far more punitive in its operation than Ronald Hyam has suggested in his controversial Sexuality and Empire.

Opinion on the efficiency of the CD acts was equally mixed. The lieutenant-governor of Bengal believed that the act had been largely successful, and the Indian government insisted that the working of the lock hospitals has, on the whole, been productive of good, both in diminishing the prevalence and mitigating the severity of venereal diseases among registered prostitutes and European soldiery, and the amount of good thus...
affected is sufficient to warrant the maintenance of the system with such improve-
ments as may be found practicable.\textsuperscript{80}

But this optimism was not shared by the sanitary commissioner with the Indian
government who pointed out that 'in spite of a very general introduction of the
rules for the prevention of venereal disease among European troops, the results
have hitherto been a failure'. In many instances, he explained, it was 'almost
impossible' to say when or where the disease had been contracted, and added
that many cantonments had, in fact, made little effort in this direction.\textsuperscript{81} In his
view, the only hope for improvement lay in the concentration of the regulations
in areas of a smaller and more practicable size, and to establish better
co-operation between civil and military authorities.\textsuperscript{82}

Following especially high levels of venereal disease among European
troops in 1877 and 1878, a special committee was appointed to look into the
effectiveness of the act.\textsuperscript{83} It was found that it provided no definition of the term
'common prostitute', that it made no provision for the compulsory registration
of prostitutes on conviction, and that it gave the police insufficient powers of
arrest. In the light of the report, and the governor-general’s refusal to sanction
more stringent regulations, the Bengal government decided to restrict the area to
which the CD Act applied.\textsuperscript{84}

In Bombay financial considerations proved more important in determining the
future of the CD legislation. Owing to severe financial difficulties in 1871, the
Bombay Corporation – with the concurrence of the Indian government – allowed
the CD Act to lapse, and regulations were not reintroduced until 1880.\textsuperscript{85} In that
year, in the face of increasing pressure from the lieutenant-governor and the rear
admiral commanding the fleet at Bombay, the municipality defied government
policy and agreed to sanction a grant of Rs 15,000 towards the provision of a
lock hospital. It was not, however, in a position to realise this sum, owing to a
shortage of revenue, and the act remained a dead letter in Bombay. The Bombay
government also took punitive action, withholding Rs 15,000 of its annual grant
towards the city's police expenditure.\textsuperscript{86}

At the same time, there was increasing criticism of the CD Acts in Britain and
India from religious groups such as the Salvation Army, which were concerned
that the acts implicitly condoned immoral behaviour. Some exponents of an
authoritarian, interventionist, approach towards public health such as the
Calcutta Health Society vigorously defended the legislation,\textsuperscript{87} but it was
denounced 'in the name of God and humanity' by evangelical organisations in
India, and meetings were held specially to condemn the measures. A meeting at
Calcutta’s Exeter Hall learned ‘with astonishment and grief that the system of
licensed impurity has been established by British authority in over seventy
places in India’, including the principal centres of population.\textsuperscript{88}

The CD Acts were also unpopular with many Indians,\textsuperscript{89} although not
universally so. In 1875, the Hindoo Patriot declared its support for the act in
Calcutta and expressed its pleasure that its provisions appeared to have led to
some improvement in the health of European troops.\textsuperscript{90} More typically, though,
the Indian press was vocal and persistent in its opposition to the CD Acts. The
Bengalee condemned the act as ‘a useless piece of legislation’ which had been
attended by ‘a degree of oppression . . . which far outweighed any benefits which
might be supposed to have accrued from it’.\textsuperscript{91} It pointed out that the act had been
a powerful engine of tyranny in mofussil towns in the hands of an unscrupulous
police and unscrupulous neighbours:

If the neighbours have any grudge against a woman of the town – if the paramour
has quarrelled with his mistress, or if the Police underling is anxious to extort some
money from one of these unhappy creatures – straight away a complaint is lodged
that the woman is carrying on the business of prostitution, the summons is issued,
conviction follows, the woman is fined and ordered to be sent to the lock-hospital
for examination, which in the case of a Hindoo means loss of caste and a depth of
degradation which it is impossible to describe.\textsuperscript{92}

As a result of the combination of these pressures, the acts were suspended in
1881 on the orders of the Liberal viceroy Lord Ripon. During the Liberal
administration of 1886 the British act was repealed, and the Indian act 2 years
later.\textsuperscript{93}

But the repeal of the CD act did not mark the end of the medical inspection of
prostitutes in India. The new Military Cantonments Act of 1889 incorporated a
deliberately catch-all clause which provided for

- the prevention of the spread of infectious or contagious diseases within a
cantonment, and the appointment and regulation of hospitals . . . for the reception and
treatment of persons suffering from any disease.\textsuperscript{94}

The provisions of the act could be, and frequently were, interpreted to permit
the inspection and compulsory treatment of prostitutes. The Liberal government in
Britain was determined to end this flagrant violation of its orders and, in 1894,
directed the Indian government to limit the scope of the Cantonments Act.
Accordingly, in 1895, the government passed legislation stating that no rule
under the Cantonment Act of 1889 should contain any regulation permitting the
medical examination or compulsory treatment of prostitutes suspected of having
venereal disease.\textsuperscript{95}

However, in 1897 the Conservative secretary of state Lord Hamilton,
concerned about the continuation of high levels of venereal disease among
British troops in India, decided to overturn the policy of the previous
administration. He instructed the viceroy, Lord Elgin, to repeal the 1895 Act and to draft
new rules permitting medical inspection to be reintroduced in cantonments – a
move which was extremely unpopular with the Indian community. The Bengalee
had 'a vivid recollection of the nameless horrors practiced by an unscrupulous
Police in the name of the Contagious Diseases Act', in which many Hindus had lost caste. But the official mood in 1897 was one in which indigenous opinion on the matter of the CD Acts counted for very little, being eclipsed by the more pressing problem of the plague epidemic which had swept across the Bombay Presidency, and which threatened Bengal and Madras. In the same month as the Bengal Act, the Epidemic Diseases Act was passed by the Indian government, placing a wide range of custodial powers at the disposal of provincial governments. In such circumstances the cantonment legislation was passed with relatively little publicity and, as Kenneth Ballhatchet has put it, 'the military authorities won the last battle in a long campaign'. Yet it was a campaign in which the military's control over the indigenous population had been confined within the walls of the cantonment by the combined forces of economy, moral indignation, and Indian opinion. 

'Reservoirs of dirt and disease'

Sanitary policing

Improvements in water supplies, barracks, and the introduction of more specific preventive measures, all contributed a great deal to the mortality decline among British and Indian troops, but the health of soldiers was not considered in isolation. Physical segregation was never total, and military cantonments and their environs were host to a variety of tradesmen, vendors, servants; all of whom were viewed as potential threats to the health of troops. The tendency to view Indians as part of the 'sanitary problem' confronting Europeans had been evident since at least the 1830s, but the mutiny heightened anxieties on this score, producing demands for the sanitary surveillance and regulation of the Indian population; at first within, and then without, the military cantonment.

Bazaars on the edge of cantonments were singled out for special criticism in the evidence given to the royal commission. The bazaars, according to Florence Nightingale, were 'simply the first savage stage of social savage life'. They had 'no regular system of drainage, no public latrines . . . and no sufficient establishment to keep them clean'. They suffered from 'overcrowding, bad ventilation, bad water supply, filth, foul ditches . . . jungle and nuisances'. In short, the bazaars were 'one immense privy'; a danger to their inhabitants and European troops alike. 

The Military Cantonments Act of 1864 was the Indian government's response to these concerns. The act provided for a system of sanitary policing under the overall charge of military medical officers: regulations were laid down governing land use, nuisances, drainage, and unlicensed trades, but the extent to which these measures were enforced is questionable. In 1868, following a severe cholera epidemic the previous year, the Army Sanitary Commission recommended that there should be a further inquiry into the sanitary state of military stations in India, and that a 'more rigid system of sanitary police' be introduced. Wary of provoking civil unrest, the Indian government resisted the move, but final authority lay with the British government, and the scheme was introduced on a trial basis in a few cantonments in the Bengal Presidency. However, the matter was not pursued further and the Indian government allowed the scheme to lapse. There was even opposition on financial grounds to the extension of the water analysis scheme established by Francis MacNamara in Calcutta. The lieutenant-governor of Bengal thought it 'undesirable to institute any such experiment, the results of which would probably be indeterminate, while the expense attending it would be uncertain'.

Problems also attended the sanitation of bazaars. As late as the 1880s, there were doubts as to the legality of interfering with bazaars on the edge of cantonments, and most local authorities had not drawn up bye-laws for their regulation. Indeed, conditions in the vicinity of cantonments were causing great anxiety among medical officers, particularly the pollution of water supplies by Indian villagers living upstream. They protested that they were powerless to intervene outside the confines of their station, and called for the formation of special committees to inspect neighbouring villages and to compel the residents to follow sanitary regulations similar to those in force outside the cantonment.

