

THE VACCINATION REGISTERS: WHAT ARE THEY AND WHAT CAN WE LEARN FROM THEM?

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Introduction

During the 1870s close to 90 per cent of the infants of England and Wales were seen at least twice by a doctor. In many places the percentage was close to 100. The visits left a record, so that we know quite a lot about these children: their names, when and where they were born, how old they were when the doctor saw them, the name and occupation of their father if they were born within marriage or of their mother if not. Such a remarkable state of affairs came about because, in 1872, compulsory vaccination against smallpox, which had been introduced in 1853, was finally made effective. All children had to be vaccinated before they were three months old or at the next public vaccination after they had reached that age, the process being monitored by a Vaccination Officer. He entered all the above information, and more, into a Vaccination Register which was central to his work. Here I will first of all describe the Vaccination Registers and how they came into existence. I will then examine the extent of vaccination in different parts of the country, as recorded by the Vaccination Registers, from 1872 until 1904 when annual statistics based on the registers ceased. Finally I will show how the registers can be used by historical demographers, especially in the study of infant mortality.

The Vaccination Registers

Inoculation, an effective means of combating smallpox, was introduced into England in the eighteenth century.¹ It was widely adopted, although smallpox remained endemic in much of the country. The problem was that inoculation, which involved taking some of the pus from a smallpox victim, usually with a needle, and injecting it into the arm of one not suffering from the disease, was effective only for the individual inoculated. That individual could, and sometimes did, infect others. Inoculation could, then, lead to more people catching smallpox than would have occurred if inoculation had never taken place. Edward Jenner's breakthrough, which came about at the very end of the eighteenth century, was to inoculate with cow pox, which, whilst providing immunity against smallpox, did not cause its recipient to infect others.

Vaccination, which this new method of inoculation came to be called, spread with amazing speed around the world. Although some of the claims for the numbers involved must be taken with the usual pinch of salt, where they can be checked they were often substantial.

Vaccination was made compulsory at an early date in a number of countries: Bavaria in 1807, Denmark 1810, Norway 1811, Russia 1812 and Sweden 1816.² In Norway, for example, the number of vaccinations per 1000 births was 15.6 in the decade before it was made compulsory. By 1831–1840 the figure was 58.1 and by 1851–1860 it was 81.5.³ The disease was, however, by no means eradicated, there being 4,499 cases in the years 1853–1860, of which 446 proved fatal, whilst from 1861–1870 there were 7,929 cases of which 560 ended in death, or 15 cases and 1 death per 1,000 births.⁴ No civil sanctions were imposed on those who refused vaccination, but the state church refused either to confirm or marry anyone not in possession of a vaccination certificate.⁵ Similar sanctions were introduced in other countries.⁶ Vaccination was made compulsory in England by an Act of 1853, but there were no Vaccination Officers to police it. These were introduced in 1867, but their appointment was not mandatory, the result being that out of a sample of 260 Poor Law Unions in 1871 only 121 had appointed them.⁷ However, as with so much social legislation, several Acts were required before, as Sir John Simon put it, the Act of 1871 introduced ‘an arrangement...by which it became almost inevitable that defaulters under the law should be followed up closely and be caught’.⁸ The procedure was as follows.

On registering the birth of a child, whoever had custody – usually the father or mother – was presented with a form requiring that the child be vaccinated within three months of its birth, or at the next public vaccination after that, in the district where it resided. Vaccination could be carried out by a public vaccinator, in which case the procedure would be free, or by a medical practitioner acting in a private capacity who would charge a fee. The form gave the places and times of the public vaccinations. The form also stated that after vaccination had been performed, the child must return to the vaccinator one week to the day, so that he could determine whether or not vaccination had been successful. If successful, a certificate of vaccination was completed by the vaccinator who, if he were a public vaccinator, returned it to the vaccination officer. If vaccination had been carried out privately, a parent or guardian of the child was responsible for getting the form to the vaccination officer. If the child, after being examined, was deemed unfit to be vaccinated, a form to this effect was completed and passed to the vaccination officer. If vaccination was unsuccessful, yet another form was completed and passed on.

The over-riding duty of the vaccination officer was to see that the various procedures were complied with. To this end he received, from the local registrar of births, deaths and marriages at monthly intervals, lists of births and infant deaths for his district. This information he transferred to his vaccination register. As the various procedures described above took place, he completed the appropriate columns in the register (see Figure 1). If he was unable to do so, he was required to ‘chase up’ the offending party. Should a child be not

Figure 1 Copy of the Vaccination Register.