In 1877 permission was granted by the Indian government and the committees were empowered to inspect all villages within a 5 mile radius of the eight cantonments initially involved in the scheme. The committees could insist that wells be repaired, refuse be collected, latrines be provided, and that a scavenging staff be engaged. It was recognised that these measures would 'large expenditure' and that they would necessitate 'much interference on the part of the police' in the daily affairs of villagers. But the Indian government thought the risk posed to the health of troops by conditions outside cantonments sufficiently great to warrant such measures, although it decided to cushion the blow in the short term by drawing the necessary funds from the military budget.

In the long term, however, it was envisaged that the money would be drawn from revenue raised by the imposition of a conservancy tax on the villagers concerned. Military imperatives were then, vitally important in the process by which sanitary policing was extended into rural areas: Indian villages were seen as the foci of epidemics which, sooner or later, would take their toll among British soldiers. In the words of the sanitary commissioner with the Indian government it was a 'good thing to secure the cleanliness of the immediate environment of troops, but they will never be safe as long as the native population and its towns and villages are left uncleaned to act as reservoirs of dirt and disease'. But, if the indigenous population was to shoulder the burden
of sanitary expenditure, greater concessions had to be made to local élites in terms of representation on local bodies. This was the essence of the reforms introduced by the viceroy Lord Ripon in the mid-1880s, and which form the subject of chapter 7.

Vital statistics

The ‘keystone in the arch of sanitation’, as one health officer described it, was the registration of births and deaths.109 The registration of deaths in cantonments was sanctioned under the act of 1864, while in the civil sphere it was made the responsibility, first of the sanitary commissions, and after 1868 of the provincial sanitary commissioners. The latter had the difficult task of co-ordinating an array of registration officers from civil surgeons to the Indian subordinate police.110 This scheme was to provide the basis for an annual aggregate of the vital statistics of the civilian Indian population, or ‘general population’, as they were referred to in official reports, after 1869. However, it was recognised from the very beginning that these statistics would provide no more than a rough indication of age-specific mortality, since many Indians were apparently ignorant of their own age. Given the enormity of the task facing the registration agencies with regard to deaths alone, plans to extend the system of birth and marriage registration which already existed in the Central Provinces and Burma were held in abeyance for the time being.111

In the countryside the administrative area of death registration was the police circle, with the chief police officer, or mohurrir as he was known in the North West Provinces, the circle registration officer. Village headmen were responsible for reporting deaths to the registration officer, classified according to race and religion, causes of death, age (approximate to between 5 and 10 years), and name of village. In the towns, where in some cases death registration had begun in the 1850s, officers were specially appointed by the municipality or the cantonment committee. Jails and lunatic asylums submitted separate returns.112

The urgency with which death registration was introduced owed much to military imperatives, and military factors continued to shape its development. In 1870, owing to high rates of cholera among European troops, the Army Sanitary Commission urged all large cities in India to produce weekly returns of deaths in the hope that this might afford warning of an impending epidemic. Some provincial governments such as the Punjab, the Central Provinces, and Berar complied, but others protested that to publish death-rates more often than on a monthly basis was practically impossible, unless financial support was forthcoming from central government to employ additional staff.113

Anxiety about the health of troops also lay at the heart of the Indian government’s attempts to centralise information in the hands of its sanitary commissioner – J. M. Cuningham. Cuningham wanted mortality statistics to be passed directly to cantonment authorities, via the quartermaster-general, and ultimately to his office, by-passing civil surgeons and provincial sanitary commissioners. But while most medical officers shared the government’s concern with the health of troops, many were vehemently opposed to any diminution of their own authority.114 William Walker, a civil surgeon in the North West Provinces, felt that

Dr. Cuningham’s proposal to introduce a system of centralizing information in the Sanitary Commissioner with the Government of India, seems to me to ignore not only the Sanitary Commissioners with the Local Government, but to shadow forth an interference with the power of the Local Government to deal with an epidemic as circumstances may seem to call for action.115

This was precisely the point: the Indian government was concerned for reasons of public order to prevent the imposition of custodial measures such as cordons sanitaires, and Cuningham’s proposals effectively deprived provincial governments and medical officers of the initiative in dealing with epidemic disease. Yet, opposition from local administrations, and, no doubt, the impracticability of operating death registration without the participation of local medical officers, meant that death returns continued to be processed first at provincial level.

But death registration was already experiencing enormous difficulties. Part of the problem stemmed from the system’s reliance on the subordinate police and others who lacked even the most rudimentary medical knowledge.116 As the sanitary commissioner of Bombay put it, ‘death registration is effected by the agency of uneducated men, and is generally admitted to be far from accurate’.117 Even within cantonments, death registration was, in 1874, still ‘far from satisfactory’, prompting the sanitary commissioner with the Indian government to comment that the time had come for ‘the compulsory registration of all births and deaths within cantonments to be strictly enforced’. In 1869 a clause had been added to cantonment regulations obliging the head of every family to report a death in his household within 24 hours but, according to the sanitary commissioner it had been little acted upon. Similarly, compulsory provisions had been made by only a small number of municipalities; again, with mixed results.118 Cuningham wrote that ‘in many parts of the country the registration of deaths is as yet so imperfectly conducted, that any detailed analysis of the results would be merely a waste of time and labour’. ‘The want of educated medical practitioners’, he continued, ‘and the ignorance and apathy, not only of the people themselves, but also of the village officials by whom reports are made, all offer obstacles to correct registration’.119

The registration of births progressed even more slowly, varying greatly from province to province. In the Bengal Presidency it was confined to a few areas in ‘Bengal proper’, the North West Provinces, and the Punjab; in Oudh it was not
attempted at all. It was, then, extremely difficult for medical men to ascertain demographic trends among the Indian population, although some rough estimates were attempted. The sanitary commissioner for the Punjab reported that in ‘normal years’ the birth rate exceeded the death rate by one third, but that in 1875, due to an ‘unhealthy season’, they had been roughly equal. In the coming years the inadequacies of the registration agencies became even more apparent. In Bombay the health officer complained that the Indian police who had been charged with registration of deaths had consistently failed to report deaths and to fill out properly the forms provided. ‘I have had to report ten of the sepoys to the Commissioner of Police’, he lamented, ‘whose patience I have very severely taxed’. In Berar there was some attempt to reform the system by removing responsibility for registration from the district superintendents of police and placing it under civil surgeons, in the hope that they would demand a higher standard of medical accuracy from their subordinates. But for many medical men the burden of extra administrative work was far from welcome, although, in 1877, sanitary commissioners were relieved of some statistical work in order that they might devote more time to registration.

Though dissatisfied with the progress of registration, the Government of India was reluctant to press it as a compulsory measure, and directed that where cantonments and municipalities chose to introduce such measures, they should not be enforced to the detriment of relations with the indigenous population. The registration of births and, especially, deaths in rural areas as well as in all towns. The Indian government believed that ‘the time has not yet arrived when the registration of births and deaths should be made generally obligatory by law’, and advised that the best course of action was to leave the matter to the discretion of local officials.

The Bombay government, however, felt that the time had come for a change of policy, and agreed with its sanitary commissioner that ‘petty fines in Municipalities, if levied judiciously will no doubt have a good effect; and any gentle pressure of this kind put on the people will tend to better registration’. Bombay continued to be the only provincial government to permit the introduction of compulsory registration in rural areas, even though it was acknowledged in the 1890s that progress was generally very slow. In 1893 the Bengal government compared its sanitary commissioner to ‘a skilled workman labouring with indifferent tools’. The following year, the sanitary commissioner with the Indian government reported that the ‘returns are still far from accurate’, the ‘machinery for recording events imperfect’, and the subordinate staff ‘neither by intelligence nor education well qualified for their duties’. Nevertheless, there had been some improvement on previous years, since whereas births had been registered in only 45 towns in Bengal in 1886, a decade later they were registered in almost every town in the province. Any improvement apparent in 1896 was, in most areas of India, short lived. The devastation caused by the plague epidemics of 1896 onwards, and by severe famines in western and central India, meant that medical and other agencies were stretched to the limit, and to the detriment of registration. However, plague did result in a number of reforms in the system of registration. The Epidemic Diseases Act passed in 1897, as a measure to control the spread of the plague, empowered provincial governments to make provisions for the inspection of corpses and the compulsory notification of all cases of, and deaths from, plague. Opposition to corpse inspection and other measures led to their being discontinued in most areas, but the usefulness of compulsory notification of infectious disease had been confirmed, strengthening the hand of those in the medical profession who had been calling for such measures to be introduced.

The Indian Plague Commission also recommended that more municipal health officers be employed, and that one of their principal duties should be to supervise the registration of births and deaths. However, it was recognised that any dramatic improvement in the accuracy of death registration was unlikely, since it was estimated that no more than one third of the population of Calcutta and other large cities had access to a qualified (western) medical practitioner. In Bombay, which had suffered more than any other city from plague, a number of individual registration initiatives followed closely upon the report of the Plague Commission in 1901. The city’s new health officer John Turner pointed out that of 24,068 deaths registered in the previous year, only 569 certificates had been provided by qualified medical practitioners, and 2,599 by infectious diseases hospitals, leaving the vast majority to be supplied by medically unqualified persons. In a proposal to the Bombay Corporation, supported by the professorate of Grant Medical College, Turner argued that more medically qualified men should be appointed by the municipality for the work of registration, and that a system of compulsory notification of all diseases be introduced. After some deliberation, the corporation accepted a watered-down version of Turner’s proposal, by which all cases of tuberculosis, malaria, and certain infectious diseases notified to the city’s health department would be published in the press and as hand bills, but without any compulsory provision to this effect. The corporation had apparently received protests from the city’s medical profession that ‘compulsory notification of malaria and tuberculosis would entail a hardship on medical men’. Turner was unable to effect any further concession from the municipality, or to engage substantially more medically qualified staff in the process of registration, and the accuracy of returns continued to leave much to be desired. In rural areas of India the progress of registration was even more disappointing. Delegates to the All-India Sanitary Conference in 1911 regretted the reluctance
of people in rural areas to register births and deaths, the inaccuracy of reporting by village headmen, and the problems faced by local boards in maintaining registration establishments on insufficient funds. With the ‘keystone’ in the arch of sanitation far from secure, the superstructure itself afforded scant protection to the millions of Indians outside of military cantonments.

**Vaccination against smallpox**

Vaccination was one of the earliest but one of the most controversial forms of colonial medical intervention in India. Jennerian vaccination was introduced into India in 1802 and promoted with considerable enthusiasm by European officials like the governor of Bombay, Lord Elphinstone. It has been suggested that, at a time when the British were seeking to consolidate their hold on newly conquered territory in India, the East India Company promoted vaccination of Indians in an attempt to create an impression of colonial benevolence. Vaccination also, perhaps, symbolised the progress of western civilisation, and it is noteworthy that Elphinstone’s ambitious plan of 1827 to vaccinate the inhabitants of rural Bombay was conceived amid the stirrings of utilitarian reform in India. Equally, vaccination provided a means of surveying and understanding the indigenous population, and was especially important in the absence of an efficient or universal system of birth and death registration.

During the early years of the campaign it was hoped that vaccination would gain the acceptance of the Indian people, and that they would eventually take it up for themselves, thus reducing the charge on the colonial exchequer. However, such a view seems surprisingly optimistic in view of the considerable opposition which vaccination had met with in Britain. Aside from technical limitations, such as the shortage of lymph and cowpox crusts which had to be imported from Britain, there were enormous cultural and political barriers in the path of vaccination in India. Probably the most significant of these was the fact that arm-to-arm vaccination — the dominant form of vaccination in India until well into the 1890s — was considered ritually polluting by Hindus since it entailed the transfer of bodily fluids from low caste or ‘untouchable’ vaccinifiers. Neither was the widespread belief in the smallpox deity, which was propitiated annually in ceremonies throughout India, displaced by the secular process of vaccination.

Vaccination had also to compete with a deeply entrenched and near ubiquitous form of inoculation against smallpox which, unlike vaccination, was sanctioned by Hindu and Moslem religions. In eastern India, inoculation was the responsibility of the indigenous population and not the colonial government. Inoculation was performed by practitioners known as *tikadars*, or ‘mark-makers’, who received a small payment for their services. Although British medical men had displayed great sympathy for the practice prior to the introduction of vaccination, incubation was afterwards regarded with hostility and almost universally deemed inefficient and dangerous. In 1844 the superintendent of vaccination in Calcutta went so far as to report that ‘smallpox is annually introduced into Calcutta by a set of inoculators’, while the IMS officer S. P. James, in 1909, still maintained that many smallpox epidemics could be traced to the activities of such men.

Most importantly, the extension of vaccination suffered from the contradictions of colonial medical policy itself. On the one hand, vaccination of the indigenous population was militarily and economically desirable; on the other, it involved great cost and the strong possibility of creating civil unrest through interference in indigenous cultural practices. According to the inspector of hospitals for Bengal, prejudice against vaccination existed not only among ‘the lower and ignorant classes, but also among some supposed to be better informed, and considered to have good social positions’. Thus, while much was done to encourage the indigenous population to come forward for vaccination, the government shied away from demands that it should be made compulsory, even within the more strictly regulated confines of military cantonments.

Where vaccination was introduced gradually and with due regard to indigenous sensibilities, it was thought that the measure might gain acceptance, and provide an excellent means of impressing other sanitary matters on the attention of the people. But a minority of reform-minded medical officers favoured the introduction of compulsory general vaccination against smallpox. John Lumsdaine, health officer of Bombay, justified the proposal on the grounds that ‘as far as the masses are concerned it would be a distinction without a difference, for it is now the general belief that it is compulsory’. By 1872 Lumsdaine had mustered enough support among the European community to effect the introduction of a bill in the Bombay legislative council providing for compulsory vaccination in the City of Bombay for all children under 14 years of age. The Indian government viewed this development with alarm and warned the Bombay government that ‘in all sanitary legislation in this country it is essential that the people should first be alive to the benefits of the proposed law. It would be much better to postpone compulsory vaccination until the benefits of vaccination are more fully appreciated’. The official view was clear, and the attempt to pass the vaccination bill was shelved for the time being; ‘All that the Government can hope to do’, wrote J. M. Conington, ‘is to confer the benefits of vaccination on a certain very limited class of persons’ and ‘to show the people by experience what vaccination means’. This was a clear departure from the view, embodied in the stirrings of utilitarianism of Elphinstone and others, that public health was a responsibility of the state.

The obstacle to a more extensive and effective vaccination programme was the vaccination establishment itself. The subordinate staff involved in inoculation could not be trusted to produce accurate statements of their work and
neither, it seems, could some of their superiors. In 1884 a deputy sanitary commissioner in the NWP was removed from his post to military duties for falsifying vaccination returns in Jalaan District. Nor was there much reason to suppose that the accuracy of vaccination statistics improved in the coming decades. In 1892 the inspector-general of vaccination for Madras noted in his annual report that in six circles the deputy inspectors had failed to verify even 50% of vaccinations, while one deputy was fined and another dismissed for irregular behaviour. Indeed, in most hill districts of the province there was 'no proper supervision exercised over Deputy Inspectors', while great difficulty was experienced in obtaining suitable (subordinate) staff on existing rates of pay.

The administration of vaccination was further complicated by the fact that it was carried out by two independent organisations: the special vaccination establishment and the provincial dispensaries. The organisation of vaccination also differed from province to province. In the North West Provinces and the Punjab there was a superintendent responsible to government for vaccination only. In Bengal there was also a superintendent of vaccination, but he was subordinate to the Medical Department and with more limited functions. In the Central Provinces, Berar, and Burma, the post of superintendent was combined with sanitary commissioner. The latter arrangement being the one preferred by the Indian government, since it was more useful for gathering information about the health of the people, and for publicising sanitary measures among them. The Central Provinces eventually became the model for the amalgamation of the vaccination and sanitary departments throughout British India in 1880.

Frustration with the slow progress of vaccination led to renewed demands that it be made compulsory within certain areas. In 1877, after much deliberation, the Bombay government decided to act contrary to advice from Calcutta and passed a Vaccination Act embodying the provisions of the Bill of 1872. A similar act was passed in Karachi in 1879. In the face of increasing demands from the European community, and with no serious unrest evident in either Bombay or Karachi, the Indian government reluctantly took steps to enable other administrations to do the same. Its Compulsory Vaccination Act of 1880 empowered provincial governments to introduce into certain towns and cantonments compulsory vaccination for children over 6 months old, with the sanction of a fine of Rs 1,000 or six months imprisonment for a parent or guardian who did not bring their child to be vaccinated. But the act did not mark a clear break with the policy of gradualism and cautious intervention espoused by the Indian government in the 1870s. The viceroy Lord Ripon felt that the act was of such a permissive nature that it gave the inhabitants of each locality the opportunity to state their objections, and he seems to have first sought the agreement of eminent Indians such as the Hon. Sayyad Ahmed, a member of the legislative council. The introduction of compulsory vaccination was also favoured by the Bengali newspaper the Hindoo Patriot, which claimed in an editorial of 1878 that it was only 'the ignorant and bigoted who still oppose it'. However, compulsory vaccination was still a controversial measure, with some prominent Indians like the Parsi philanthropist Sir Jamsatji Jijibhai refusing to bring forth their children for vaccination. The Madras government was also wary of making vaccination compulsory in Madras City, and did so only after much protest from its European inhabitants, and in the wake of a severe outbreak of smallpox in 1884. In fact the majority of provincial administrations were reticent about implementing the act, and it was introduced into only 441 towns and cantonments by 1906, representing 7% of British India's total population.

The limited extent to which compulsion was introduced was probably a reflection of continuing indigenous hostility towards vaccination, outside of a small, western-educated, urban elite. In 1888 the sanitary commissioner of Bombay wrote of the refusal of many parents to allow vaccinators to take lymph from their children, and noted that thousands of villages in the Bombay Presidency had not yet even been visited by a vaccinator. In 1880, the surgeon-general of Bengal also noted the persistence of 'extravagant beliefs and prejudices' against vaccination in his province, and the continuing popularity of inoculators, especially in the hill districts.