I Extract from the Register Book of Births relating to each child			II Minutes of notice given pursuant to 30 and 31 Vict. C. 84, s 25		Register of Certificates				IV	V				
1	2	3	4	5	6	7	8	9	I	II	III	IV	V	
No in Birth Register	When born	Where born	Name, if any, of child	Sex	Name and Surname of the Father, or (if the child be illegitimate) of the Mother	Rank, Occupation or Profession of parent	When given	To whom given	Date of medical certificate of successful Vaccination	Date of Certificate of Insusceptibility or of having had Small Pox Ins' or 'S. P.' as case may be	Name of the Medical Man by whom the Certificate is Signed	Date of Certificate under Sec. 2 of the Vaccination Act, 1898	Date of death in case of child being dead before vaccination	Reference to number in the Officers' Report Book in cases transferred thereto

Source: *Appendix to the First Report of the Local Government Board, British Parliamentary Papers, 1872, xxviii:147.*

Note: Somewhat anomalously I have added the slight change to the form when the so-called 'conscience clause' was added in 1898.

Table 1 Public and private vaccinations in the sub-registration districts of Sheffield, 1878–1887.

Sub-registration district	% public vaccinations	% private vaccinations
Attercliffe	67.9	32.1
North	69.8	30.2
South	66.8	33.2
Brightside	58.9	41.1
Park	78.1	21.9
West	69.4	30.6
Eccleshall	49.9	50.1
Nether Hallam	68.6	31.4
Upper Hallam	58.3	41.6

Source: Local Government Board Report on an epidemic of small pox at Sheffield 1887–1888 Information provided by Valerie Dodgson, former research student of the Open University.

vaccinated without due cause, then the parent or guardian could be fined not just once but repeatedly. Unpaid fines could lead to the distraint of goods and even prison. The legislation and the apparatus set in place to ensure compliance was, then, quite draconian, although whether it can be called ‘health fascism’ is open to question.⁹

The government body responsible for overseeing the vaccination legislation was the Local Government Board, which worked through local Boards of Guardians. Because both bodies were in charge of the Poor Law and because that was seen as demeaning, many parents, particularly working class parents, were not happy to be associated with them.¹⁰ This fuelled opposition to the legislation—an Anti-Vaccination League had been formed in 1853 when vaccination was first made compulsory, although, as we have seen, not effectively so—and also led to many parents ‘going private’. Exactly who used private medical practitioners can be discovered from the individual entries in the Vaccination Registers, where the name of the doctor carrying out the vaccination was given. The names of the public vaccinators are given in *The Medical Register*, as well as in local sources. Of course a public vaccinator might also vaccinate privately, in which case there would be no way of knowing in which capacity the work was being done. A return from Sheffield shows that, as expected, the proportions using private medical practitioners varied somewhat, with the more working class districts, such as Park, having the greater percentage of vaccinations carried out by the public vaccinators. Still the percentage of private vaccinations, at one in five, was substantial even there (see Table 1).

Vaccination against smallpox appears to have been the flagship policy of the medical department of the Local Government Board. In the annual reports of the medical officer to the Board, the working of the vaccination legislation always appeared first and it was acknowledged that it took up much of the time of the department. Also the report contained a lengthy annual breakdown of the effectiveness of the legislation, by registration district, until the department was stopped from doing so after 1904 on the recommendation of the Select Committee of the House of Commons on Parliamentary Publications.¹¹ The Board also engaged in lengthy correspondence with local Guardians and sent inspectors to see that the legislation was being adhered to.¹² For example, in 1878, inspectors from the department examined 'in detail' the 'working arrangements for public vaccinations' of 276 Unions.¹³ Given the prominence accorded to the vaccination process and the severe penalties associated with it, it is somewhat surprising to find that in 1919, Sir George Newman, Principal Medical Officer of the Local Government Board and Chief Medical officer of the newly created Department of Health, should describe the Board's *modus operandi* over the past 60 years in the following way:

There have been at all times in its history friendly and other critics who have urged that the duties and efforts of the [Medical] Department [of the Local government Board] should be strictly scientific and unalloyed with social or moral considerations and influences. Disease, they have claimed, should always be promptly dealt with by the State, on the cold and lofty plane of scientific and logical finding. This drug cures this disease, therefore *compel* the use of this drug; that action will protect that community, therefore, *enforce* that. The method of the Department has been different. It has taken its kingdom with entreaty rather than with contention, and has built on the basis of assent and consent rather than compulsion.¹⁴