Another problem surrounded the use of vaccine made from calf lymph, introduced on an experimental basis in Bombay in the late 1850s. There was, initially, considerable opposition to the practice from orthodox Hindus who objected to what they saw as a violation of their sacred animal, and an attempt to introduce vaccination with calf lymph into Karachi had to be abandoned in 1880 because of civil unrest. Nevertheless, many medical officers, such as the sanitary commissioner for Hyderabad, continued to advocate the measure on the grounds that it was 'popular with the native public, who, as a rule, dislike to give lymph from their children's arms, and especially ... those fastidious caste men who object to lymph taken from the arms of low caste children'. The stock of calf lymph, he argued, could be increased indefinitely at comparatively little expense, although he recognised that the method did have certain drawbacks; principally, the shorter lifespan of calf lymph and the fact that it caused greater inflammation.

W. J. Simpson, health officer of Calcutta, was another enthusiastic advocate of calf lymph, claiming high-caste Hindus had been gradually reconciled to the practice, and that only certain tribes in up-country areas consistently opposed it. However, the Nepalese and the Lepchas, who inhabited the hill districts of Bengal were equally opposed to arm-to-arm vaccination, and were generally unwilling to permit their children to be used as vaccinifiers. The Indian government and provincial governments also had reservations. As the secretary to the Indian government pointed out, 'the cost of producing all the animal vaccine that
would be wanted would be prohibitive'. In the early 1890s the issue was further complicated by the growth of Hindu opposition to the killing of cows by Muslims.\textsuperscript{176}

A measure of official reticence over the use of calf lymph was the decision by the Madras government to remove a deputy sanitary commissioner from his position with the Sanitary Department for distributing calf lymph without having first obtained permission from government. The offending officer, W. G. King, claimed that there had been nothing in the Madras \textit{Manual of Vaccination} to prohibit such a course of action, and his supporters ensured that the matter was taken up at the highest level in Britain. Having persuaded the British government of the injustice of King’s removal from office, the secretary of state Lord Kimberley intervened on his behalf, forcing the Madras government to reinstate him, this time as the new sanitary commissioner, with a salary increase of Rs 400 per month.\textsuperscript{177}

It was, perhaps, the King decision that led other provincial governments to extend their production of vaccine from calf lymph. It was also true that, in many instances, vaccination with animal lymph was more acceptable to Indians than the old system of arm-to-arm vaccination. From November 1893 the use of calf lymph became the stated policy of the Bengal government,\textsuperscript{178} while in the Central Provinces it was found that many objections to the use of animal lymph could be overcome if the matter was obtained from buffaloes instead of cows.\textsuperscript{179}

The same method was adopted in Assam, but some problems were initially experienced in the production of the vaccine.\textsuperscript{180} By 1911 the manufacture of vaccine from animal lymph had allowed British India to become self-sufficient in vaccine, with the Vaccine Institute at Belgaum producing over 600,000 doses annually.\textsuperscript{181} Laboratories such as the King Institute in Madras had also done much to improve the quality of animal lymph and its preservation.\textsuperscript{182}

This expansion of production permitted a substantial increase in the number of vaccinations performed yearly from the late 1890s. From less than 5 million per year in 1887, the number of vaccinations rose to over 9 million in 1905.\textsuperscript{183} However, it is necessary to regard these figures with some scepticism, for, as the secretary to the Indian government warned, the percentage of success claimed for primary operations [in Bengal] is... incredibly high, and is due, it is feared, to deception practised on civil surgeons. In other provinces Vaccinators and Inspectors have been detected in bringing forward for inspection the same children for a number of years in succession.\textsuperscript{184}

These reservations seem to be consistent with the fact that, although the number of vaccinations had increased considerably in the 1890s and early 1900s, there was no corresponding decrease in mortality from the disease. In British India as a whole, the number of smallpox vaccinations performed annually increased from 6.2 million in 1891–2 to 8 million a decade later. Yet deaths from smallpox actually increased over this period, from 101,721 in 1891–2 to 115,445 in 1901–2, falling significantly only after 1909.\textsuperscript{185}

The plague epidemics of 1896 onwards also did much to hinder the progress of vaccination. Plague created an additional burden on vaccination establishments which were already insufficient to reach many people in rural areas; and, in the atmosphere of mutual distrust and panic which followed the outbreak of the disease in India, rumours circulated to the effect the vaccination was responsible for transmitting the plague.\textsuperscript{186} Indeed, there is evidence that opponents of vaccination actually became more vocal in India in the wake of plague. In a series of letters to the orthodox Hindu newspaper the Amrita Bazar Patrika, in 1912, a correspondent warned that strict enforcement of vaccination in Japan had led to an increase in smallpox, and urged that general sanitary reforms were a better preventive against smallpox than vaccination.\textsuperscript{187} The \textit{Indian Public Health and Municipal Journal} also noted an increase in opposition to compulsory vaccination at this time.\textsuperscript{188} In addition to suspicion of colonial motives in promoting vaccination, there was also resentment among Indian Moslems of the fact that many vaccination establishments were comprised almost entirely of Hindus.\textsuperscript{189}

Vaccination, then, by 1914, was still clearly culturally unacceptable to many of the Indian people, although this was not, probably, the most significant factor in the slow progress of vaccination. Where vaccination was introduced with the co-operation of community leaders there is some evidence that resistance to the measure could be overcome in time.\textsuperscript{190} A more significant factor was the basic inadequacy of the vaccination programme. Vaccination establishments simply had not sufficient resources to reach many of the infants who required vaccination on a regular basis. Thus, although the numbers of those vaccinated increased, the disease was never denied a fresh supply of victims among the new-born in areas which relied on the occasional visits of travelling vaccinators.\textsuperscript{191} Equally important was the fact that smallpox was never made a notifiable disease in India. As with the issue of compulsory vaccination, the lack of action in this regard was a measure of the government’s fear of provoking a backlash from its subjects, and of the practical difficulties of enforcing such measures even in the best-protected urban areas.

The civilising mission

The political uncertainties of the post-mutiny era fostered a mood of caution among British administrators in India: legislative intervention in public health, or in any other sphere which impinged upon deep-rooted religious or cultural practices, was kept to a minimum. In addition to public order considerations, sanitary legislation of the kind enacted in Britain was never a realistic option in India, given the immense area to be policed and insufficient medically trained
personnel to ensure its enforcement. It was as an alternative, or as a precursor to legislative intervention that popular education in hygiene came to attract the attention of sanitary reformers late nineteenth-century India.

Sanitary education formed part of the strategy of cautious intervention advocated by the Indian government, thought initiatives in this direction came not chiefly from the government, but from voluntary bodies funded on a charitable basis. For the most part the government was sympathetic to these voluntary initiatives, but was reluctant to involve itself directly in their administration. Nevertheless, voluntary bodies promoting vernacular education in western hygiene drew enthusiastic support from the Anglo-Indian community and from sections of the Indian elite. Though government patronage of these schemes rarely extended to financial support, certain spheres of their activity were slowly brought within the remit of local or provincial government. By the 1910s the climate of opinion created by the activity of voluntary bodies also began to have some influence upon the public health policy of the Indian government.

The dispensary movement and sanitary education

The establishment of charitable dispensaries from the 1830s was one of the earliest attempts to provide western medical care for the Indian people. It was soon realised that these institutions could perform useful public health functions, in addition to their curative work. Dispensaries became local centres for vaccination against smallpox and for conveying western ideas about sanitation and hygiene: and ‘local sanitary amendments, such as the digging of tanks and wells, fencing them off, and filling up holes’ apparently followed the opening of dispensaries in different parts of Bengal. Many of these dispensaries owed their existence to Indian philanthropists, who provided the money for the building of dispensary houses and a monthly sum for their maintenance.

By the 1860s, the fortunes of the landed notables who had sponsored these schemes were waning, and increasingly the sources of philanthropy became more diverse. In some cases ‘native doctors’ and medicines, and even the dispensary itself, were provided by government; sometimes by commercial organisations, like the Bengal Coal Company; and sometimes by subscriptions from Europeans. However, from 1870, as part of a move to reduce public expenditure, the colonial administration sought to distance itself from the running of dispensaries, which it felt should rely increasingly on local funds. The Government of Bengal resolved that:

The utility of dispensaries has now become so fully acknowledged that there is no necessity for the state to offer assistance to such an extent as when the movement was recent... The accumulation of balances further shows that there is no difficulty in obtaining locally even more money that suffices to meet the wants of these institutions as at present conducted.

Financial devolution left dispensaries dependent on local revenues which were subject to substantial fluctuation and regional variation, and dispensary provision varied accordingly. However, the total number of such institutions increased considerably in the decades after 1870: in 1867 there were only 61 dispensaries in the province of Bengal, with 17,000 in-patients and 318,895 out-patients, but by 1900 over 500 had been established in Bengal, attracting in excess of 50,000 in-patients and 2,296,617 out-patients.

The increasing number of persons treated at dispensaries was one of the more impressive achievements of colonial health policy in India, but the extent to which contact with dispensary staff provided an education in public health is harder to gauge. The presence of dispensaries in some cases apparently encouraged a desire for vaccination among the Indian people, while in towns like Puri, the presence of the dispensary was thought an important factor in the adoption by Indians of western sanitary practices.