Vaccination in practice

As noted above, vaccination was very much the flagship policy of the medical department of the Local Government Board, as indicated by the amount of effort devoted to carrying it out and by the space allocated to it in the annual reports. As a result we have, for each registration district, the number of births, successful vaccinations, deaths before vaccination, cases of insusceptibility, of smallpox, of postponement, together with certificates of conscientious objection (from 1897), and numbers not falling into any of the above categories. The number of children who were not vaccinated because they had had smallpox was miniscule (86 in England and Wales as a whole in 1872, or 0.1 per cent of all births). The numbers not vaccinated because they were insusceptible was somewhat greater, at 942, whilst in 4,264 cases, vaccination was postponed. Table 2 shows for a sample of registration districts¹⁵ that, if one allows for the children who died before they were due to be vaccinated, the Act of 1871 was remarkably successful by 1873, its second year of operation.

The Local Government Board was naturally delighted at its success, a delight it made clear in several comments. For instance, in Table 2, the 41,330 in the

Table 2 The vaccination experience in a sample of registration districts and in England and Wales in 1873.

A	B	C	D	E	F	G	H
Registration District	Births	(1)	(2)	(3)	(4)	(5)	(6)
Ampthill	616	539	875.0	68	110.4	9	14.6
Wallingford	446	407	912.6	30	67.3	9	20.2
Cambridge	1,002	877	875.2	91	90.8	34	33.9
Hollingbourn	452	402	889.4	42	92.9	8	17.7
Loughbor'gh	780	648	830.8	100	128.2	32	41.0
Norwich	2,668	2,318	868.8	286	107.2	64	24.0
Wellingbr'gh	1,266	1,035	817.5	162	128.0	69	54.5
Clun	333	272	816.8	26	78.1	35	105.1
Ipswich	1,529	1,353	884.9	139	90.9	37	24.2
York	2,102	1,817	864.4	185	88.0	100	47.6
Hemsworth	245	225	918.4	19	77.6	1	4.1
Woodbridge	637	579	908.9	51	80.1	7	11.0
Nuneaton	465	365	784.9	68	146.2	32	68.8
Bath	1,908	1,591	833.9	179	93.8	138	72.3
Warwick	1,367	1,230	899.8	115	84.1	22	16.1
Dartford	1,525	1,373	900.3	113	74.1	39	25.6
Wangford	446	385	863.2	45	100.9	16	35.9
Sheffield	7,431	5,876	790.7	923	124.2	632	85.0
Fulham	2,661	2,225	836.2	243	91.3	193	72.5
Carmarthen	1,061	949	894.4	89	83.9	23	21.7
Total	28,940	24,466	845.4	2,974	102.8	1,500	51.8
England & Wales	826,508	704,666	852.6	80,512	97.4	41,330	50.0

Note: (1) = Successfully vaccinated
(2) = Vaccination rate (C/B*1000)
(3) = Died unvaccinated
(4) = Died unvaccinated per 1,000 births (E/B*1000)
(5) = Remaining
(6) = Remaining per 1,000 births (G/B*1000)

I have excluded from this table the small number of infants who were insusceptible to vaccination or who had had smallpox before vaccination could take place.

Source: *Report of the Medical Officer of the Local Government Board, British Parliamentary Papers 1876, xxxviii: 354–369.*

'remaining' column amounted to only 5 per cent of eligible births, which, given the extent of migration is a proportion almost too low to be believed. Furthermore, although many of these cases were described as 'removed', 'not to be traced' or otherwise unaccounted for, it later transpired that many *were* traced after the original return had appeared. Administrative deficiencies also

accounted for some problems. For instance, in some places not enough vaccination officers had been appointed. In others, the vaccination officers for one reason or another did not do their job properly. In four unions – Banbury, Dewsbury, Keighley and Leek – the Guardians refused ‘to give effect to the compulsory provisions of the law’.¹⁶ In these places, the number of vaccinations per 1,000 births was, respectively, 715, 529, 468 and 768.¹⁷ It was also noted that the vaccination officers were sometimes unable to find a child because of ‘the birth itself having been registered (as is not uncommon in the case of illegitimate children) under a false name or a false address’.¹⁸

In Keighley the flouting of the law led to several guardians being sent to York Debtors’ Prison for a month in 1875. This was counter to the wishes of many of the town’s inhabitants, some of whom unhitched the horses from the omnibus taking the prisoners to the station and dragged it through the streets. The event was recorded in verse:

At the pale little sheriff one couldn’t but smile
As dumbfounded he sat like a mouse all the while
Saying, I’ve heard tell of Keighley, but ne’er been before
And may I be hanged if I come any more.¹⁹

The figures in Table 2 suggest that places such as Keighley were quite exceptional, a situation that continued throughout the 1870s. In 1881, the ‘fractional increase in the percentage of children whose vaccination had not been finally accounted for’ in England and Wales, was put down to the virtual absence of smallpox deaths, there being only 536 in 1879 as against an average of 2,336 in the previous six years.²⁰ From the Local Government’s point of view, the situation as regards vaccination continued to be satisfactory overall throughout most of the 1880s, although there was a gradual decline in compliance and certain areas, notably Leicester, showed a marked disregard for the law.²¹ Several thousands a year continued to be fined or imprisoned for not having their children vaccinated. For example, a Parliamentary Return in 1880 gave the initials of 3,888 individuals who were fined in England and 87 who were imprisoned, 73 for 14 days or *less*.²² Nobody was imprisoned in Wales. It is interesting that this quantitative assessment is somewhat at variance with the qualitative one of Durbach. She suggests that ‘anti-vaccinationists who could not afford the fines and had goods to distrain were routinely imprisoned for non-compliance...[and that] the sentence for anti-vaccination prisoners was generally a fortnight but at times more severe’.²³ An earlier Return, covering the years 1875–78, gave the full names of the offenders, together with where they were sentenced, thus offering the opportunity for record linkage to the 1881 census, with the possibility of knowing their age and social circumstances.²⁴

The turning point as regards compliance with the law nationally came about in 1889. In May of that year a Royal Commission was appointed to look into the ‘subject of vaccination, and [it was reported] since that date an increasing number of Boards of Guardians have more or less completely abstained from enforcing compliance with the law as to vaccination ‘pending the issue of the

report' of the Commission'.²⁵ In his 1897–1898 Report, the Medical Officer to the Local Government Board feared that the falling off in the number of vaccinations was opening the way for widespread epidemics of smallpox.²⁶

The Royal Commission on Vaccination published its seventh and final report in 1897, a new vaccination Act following a year later. The Commission recognised the process had been a long one; in fact three of the original 13 commissioners died whilst it sat. In its defence, the Commission said that it had 'wanted to give opponents of vaccination as much opportunity to provide evidence as those who supported it'. To that end the Commission sat on 136 occasions and examined 187 witnesses.²⁷ Among the most important clauses of the 1898 Act (61 & 62 Vict. c.49), was an extension of the period by which a child had to be vaccinated from three to six months; a 'conscientious objection' clause which gave parents the right not to vaccinate their offspring if they believed that it would harm them (the first use of the term); vaccination in the home by the public vaccinator if requested; and the ending of repeat fines. The conscientious objection clause came into operation on 12 August 1898, but for the remainder of that year it was open to parents to apply for certificates of exemption for children born before the Act. No fewer than 203,413 certificates were issued, relating to 230,147 children. Only about 50,000 were issued on behalf of children whose births were registered in 1898.²⁸

Table 3 shows the experience of vaccination in 1873, when compliance with the legislation was at its height, compared with the low point in 1897. It so happens that the number of vaccinations per 1,000 births in England and Wales and in the sample of registration districts is very close at both dates. Nothing much, however, can be read into this, as the selection of districts was not at all random in the statistical sense. Of far greater interest is the wide variation in experience of the different districts. In 1873 virtually all the districts saw vaccination rates in the 800–900 per 1000 births range. By 1897 they ranged from 8 per 1000 in Wellingborough to 900 per 1000 in Wallingford. Durbach, in her recent study of working class resistance to vaccination, seems to be unaware of these variations. For instance, she notes that 'while anti-vaccinationism was a national movement, it found its most fervent support in predominantly working class regions and neighbourhoods'.²⁹ She picks out for special mention the East End of London and the 'the cluster of industrial towns in Lancashire and Yorkshire in the square bounded by Blackpool, Leeds, Sheffield and Liverpool'.³⁰ So far as the first of these areas is concerned (the East End), Mooney, using the quantitative evidence supplied by the Medical Officer of the Local Government Board's Reports, suggests, in fact, that compliance was quite high in these areas.³¹ As for the second (the industrial areas of Lancashire and Yorkshire), there were great differences between towns only a few miles apart. For instance, in 1897, in Huddersfield there were 4,038 births and 3,556 successful vaccinations. Yet only an afternoon's stroll away in Halifax, there were 4,490 births and only 199 successful vaccinations.³² Behind these spatial differences, and the temporal ones noted earlier, lie a host of factors waiting to be explored. Just why was there such a variation? Why should parents in some communities obey the law and in others flout it? What was the role of the local

Table 3 Number of infants vaccinated per 1000 births in 1873 and 1897.