In the majority of cases, dispensary staff set a good example to their patients, but doubt was cast on the competence of some. On inspecting Bograh dispensary, the deputy inspector-general of hospitals for Bengal found that the medical officer in charge was an opium eater and totally unfit for his post. According to the superintendent of Marrickgunge dispensary, the insubordination and carelessness shown by native doctors when away from control is so uniform that it is only by periodical inspections and really knowing the actual state of the branch dispensaries that these institutions are made useful to the community. It is, of course, necessary to take account of racial prejudice when evaluating the testimony of European medical officers. Nevertheless, it is likely that conditions were far from perfect in many dispensaries; particularly as local dispensary committees usually met infrequently, making effective management of such institutions difficult.

One notable area in which dispensaries failed was in the treatment and vaccination of women. In 1869, the superintendent of dispensaries for Bareilly District spoke of the ‘great difficulty’ he and his staff had in persuading women to attend dispensaries, and, in 1871, only 18% of those attending dispensaries in Bengal as in-patients or out-patients were women. From the 1880s, however, there were attempts to make dispensaries more acceptable to Indian women otherwise prevented from attending by the seclusion of purdah. Writing in 1900, the inspector-general of hospitals for Bengal claimed that most dispensaries in the province had now been improved... in connection with the privacy of women. In all places the object has been to have a separate delivery window for females, which shall open, if possible, into a separate waiting-room for that sex. Privacy for women has been held by me to be a most important condition of success.

But the results of these initiatives were disappointing. Although many more
women were attending dispensaries in Bengal (some 587,092 in 1901) than in the 1870s, this was simply a function of the growing number of such institutions in the province. In fact, in 1901, the percentage of women attending dispensaries had increased by only 0.3% on that of 30 years before.

Outside of dispensaries, the government’s role in sanitary education was confined largely to the distribution of literature on basic hygiene. I. M. Cuningham’s Sanitary Primer was translated into many Indian languages and became a set text in Indian schools. Tens of thousands of copies were distributed in the 1870s and 80s. In 1887, 3 years after Cuningham’s retirement from the post of sanitary commissioner, his primer was replaced with an alternative source of wisdom on sanitary matters, the former being considered ‘too elementary’ even for junior classes. The Indian government’s attention had been directed to a publication by the Madras Christian Vernacular Education Society, entitled The Way to Health. Like Cuningham’s Primer, it stressed the evils of fatalism and the simple precautions which might be taken against ill-health. But The Way to Health paid more attention to the causation of specific diseases than Cuningham’s text, and, unlike its predecessor, presented cholera as an essentially waterborne infection. However, its tendency towards oversimplification, and its anachronistic notions of disease causation, may not have been the only reasons for the withdrawal of Cuningham’s Primer. In 1882, with Cuningham still in situ at the Sanitary Department, the Government of Assam requested that it be replaced by a booklet written by an Indian – Babu Jada Nath – on account of its simpler phraseology and ‘native standpoint’. Yet, the Indian government refused to sanction its withdrawal, presumably not wanting to undermine confidence in its sanitary commissioner.

It is significant that the text which eventually replaced Cuningham’s was published by a missionary organisation. Non-official, and especially religious, organisations invariably made the running in matters of sanitary education. Hygiene was an important element of their ‘civilising mission’, in which moral and medical teaching went hand in hand. Public and personal hygiene was a matter of Christian duty, and sanitary manuals like The Way to Health inveighed against the moral as well as the medical dangers of alcohol and other forms of intoxication. Missionaries were perhaps better placed than government officials to observe on a regular basis the cultural practices of Asiatic peoples and to devise methods by which western principles could be introduced. However, the moralising tone and the air of cultural superiority conveyed in missionary texts may have limited their appeal to an Indian audience.

The veil of the ‘zenana’

The most striking aspect of non-official activity in the sphere of public health education was its preoccupation with the health and sanitary education of Indian women. Prior to 1870 there had been few initiatives in this direction, but it had often been noted that women were seldom admitted to hospital or sought western medical attention. In the 1860s there were a number of attempts to remedy this situation, concerned chiefly with the training of Indian midwives (daisi). The question of how best to gain access to one-half of India’s population, so far largely untouched by western civilisation, became increasingly important to missionaries in the 1870s and 80s. The provision of medical relief was seen as one of the few ways by which western ideas could penetrate the veil of the zenana.

At the same time there was a growing supply of female medical practitioners from Europe and North America who, unlike their male counterparts, would not be barred from attending purdah women. Missionary work provided one of the few openings to newly qualified women in Britain and the United States. Female practitioners from America began to set up missions in India in the 1870s, while the first British medical woman to practise in India – Miss Fanny Butler – was despatched by the Church of England Zenana Missionary Society in 1880. Prior to 1880 some medical work was undertaken by female missionaries without medical qualifications; for example, the work of the Society for Female Medical Education in the East. The establishment of these organisations suggests that the health of women in the British Empire had become an issue of some importance in Britain as well as in India.

Another indication of growing public concern over the health of women was the support declared by Queen Victoria for a proposal by Mr Kittridge of Bombay to raise funds for British medical women willing to give their services in India. The scheme, which was supported by several prominent Indian gentlemen, also hoped to raise enough money to establish a medical course in India; the total required being estimated at Rs 30-35,000. These proposals were greeted with enthusiasm by the Bombay Gazette, which was pleased to report that over Rs 33,000 had been received in subscriptions in the 3 weeks since the scheme was announced.

However, Kittridge’s proposal raised the question of what kind of medical education should be made available to women, and hence of their professional status in relation to male practitioners. Initially the government of Bombay approved a proposal by Dr Van Dyke Carter – principal of Grant Medical College – to institute a 3-year course specifically for women. In many respects the course was similar to that leading to the Licentiate of the London Society of Apothecaries, and did not provide special instruction in diseases peculiar to women or in obstetrics. This move was heavily criticised by the Bombay Gazette, which argued that women should be admitted to existing courses of instruction, including the 5-year MB degree. Otherwise, it claimed, Indians would lack confidence in the ability of women medical graduates.
Ultimately a compromise was reached, in which women were restricted, initially, to taking the diploma suggested by Dr Van Dyke Carter, but after 3 years would be admitted into the full university course to study for the final 2 years of the degree. This did not augur well for future relations between male and female medical staff. The Indian Medical Gazette wished the movement 'every success', but was of the opinion that 'women are better fitted for nursing rather than doctoring, and that educated nurses would fulfil the requirements of this country better than full-fledged lady doctors'. It is significant that the years 1883-4 marked an intensification of the campaign for medical registration in India. Male practitioners were concerned that the inclusion of Indian women in the medical profession would lower its status in the eyes of Europeans.

Despite the reservations of IMS officers, the movement for the training of British and Indian female practitioners began to gain ground, capturing the imagination of the British public, the Anglo-Indian community, and a section of the western-educated Indian elite. Two years after the Bombay scheme was established, Queen Victoria enquired of the new viceroy — the Marquis of Dufferin — whether or not it could be extended to include the whole of British India. The Indian government, while reluctant to involve itself directly in such a scheme, was willing to provide the services of one clerk and to permit IMS officers to supervise its operation.

The new organisation was entitled the National Association for Supplying Female Medical Aid to the Women of India; known more commonly as the Dufferin Fund, after its first president the Countess of Dufferin. Queen Victoria became the fund's patron, affording it a good deal of publicity. It aimed to provide the salaries of British medical women willing to work in India, and scholarships for Indian women wishing to train in western medicine. By 1888 eleven medical women were employed by the fund, six of whom were of Indian origin. The launch of the Dufferin Fund was greeted with enthusiasm by the Anglo-Indian community in general, but there was still some reservation on the part of the IMS. 'We wish it every success', wrote the editor of the Indian Medical Gazette, 'as it promises to provide skilled nurses and midwives for Indian women [but] as concerns the education of native girls as doctors, we are not quite so clear or sanguine.'

The impetus behind the fund was not simply the humanitarian desire to extend medical relief and knowledge of hygiene to Indian women, but to proselytise western values more generally. Europeans regarded the zenana as a bastion of ignorance and superstition; as the Bombay Gazette put it:

western ideas will continue to spread in India, partly because of our eagerness in disseminating them, partly because of the eagerness of the more advanced native races in spontaneously embracing them. But here is a field in which native custom is stronger than any effort that might be made to shake it, even if we are sufficiently confident in the superiority of western customs to make the effort... If native women are to have medical attendance worthy of the name it must be the attendance of women versed in the art of medicine and skilled in its act.

Female doctors, then, were considered essential to the success of the civilising mission, but, even where medical missions or voluntary hospitals were able to call on the services of female practitioners, it proved difficult to penetrate the zenana. Writing of her experiences at a dispensary for women in Hyderabad, a British doctor acknowledged that the city's inhabitants were 'liberal-minded' and 'receptive of new ideas', but that it was still difficult to dispel their fears about hospitalisation. The mythology of the 'magic bullet' surrounding western medicine could also be counterproductive. 'Frequently', she complained, women using the dispensary 'cease attending after a few days, believing that if English medicine does any good, it ought to do so in a very short period'. More importantly, the institution of purdah itself continued to hamper the work of medical missions. 'Some of the men', she wrote, 'are still extremely reluctant to allow their wives and daughters to make periodical visits to the hospital, fearing perhaps that they will create a love of going out, which would be extremely inconvenient to such domestic tyrants.'

The treatment of purdah women was also frustrated by a rule in the Dufferin Fund's constitution which required its hospitals to undergo regular inspection by male doctors from the IMS.