Registration District	Vaccinated per 1000 births	
	1873	1897
Ampthill	875	117
Wallingford	913	900
Cambridge	875	616
Hollingbourn	889	777
Loughborough	831	67
Norwich	869	67
Wellingborough	818	8
Clun	817	460
Ipswich	885	175
York	864	792
Hemsworth	918	712
Woodbridge	909	832
Nuneaton	785	65
Bath	834	568
Warwick	900	812
Dartford	900	789
Wangford	863	868
Sheffield	791	757
Fulham	836	811
Carmarthen	894	886
Sample total	845	598
England & Wales	853	624

Source: *Reports of the Medical Officer of the Local Government Board for 1873 and 1897*, British Parliamentary Papers 1876, xxxviii, 354–69; 1900, xxxiv, 27–44.

authorities, of the medical practitioners, of the vaccination officers? Were the different experiences of vaccination mirrored in other medical spheres?

A further set of differences emerged after the ‘conscientious objection’ clause was introduced. In some areas large numbers of parents sought its protection. This was especially the case where many had previously not had their children vaccinated. However the situation was not a straightforward one. Local community values seem to have played a part. Take the case of Loughborough. Here in 1896 less than 5 per cent of infants were vaccinated and over 80 per cent fell into a residual category of neither dying before vaccination nor being excused for one reason or another. The Act of 1898 caused a large number of parents to seek a certificate of conscientious objection (over 50 per cent). From this date too, the number of vaccinations commenced a steady rise, so that by 1904, almost 40 per cent of all children were being vaccinated. The residual category dropped dramatically between 1896 and 1897 from over 80 per cent to

just over 20 per cent and after remaining at or about that level for a number of years fell to around 10 per cent by 1903–04. In Ipswich, on the other hand, relatively few parents had their children vaccinated and not many, certainly far fewer than in Loughborough, took refuge in the conscience clause. Table 4 shows the situation in all the sample districts. Again one asks: what was it that brought about these differences? Why should so many parents seek certificates in some areas and so few in others? And why should so many chose to have their children vaccinated when only a few years earlier so few had done so? The vaccination registers reveal a fascinatingly varied picture across the country as regards attitudes and actions on what the government, at least, regarded as a major health issue. Why this was so calls for further research at the local level.

The Vaccination Registers and infant mortality

At the beginning of this article I pointed out that in the 1870s and much of the 1880s, almost all infants were seen at least twice by a medical practitioner. No doubt some were seen more often, but we have no means of knowing how many. Nor do we know how many doctors were involved. That it ran into thousands is apparent from some occasional snippets of information. For instance, *The Times* noted in 1862 that from (possibly incomplete) returns, 332,165 infants had been vaccinated by 3,731 public vaccinators. This amounted to only 523 vaccinations per 1000 births.³³ As, ten years later, double this number of children were being vaccinated, one might assume that double the number of medical practitioners were involved. Such a conclusion can only be tentative as the number of vaccinations carried out by each public vaccinator appears to have varied widely. A return of the number of vaccinations carried out by public vaccinators in London in 1860 showed very wide variations. Thus in Lewisham, the six public vaccinators carried out 92, 47, 83, 76, 648 and 81 vaccinations. In Hackney the 26 public vaccinators carried out from 12 to 206 procedures. In the Strand, two of the six public vaccinators had two cases a week, a further two had five, one had three and another, 11.³⁴

So far I have given figures for the vaccinations carried out by the public vaccinators. Many parents, however, as shown in Table 1 above, had their children vaccinated by private vaccinators, for which they had to pay. Again the numbers involved are elusive. Evidence from Sheffield does, however, give us some idea of what went on in one part of the country. There is, of course, no way of knowing how representative this was. In the year from April 1895 to March 1896, vaccinations in the Park sub-registration district of Sheffield were carried out by 44 medical practitioners. The number of infants vaccinated was 739. As many as 550 of these vaccinations were carried out by the two public vaccinators (74.4 per cent).³⁵

These figures would suggest that many doctors were involved in this first example of state medicine. The question is: did this have any wider effect on the welfare of English and Welsh babies? In particular, did it have any effect on the infant mortality rate?

Table 4 Vaccinations, certificates of conscientious objection and those not fitting into any other category per 1,000 births in various registration districts and in England and Wales in 1897.

Registration District	Per 1000 births				
	Births	Vaccinations	Died unvaccinated	Certificates of conscientious objections	Children not finally accounted for
Ampthill	368	116.8	84.2	296.2	494.6
Wallingford	340	900.0	50.0	2.9	35.3
Cambridge	933	616.3	102.9	24.7	236.9
Hollingbourn	327	776.8	97.9	0.0	116.2
Loughborough	922	67.2	143.2	556.4	232.1
Norwich	3,370	67.1	191.1	466.5	273.9
Wellingborough	1,708	8.2	129.4	208.4	654.0
Clun	213	460.1	79.8	4.7	422.5
Ipswich	1,762	175.4	116.9	86.3	620.3
York	2,586	791.6	128.8	0.8	57.2
Hemsworth	777	711.7	131.3	3.9	128.7
Woodbridge	630	831.7	69.8	1.6	84.1
Nuneaton	872	65.4	177.8	50.5	706.4
Bath	1,742	567.7	99.9	3.4	252.0
Warwick	1,227	811.7	74.2	0.8	90.5
Dartford	2,333	789.1	114.0	3.9	79.3
Wangford	379	868.1	100.3	0.0	21.1
Sheffield	7,935	757.2	137.0	2.5	87.1
Fulham	7,252	810.8	107.3	1.0	65.2
Carmarthen	871	886.3	95.3	0.0	9.2
Total	36,547	598.8	124.4	77.2	183.9
England & Wales	927,518	623.9	112.1	34.2	211.5

Source: *Report of the Medical Officer of the Local Government Board 1897*, British Parliamentary Papers 1900, xxxiv: 27–44.

Note: Not included in the table are a minuscule number of children who had had smallpox (1 in entire country!); were insusceptible to vaccination or had their vaccinations postponed. The final column is largely made up of children whose parents simply ignored the legislation together with a number (probably small) who had left the district and could not be traced.

The initial response to both these queries would seem to be, ‘not much’. The rapid secular decline in the infant mortality rate did not commence until around the turn of the century. However, it is interesting to note, in this context, the suggestion that the beginnings of that fall can be traced at least as far back as the 1870s, although it rose again in the 1890s, largely it is thought because in the 1890s there were a number of hot dry summers which led to

Figure 2 Copy of the Infant Death Register.

Extracts from the Register Book of Deaths relating to each child									
No in Death Register	When Died	Where Died	Name and surname of infant	Sex	Age	Name and Surname of the Father, or (if the child be illegitimate) of the Mother	Rank, Occupation, or Profession of Parent	No. in Birth Register if registered in this Sub-District, and the Register is in possession of the Registrar	Remarks
1	2	3	4	5	6	7	8	9	10

Source: *Appendix to the First Report of the Local Government Board, British Parliamentary Papers, 1872, xxviii:146.*

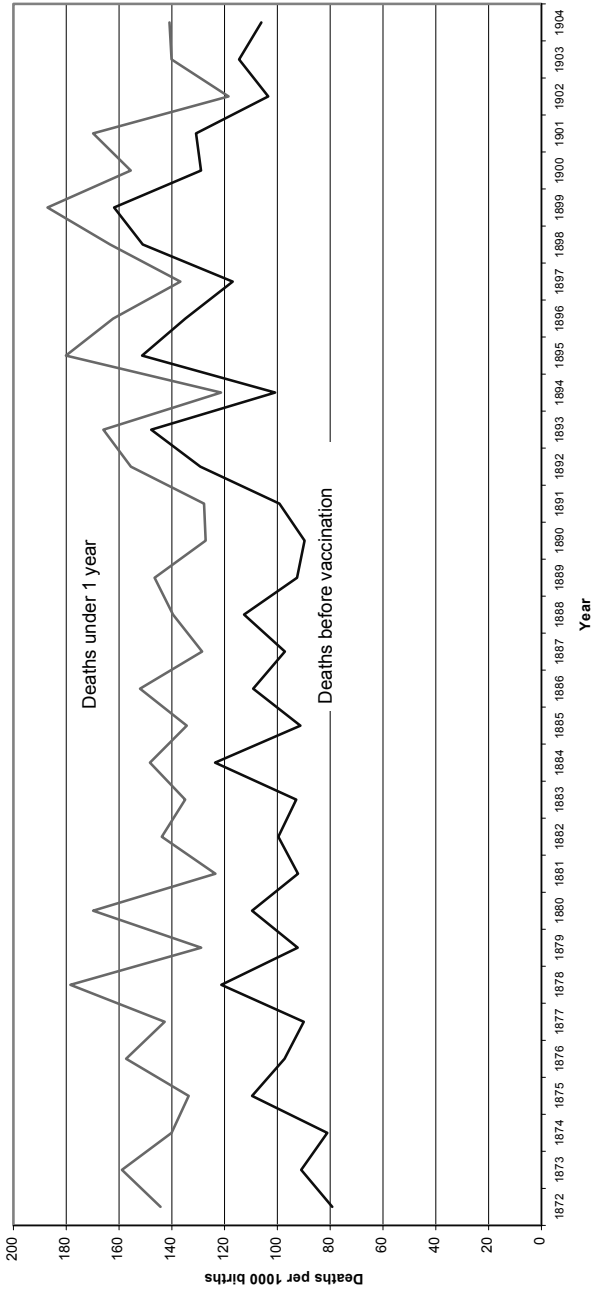
epidemics of diarrhoea that had a fatal effect on many infants.³⁶ This movement paralleled that of the efficacy of the vaccination legislation: a high level of vaccinations in the 1870s and most of the 1880s, a dramatic falling away in the 1890s and a recovery in the 1900s. But correlation is not causation and, given the brief contact between doctor and infant in the vaccination procedure, a direct impact by the medical profession on infant health in this context is unlikely to have been very great.