Nevertheless, the fund received sufficient subscriptions from Indians as well as Europeans to enable it to open branches in London and in most Indian provinces. In 1886 the Bombay Gazette expressed pleasure at the 'impressive list of contributions from the chiefs and princes of western India, and from other wealthy representatives of the native races'. According to the Hindoo Patriot, the women of India were under a 'deep debt of gratitude' to Lady Dufferin for founding such a 'noble institution' which had so far proved 'remarkably successful'. Though some of the initial momentum began to fade in the coming years, the fund's finances were still in a 'satisfactory' state in 1891. So far, reported the Indian Medical Gazette, 11 lakhs of rupees had been invested in the fund, yielding an annual income of Rs 50,000. Income from private donations and subscriptions for the year 1891 totalled almost 1 lakh of rupees. Thirteen female practitioners (holding qualifications higher than the LMS) were now employed by the association, and 27 women of the 'assistant-surgeon' class who held a variety of 'certificates' and 'diplomas'. Twenty-one of the latter were Indians, and another 204 medical students sponsored by the fund had yet to qualify. Over 400,000 women were said to have received medical aid at its hospitals and dispensaries. By 1892 there were 10 provincial branches of the fund in India and 120 local and district associations administering 48 hospitals. These were supervised by a central committee in London.

However, the effectiveness of the fund remained limited inasmuch as it
courted well-to-do Indians and drew its patients almost exclusively from the Indian middle class. The *Morning Chronicle* thought the association 'one of the noblest institutions for the benefit of womanhood in India', but regretted that the fees charged at its hospitals and dispensaries were not only exorbitantly high, but quite out of any reasonable proportion to the demand that the public has on their services. This, it need hardly be urged, makes their services open to the 'privileged few', while the great majority of people... are simply banned from taking benefit of the trained knowledge of lady doctors.

According to Surgeon-General C. R. Francis, speaking at the Indian Medical Congress in 1891, 'the stronghold of custom and prejudice was in the home', and the training of medical women had so far done little to overcome it. In general it was acknowledged that western notions of hygiene had made little impact on the vast majority of Indian people. In 1894 the Army Sanitary Commission observed that it is only needful to read the reports of the Deputy Sanitary Commissioners, who have spent the best part of the year amidst the people in their towns and villages, to be convinced that, as taught by us, sanitation is still almost everywhere unknown or, if heard at all, is disliked as a new-fangled, troublesome and expensive innovation. The people prefer to live and die as their forefathers lived and died — to be left alone.

Similarly, in his account of his experiences as a civil surgeon on the North West Frontier in the early twentieth century, Henry Holland lamented that 'it is slow work to educate the people in ways of health; to overcome prejudice, ignorance and apathy; to gain a community response to the value of preventive measures'. In Holland's view, these remarks applied not only to the illiterate rural masses, but equally to 'the intelligentsia of cities in the East'.

The inability of the Dufferin Fund to effectively penetrate the zenana may have owed much to the increasing suspicion with which it was regarded during the 1890s. The influential *Bengalee* newspaper, which represented Hindu professionals in the province, felt that the fund had not done enough to secure the employment of Indian women in supervisory positions. Of the 11 fully qualified doctors employed by the association in 1890 not one was an Indian, despite the fact that several Indian Christian women had obtained medical degrees. The *Bengalee*'s editor hoped that this 'slur to native worth' had not been intentional, but in its annual report issued early the following year, the central committee of the fund defended the exclusion of Indian women on the grounds of age and experience, and saw 'very strong reasons' for continuing to employ women from Europe. It was now clear, according to the *Bengalee*, that the fund meant 'deliberately to exclude our countrywomen from occupying posts of high responsibility' and to perpetuate 'those unjust race-distinctions which act as a great hindrance to the advancement of the Indian people'.

Relations between the fund's employees and their male counterparts in the IMS were equally fraught. In 1904 the *Indian Medical Gazette* wrote of the fund's 'inefficiency', which it ascribed largely to the 'defective education' of its staff. It also noted that its financial position had worsened considerably, and that many of its hospitals were experiencing problems with the lack of privacy afforded to patients. The numbers of Indian women coming forward to train as hospital assistants and apothecaries was equally disappointing, low pay and lack of proficiency in English being blamed for this state of affairs. There was also considerable dissatisfaction among the fund's European employees. In 1907 an Association of Medical Women was established in India along the lines of the one already existing in Britain. Two years later, in an attempt to end male dominance of the association, it made a representation to the effect that at least one female practitioner should be given a seat on its central committee and that its secretary should in future be a woman. A sub-committee of the fund alleged that medical aid and advice for women in India was totally inadequate.

However, some progress had been made in training Indian women as midwives. The Victoria Memorial Scholarship Fund established by Lady Curzon in 1903 had, by 1912, set up centres in 14 different provinces and trained 1,395 midwives. Provincial governments now also made small contributions to the education of women. The Government of the United Provinces granted 6 scholarships annually to enable women to complete a 2-year course of instruction at Agra Medical School.

By 1913, after much criticism in the British press, the Indian government decided to assume a more direct role in the finance and administration of the Dufferin Fund. The lack of special provision for the health of Indian women had formed the subject of editorials in *The Times* and the *Daily Chronicle*, and medical women themselves had memorialised Secretary of State Lord Morley and his successor, in 1910, Lord Crewe. The need to train more Indian women in medicine had now been largely accepted by medical practitioners in India. Speaking at the second All-India Sanitary Conference in 1912, Dr Souza, health officer of Lucknow, saw women as vital to the success of sanitary education: we all know the influence exercised by women in India in domestic sanitation, and if any good is to accrue from our efforts, we have not only to detect diseases in children, but approach their mothers and instruct them in prevention and treatment of diseases.

A proposal from Miss Benson, an employee of the Dufferin Fund for 'the formation of a women's domestic sanitary service' in India was also well received. Though it decided against the creation of a state service similar to the IMS, the government approved a grant of Rs 1,500,000 (£10,000) per annum for a
reconstituted service administered by the central committee of the Dufferin Fund, to be called the Women's Medical Service for India. Recruitment in India would be conducted by a sub-committee which included the DGIMS and the viceroy's personal surgeon; and in Britain by a sub-committee which included 1 medical man and 2 medical women. The central committee itself now included a female medical member, and the salaries of women holding qualifications higher than the LMS were placed on a par with those of male civil surgeons. Thus, the professional concerns of female medical personnel had been taken into account, but their political demands had not.

One consequence of the women's health movement was a growing interest in maternal and infant welfare. The first initiatives in this direction were made in Bombay, Delhi, and Karachi, where small maternity homes were founded, and free or cheap milk distributed by voluntary organisations. But no systematic attempts were made to address this subject until 1914, with the establishment of the Lady Wellington Scheme. Initially funded by subscription, the scheme employed 12 female health visitors to attend poor women in the city of Bombay. They offered advice on matters of personal hygiene and, if necessary, persuaded women to attend a municipal maternity home, or one of the homes established under the scheme. Two such institutions had been established by 1916, one of which was taken over by the municipality in 1918.

The medical education of British and Indian women was only one part of the attempt to spread the sanitary gospel. Another aspect of this campaign was the formation of sanitary associations in a number of the larger Indian cities: a direct consequence of the plague epidemics of 1896 onwards. The Bombay Sanitary Association (BSA), founded in 1904, had by 1912 attracted Rs 800,000 in grants from the provincial government and the Bombay Corporation, and in donations from the public. The BSA funded a course in elementary hygiene, enabling graduates to qualify as sanitary inspectors, and 201 students completed it between 1904 and 1912. Health visitors were also employed by the association to advise the city's population on sanitary matters. They made weekly reports to the BSA's secretary, who informed the city's health officer of any insanitary conditions.

Another important feature of the campaign for sanitary education concerned the teaching of hygiene in government-maintained schools. In 1908 the editor of the Indian Public Health and Municipal Journal warned that 'unless the rudiments of Hygiene . . . [were] drilled into . . . [children] at school it . . . [would] be difficult for them to grasp sanitary problems when they . . . [grew] up'. Not a single government-maintained school in India provided systematic instruction in hygiene, he complained, and in such circumstances it was not surprising that 'false views as regards inoculation against plague and other beneficial sanitary measures' had been formed. A Catechism on Hygiene for elementary schools was published later the same year, but it was not until 1914 that the curriculum in Indian schools was revised to provide for the teaching of sanitary science at all levels.

More attention was also paid to the subject of physical education. 'The surest and best way of preventing the physical deterioration so manifest in our juvenile population . . .' wrote Bombay's health officer John Turner, to make physical education compulsory in secondary schools, and to instruct both teachers and pupils in the 'laws and essentials of healthy living'. 'Owing to the ignorance of the parents', he continued, 'the care of the home needs to be supplemented . . . The State being the ultimate guardian of the child, should participate in the guardianship of health.' However, medical examination of schoolchildren (introduced in Britain in 1907), despite repeated demands by the sanitary profession, was not established in India until 1914, and then only on an experimental basis. It was placed on a permanent footing in Bombay in 1917, though with a manifestly inadequate establishment of only two inspectors.