More important, perhaps, is the effect of the contact on the general awakening of interest in the problem of infant mortality. Again we have to look to the early 1900s for any sustained campaign against infant mortality, but it has been suggested that we look to the 1870s, more especially to 1876, for the origins of that campaign. For, in that year the current definition of infant mortality (the number of infant deaths in any one year per 1000 births occurring in that same year) was placed before the world by the Registrar General.³⁷ The high mortality amongst infants had, of course, been recognised before, but the creation of a specific measure which led to comparisons being drawn between one part of the country and another, especially between town and country, and between infants born in or outside marriage, helped focus minds on the issue.

The Vaccination Registers offer us a tantalising glimpse into infant mortality but it is only a partial one. For the registers, whilst providing us with much information on individual births, only tell us which of those children died before vaccination, not after it. So, although we can do a class and locational analysis of the mortality of infants up to three to four months of age with a high degree of certainty, we cannot do so for the later ages. At least we cannot do so unless we have the lists of all infant deaths that were provided by the superintendent registrars to the vaccination officers.

Fortunately a number of these have survived in various parts of the country and, like the Vaccination Registers, are held in county and municipal record offices.³⁸ As the Vaccination Registers give all the births and the Infant Death Registers all the deaths, record linkage can be carried out and more complete infant mortality rates calculated.

Figure 3 Deaths under 1 year and before vaccination per 1000 births: Ipswich 1872-1904.



Source: Registrar General's Quarterly Reports 1871-1911: Vaccination Returns in the Reports of the Medical Officer of the Local Government Board 1872-1904.

If an indication of the changes in the magnitude and direction of infant mortality are all that is required then the Vaccination Registers from many parts of the country in the 1890s can give a good approximation of infant mortality. This is because few vaccinations were carried out. This left far more infants in observation for longer and so many more infant deaths were recorded. However, in some parts of the country the system may have broken down to the extent that not all the events were recorded, although the Medical Officer of the Local Government Board never seems to have acknowledged this. A good example of this proxy infant mortality rate comes from Ipswich. Here we can calculate a rate of mortality based the vaccination registers which can be compared to the infant mortality rate that we can calculate from data provided by the Registrar General. The result appears in Figure 3.

It is clear that as fewer infants were vaccinated in the 1890s, more were in observation by the Vaccination Officer and for longer periods. This meant that he recorded more infant deaths, with the result that the mortality rate calculation from the Vaccination Registers came very close to that based on the Registrar General's totals of births and infant deaths. Assuming that the Ipswich experience is a representative one, it would appear that we can use the Vaccination Registers to produce a proxy infant mortality rate not only for the sub-registration districts but also for entities within them, such as individual, or groups of, towns and villages.

The Vaccination Registers can also be used to produce an, in some ways, more precise measure of infant mortality and for periods shorter than one year.³⁹ To understand this method it is necessary to understand the difference between the 'period' and the 'cohort' measure of infant mortality. The 'period' measure is the one favoured by the Registrar General. It takes the number of births occurring (or usually being registered) in a calendar year and relates them to the number of infant deaths in the same year. Thus if there were 2,000 births and 200 deaths registered in one and the same year, the infant mortality rate would be $(200/2,000)*1,000$ or 100. This is then expressed as 100 deaths per 1,000 births. The assumption here is that the 200 deaths were drawn from the 2,000 births. Many would be. But some of the deaths from those 2,000 births would not occur until the following year. Similarly, a proportion of the 200 deaths used in the above calculation would be drawn from births occurring in the year previous to that which produced the 2,000 births. Although this weakness in the measure is recognised, it is generally assumed that between one year and the next the numbers of births and deaths would not vary much, so the plusses and minuses noted above would roughly cancel out. A similar attitude is taken as regards discrepancies caused by migration, where some not born in the area died after migrating to it, whilst others who were born in the area migrated out and so their deaths were recorded elsewhere.