**Conclusion**

Public health provisions in British India grew out of, and continued to be shaped by, anxieties aroused by the Indian mutiny of 1857; particularly the unhealthy state of British troops. An infrastructure of public health evolved in response to these concerns, at first within the confines of military cantonments and then, increasingly, without the camp. But the desire to sanitize the Indian population, most evident among the military and certain officers of the IMS, was held in check by financial considerations, logistical difficulties, and by opposition from British humanitarians and Indian elites. The 'civilizing impulse' was forced to express itself in more subtle forms — in sanitary education and in the activities of the Dufferin Fund — but such organisations had little success in penetrating the veil of the zenana, and in inculcating western principles of hygiene.

Yet, if the 'civilizing mission' was largely a failure, public health measures such as smallpox vaccination and the registration of deaths provided means — however imperfect — of knowing the population. The expansion of smallpox vaccination in the late nineteenth and early twentieth centuries was also beginning to effect a decrease in mortality from the disease in some areas of India, although the inadequacies of the vaccination establishment and continuing suspicion of the measure ensured a constant stream of infection, particularly in rural areas. The main focus of colonial medicine remained the military cantonment, where much was done to improve the health of British and Indian troops. Mortality rates among both British and Indian soldiers began to fall significantly, if unevenly, from the early 1880s. But disease continued to constitute a greater obstacle to military efficiency than Curtin, Headrick, and others have suggested. Sickness among British soldiers remained alarmingly high until the turn of the century, and military hygiene still left much to be
desired outside of the cantonment. Both the British and Indian armies suffered high losses from disease when conducting campaigns in the northern frontier provinces, where the army fell prey to epidemics among the indigenous population; a problem which will be considered at greater length in the following chapter.

Statistics are the Sibylline Books of modern times; and when they are the outcome of true registration . . . they are an unerring guide for the future. (James Lumstaine Bryden, Reports Bringing Up the Statistical History of the European Army in India, Calcutta, 1876)

The evil results of the contagion theory, as interpreted in other countries, have been shown, not only in the rigours and hardships of quarantine . . . but in the panic and demoralization which have degraded and deranged society generally. (Sir Joseph Fayrer, The Natural History and Epidemiology of Cholera, London, 1888)

Before 1817, cholera had been confined to Lower Bengal, with sporadic outbreaks among the rural population, but not among European enclaves in towns, or in military stations. In that year, however, the disease spread outside of its ‘home’ in Bengal to claim the lives of many thousands of Indians and Europeans in northern and eastern India, and, in the following years, in the presidencies of Bombay and Madras. As described in chapter 2, the outbreak of what appeared to be a new disease – epidemic cholera – made a profound impression on Europeans, arousing more fear and interest than any other disease.¹ In the wake of further outbreaks of the disease, debate raged over the causation of cholera and how best to prevent it.

¹ No disease was more important, and no disease so little understood, as the ‘epidemic cholera’. Hindu literature referred only to cholera in its sporadic, endemic form, while European practitioners conjectured variously that the disease was caused by the electrical state of the atmosphere;² by the operation of climate on the soil, providing the right conditions for the germination of the cholera ‘seed’;³ by contagion;⁴ or by transmission of the cholera germ in water (Snow’s theory). Such questions acquired a fresh relevance after the mutiny, during which British troops had been seriously depleted by the disease. The dominant view in the 1860s was that cholera was essentially a ‘disease of locality’, its causes being similar to those of malaria; although an increasing

C. A. Gordon, *Army Hygiene*, pp. 84–93 (London, 1897), 26; (1898), 26; *BMJ* (January 1898), 1620; (June 1898), 1521; (November 1899), 1376; *Lancet*, June 1899, p. 1501; *IMG* (November 1899), 403.

C. A. Chambers, 'Enteric fever in Indians, with special reference to its occurrence in the Indian Army', *JTM* (September 1913), 280–2.


**3 The foundations of public health in India: crisis and constraint**


4 The members of the commission were Richard Airey (quarter-master-general and president), Douglas Galton (asst. under-secretary for war), John Sutherland, T. G. Logan (inspector-general of hospitals), Edward Beffield (deputy director of works, War Office), Proby T. Cantley (member of the Council of India), James Ranald Martin (inspector-general of hospitals and president of the India Office Medical Board), Robert Rawlinson (Local Government Act Office), and J. J. Frederick (secretary).

5 Report of the Commissioners Appointed to Enquire into the Sanitary State of the Army in India, Parliamentary Papers, I and II (1868).


7 *SCG* (1870), I.


10 Jeffreys, *The British Army in India*, p. 59.


15 Gordon, *Army Hygiene*, pp. 39, 42.


18 Freeman, *The Sanitation of British Troops in India*, p. 52.


22 Le. 6 years service with the colours instead of 12, followed by 6 years in the reserve.


25 Roberts, *Enteric Fever in India*, p. 11. From 1903–6 the incidence of drunkenness convictions amounted to only 12 per cent of the British Army in India; the lowest previous figure being 33 per cent in 1871–5.

26 W. H. M. RAMC 397/ERR 1–1/1: barrack reports of Sir John Hall, 1852.


29 Parliamentary Papers, xix (1814), pp. iii–iv.


33 *Proc. of the Sanitary Commission for Bengal* (1865), 64.

34 Memorandum on Measures adopted for Sanitary Improvements in India up to the end of 1867 (London, 1868).


36 *SCG* (1867), 148, 191; (1868), 73.


39 See appendix B: allotments to military sanitation.


41 *SCG* (1870), 8; (1872), 193–4.

42 *SCG* (1875), 119–20.

43 *SCG* (1876), 129; *IOR P/1003 GOI (Sanitary)*, memo of Army Sanitary Commission on the report of the sanitary commissioner with the Indian government for 1875.

44 IOR P/1003 GOI (Sanitary) no. 177, general order by commander-in-chief, 30 July 1877.
45 Thornton, Memories of Seven Campaigns (London, 1895), pp. 148, 309.
46 See appendix B.
47 See Reports of the Chemical Analyzer to the Government of Bombay (1876–90) and SCGI (1896), 23.
48 SCGI (1895), 193.
49 Nightingale, Observations, p. 10.
50 Ranking, Military Sanitation, p. 5.
51 Caldwell, Military Hygiene, p. 57.
52 Ibid., p. 58.
53 SCGI (1907), 13–16.
54 SCGI (1904), 21.
55 Freeman, The Sanitation of British Troops in India, p. 17.
56 Caldwell, Military Hygiene, pp. 42–3.
57 Ibid., p. 43.
60 Z. Cope, Almroth Wright. Founder of Modern Vaccine Therapy (London, 1966), pp. 21–33. Though there was some uncertainty over the effectiveness of the typhoid vaccine, the Advisory Board’s reluctance to carry out trials in order to test the vaccine suggests that other factors lay behind their opposition to Wright. Existing scholarship has tended to view this decision as a ‘purely’ medical one, ignoring other dimensions of the inoculation controversy, for example Curtin’s Death by Migration, p. 154.
61 Cope, Almroth Wright, pp. 21–2.
62 The shortage of recruits to the British Army – around one-third of which was stationed in India – is considered in Hewlett’s Enteric Fever, p. 170.
63 Roberts, Enteric Fever in India.
65 Caldwell, Military Hygiene, p. 41.
66 SCGI (1870), pp. 48–52.
68 Ballhatchet, Race, Sex, and Class under the Raj, pp. 43, 49.
69 Ibid., pp. 35–6.
70 SCGI (1867), 157; IOR P/674, GOI (Sanitary), no. 204, 1871.
71 IOR P/434/34. GOI (Sanitary), resolution on the new duties of sanitary commissioners, no. 9-681-88, 12 February 1868; BHO, 1 (1871), 8; BHO, 1 (1872), 7.
72 IOR P/674. GOI (Sanitary), commissioner of police, Calcutta, to GOBe., submitting report of the superintendent of lock hospitals for 1870.
73 IOR P/1002. GOI (Sanitary), extract from the procs. Govt. of Bengal (Judicial Dept.), 6 August 1873.
74 D. Arnold, Police Power and Colonial Rule (Delhi, 1986), p. 64.
75 IOR P/438. GOBo. (Genl. Dept.), no. 41, letter from the municipal commissioner of Bombay to GOBo., 4 June 1871.
76 BHO, 3 (1871), 8.

Notes to pages 73–8
77 IOR P/674. GOI supt. of lock hospitals, Calcutta, to commissioner of police, Calcutta, 1871.
78 Hyam, Empire and Sexuality, p. 123.
79 IOR P/1002 GOI (Sanitary), procs. GOBe., 6 August 1873, no. 13.
80 IOR P/1203. GOI (Sanitary), resoln. no. 357, 21 December 1877.
81 SCGI (1875), 76.
82 SCGI (1876), 31.
83 SCGI (1878), 25–8; (1879), 31.
84 IOR P/1664. GOI (Sanitary), no. 1037, sec. to GOBe. to sec. to GOI, 30 August 1881.
85 SCGI (1871), 111. Evelyn Baring (later Lord Cromer), legal member of the viceroy’s council was one of the staunchest opponents of the CD Acts, but for financial rather than moral reasons. See Lord Zetland, Lord Cromer (London, 1932), pp. 77, 165.
86 IOR P/1781. GOI (Medical), resoln. no. 120, 7 June 1881.
87 Bengalee, 30 July 1887.
88 Bengalee, 2 July 1887.
89 Ballhatchet, Race, Sex, and Class under the Raj, pp. 43, 49.
90 Hindoo Patriot, 17 May 1875, p. 234.
91 Bengalee, 21 August 1886.
92 Bengalee, 2 July 1887.
93 IOR P/3195. GOI (Sanitary), no. 24 October 1888, sec. of state to gov.-gen. in council, 14 June 1888.
94 IOR P/4753. GOI (Sanitary), no. 19 May 1895, enclosing copy of Military Cantonments Act 1889.
95 IOR P/4753. GOI (Sanitary), no. 19 May 1895.
96 Bengalee, 20 February 1897, p. 89.
97 See chapters 5 and 6.
98 Ballhatchet, Race, Sex, and Class under the Raj, p. 95.
99 Nightingale, Observations, p. 25.
100 Gazette of India, 2 March 1864, pp. 84–6.
101 SCGI (1868), 60.
102 SCGI (1869), 74–5.
103 SCGI (1869), 104–5.
104 IOR P/434/45. GOI (Sanitary), sec. to GOI to sec. to GOBe. (Judicial Dept.), 5 February 1870.
106 SCGI (1875), 121; (1876), 128–9.
108 SCGI (1892), 25.
109 BHO, 2 (1869), 4.
110 Gazette of India, 1864, pp. 84–6; IOR P/434/34. GOI (Sanitary), nos. 1–18, ‘Duties to be performed by sanitary commissioners with the local governments and administrations in the Bengal Presidency’, 19 September 1868.
111 SCGI (1868), 61, 97.
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IOR
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registration in British India, 10 June 1874. ively. See
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1893.
Procs. All-India
BHO,
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Prevailed
p. iv.
S.
(1877),
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(1804),
1804),
175. slave ships in order to maximise productivity and profits. See L. Stewart, 'The edge of utility: slaves and smallpox in the early eighteenth century', Medical History, 29 (1985), 54–70.


James, Smallpox and Vaccination, pp. 10–11.

Vaccination required a large number of subordinate staff. Even in 1878, a total of 2,559 vaccinators were employed throughout British India, the largest number (591) in the NWP, and the lowest number (139) in the Punjab and the Central Provinces respectively. See SCGI (1878), 96.


SCGI (1868), 50.

IOR P/524. GOI (Sanitary), no. 209, sanitary commissioner with the Indian government to sec. to GOI, 21 April 1871.

BH0, 1 (1869), 9–10. Inoculation had already been banned in Calcutta and surrounding villages. See James, Smallpox and Vaccination, p. 14.

IOR P/674. GOI (Sanitary), memo no. 400 circulated by sec. to GOI to GOBo., 26 August 1872. The Bill provided for the compulsory vaccination of all children over six months old born, or newly arrived in, the city of Bombay. This was an optimistic, if not unrealistic, objective, given that rapidly industrialising Bombay was attracting large numbers of immigrants from its rural hinterland. See I. Klein, 'Urban development and death: Bombay City, 1870–1914', Modern Asian Studies, 20 (1986), 725–54.


SCGI (1869), 121.

IOR P/2510. GOI (Sanitary), no. 4, 25 November 1884. Surg.-capt. Pringle subsequently resigned from the IMS.

Madras VR (1891–2), 16.


SCGI (1877), 101.

SCGI (1879), 100.

SCGI (1887), 55.

James, Smallpox and Vaccination, pp. 31–3; SCGI (1879), 83.

Madras Times, 3 July 1880, pp. 2–3.

Hindoo Patriot, 6 May 1878, p. 211.
167 IOR P/1432. GOBo. (Genl.), no. 141, resoln. no. 748, 25 March 1879.
169 Arnold, 'Smallpox and colonial medicine', p. 60.
170 SCBo. (1888), 52.
171 Bengal VR (1879–80), 7.
172 SCGI (1881), 152.
173 IOR P/2708. GOI (Sanitary), no. 42, sanitary commissioner for Hyderabad to sec.to GOI, 24 June 1886.
174 IOR P/2708. GOI (Sanitary), Simpson to sanitary commissioner for Bengal, 5 July 1887.
175 Bengal VR (1877–8), 6–7.
176 IOR P/4346. GOI (Sanitary), no. 13, under sec. to GOI to chief sec. to Punjab govt.
177 IOR P/4346. GOI (Sanitary), no. 16, gov.-gen. in council to sec. of state, September 1893.
178 IOR P/4555. GOI (Sanitary), no. 98, Bengal Municipal Dept. resoln. no. 3391–3, 7 November 1893.
179 IOR P/4755. GOI (Sanitary), no. 42, procs. chief commissioner, CPs, no. 5738, 20 August 1894.
180 IOR P/4755. GOI (Sanitary), no. 41, procs. chief commissioner, Assam, no. 5719, 21 July 1894.
181 Arnold, 'Smallpox and colonial medicine', p. 54.
182 Madras VR (1905–6), 18.
183 See Reports of the Sanitary Commissioner with the Government of India.
184 IOR P/4755. GOI (Sanitary), no. 310, sec. to GOI to sec. to GOBo., 31 October 1894.
185 SCGI for 1892 and 1902.
186 SCGI (1899), 143. See also Arnold, 'Touching the body', pp. 68–76 and chapter 6 below.
187 Amrita Bazar Patrika, 1 May 1912, p. 9; 2 May 1912, p. 7.
188 IPHM, February 1909, p. 244.
189 Muslem Chronicle, 5 September 1895, p. 379.
190 Madras VR (1901–2), 7.
191 Madras VR (1897–8), 6–8.
192 IOR P/525. GOI (Sanitary), Cunningham to sec. to GOI, 18 August 1873.
193 Reports on the Charitable Dispensaries of Bengal (hereafter, Bengal Dispensary Reports), 2.
194 Ibid., 4.
195 Bengal Dispensary Report (1869), 37.
196 Ibid., 30.
197 Bengal Dispensary Report (1870), xxii.
198 Bengal Dispensary Report (1871), xix.
199 Bengal Dispensary Report (1867), 5.
200 Bengal Dispensary Report (1900), i, xv.
201 Bengal Dispensary Report (1869), 55.
202 Ibid., 63.
203 Bengal Dispensary Report (1870), ix.
204 Bengal Dispensary Report (1869), 41.
205 Bengal Dispensary Report (1870), 91.
4 Cholera theory and sanitary policy

1 Annesley, Sketches of the Most Prevalent Diseases of India, pp. xviii, 4, 9.

2 Ibid., p. 122.

3 This was the most common view of cholera causation in India. See for example J. Johnson, Influence of Tropical Climates, pp. 398-402; Fayrer, Natural History and Epidemiology of Cholera; Martin, Influence of Tropical Climates, p. 131.


8 J. L. Bryden, Cholera Epidemics of Recent Years Viewed in Relation to Former Epidemics. A Record of Cholera in the Bengal Presidency from 1817 to 1872 (Calcutta, 1874), p. 1. See also Bryden's 'The Epidemic Cholera in Bengal (Calcutta, 1869), and Lancet, 1 (1870), p. 209.


10 Jordanova, 'Earth science and environmental medicine', p. 135.


15 Lancet obituary of Bryden, 2 (1880), 913-16. Farr was somewhat more cautious in making claims about the predictive value of his work than Bryden: Eyler, 'William Farr's epidemiology', pp. 8-9.

16 BMJ (15 August 1868), 173.

17 Bryden quoted in Lancet, 5 February 1870, p. 209.

18 Ibid., p. 81.


21 IOR P/674. GOI (Sanitary), DeRenzey to sec. to GOI, 13 September 1871. DeRenzey's emphasis on sanitary measures designed to protect the water supply is clearly stated in SCP (1868), pp. 25, 39. DeRenzey advocated a closed-pipe water-supply for towns and military cantonments.

22 Parkes, Practical Hygiene, pp. 21-4, 36 and 47-8. However, no causal organism had yet been identified in the case of cholera, and there existed considerable uncertainty in Britain at this time as to the exact nature of the threat posed by impure water. See C. Hamlin, 'Politics and germ theories in Victorian Britain: the metropolitan water commissions of 1867-9 and 1892-3', in R. MacLeod (ed.), Government and Expertise. Specialists Administrators and Professionals, 1860-1919 (Cambridge, 1988), pp. 110-27.

23 IOR P/674. GOI (Sanitary), DeRenzey to sec. to GOI, 13 September 1871. DeRenzey's emphasis on sanitary measures designed to protect the water supply is clearly stated in SCP (1868), pp. 25, 39. DeRenzey advocated a closed-pipe water-supply for towns and military cantonments.

24 GOI (Sanitary), DeRenzey to sec. to GOI, 13 September 1871: 'Dr. Bryden's theory is merely the old one professing to rest on a statistical basis and until now there were few Indian Medical Officers who disagreed with or dissented from it.'

25 BMJ, 1 (1859), 635-6. MacNamara left India in 1870.

26 GOI (Sanitary), DeRenzey to sec. to GOI, 13 September 1871: citation of Cunningham's sanitary report for 1870.