The 'cohort' measure of infant mortality overcomes the first of these problems although it can only be calculated when individual level data, such as that in the Vaccination and Infant Death Registers, is available. For what it does is to relate deaths directly to the group, or 'cohort', of births from which those deaths are drawn. It cannot, usually, overcome the second problem, as tracing

Table 5 Estimates of the infant mortality rate in Leamington Spa 1896.

A	B	C	D	E	F	G	H
Age (months)	Deaths	Vaccinated	At risk	Life-table mortality	Survivors	Deaths per 1000 survivors	Cumulative Deaths per 1000 survivors
0	11	0	610	0.018033	1000	18	18
1	14	6	599	0.023372	982	23	41
2	10	38	579	0.017271	959	17	58
3	7	155	531	0.013183	942	12	70
4	2	165	369	0.00542	930	5	75
5	3	72	202	0.014851	925	14	89
6	1	28	127	0.007874	911	7	96
7	1	23	98	0.010204	904	9	105
8	0	10	74	0	895	0	105
9	1	4	64	0.015625	895	14	119
10	1	6	59	0.016949	881	15	134
11	0	3	52	0	866	0	134
12	2	1	49	0.040816	866		
Totals	53	511					134
Births 610							
Deaths 53							
Aggregate IMR (53/610)*1000 = 87				Individual-based IMR = 134			

Source: G.W. Baird, 'The final conquest of infant mortality, 1871–1948: a medical conundrum. The case of Leamington Spa', Unpublished Open University MPhil thesis, 1998.

infants leaving an area is very difficult. This is a problem facing mortality rates based on family reconstitution, a technique that uses the 'cohort' method. So far as 'cohort' rates based on the Vaccination Registers is concerned, the major problem lies in their not recording deaths after vaccination. The problem is especially acute when vaccination was virtually universal and took place around the stipulated time of three to four months. This meant that the number of births "still in view" fell very sharply indeed, since almost all infants had been vaccinated. Although, then, very few deaths were recorded after the usual age for vaccination, those that were led to an elevated mortality by the end of the first year of life because so few births were, as we have put it, "still in view". The example given in Table 5 suffers from this fault, the effect being that the annual rate based on the cohort method is far too high. However, if few children were vaccinated and the system of recording was maintained, the 'cohort' measure should be a good indicator of infant mortality.

A worked example is derived from the MPhil thesis of Wendy Baird.⁴⁰ Tables 5 and 6 are based on Microsoft Excel software, with the latter showing the formulae used to create the former. Leamington was an area that did not see a great collapse in the rate of vaccination, for as late as 1896 there were as many

Table 6 Excel formulae used in the creation of Table 5.

	A	B	C	D	E	F	G	H
1	Age in months	Deaths	Vaccinated	At risk	Life-table mortality	Survivors	Deaths	Cumulative deaths
2	0	11	0	= B10	=B2/D2	1000	=F2-F3	=G2
3	1	14	6	=D2-B2-C2	=B3/D3	=F2*(1-E2)	=F3-F4	=H2+G3
4	2	10	38	=D3-B3-C3	=B4/D4	=F3*(1-E3)	=F4-F5	=H3+G4
5	3	7	155	=D4-B4-C4	=B5/D5	=F4*(1-E4)	=F5-F6	=H4+G5
6	4	2	165	=D5-B5-C5	=B6/D6	=F5*(1-E5)	=F6-F7	=H5+G6
7	5	3	72	=D6-B6-C6	=B7/D7	=F6*(1-E6)	=F7-F8	=H6+G7
8	6	1	28	=D7-B7-C7	=B8/D8	=F7*(1-E7)	=F8-F9	=H7+G8
9	7	1	23	=D8-B8-C8	=B9/D9	=F8*(1-E8)	=F9-F10	=H8+G9
10	8	0	10	=D9-B9-C9	=B10/D10	=F9*(1-E9)	=F10-F11	=H9+G10
11	9	1	4	=D10-B10-C10	=B11/D11	=F10*(1-E10)	=F11-F12	=H10+G11
12	10	1	6	=D11-B11-C11	=B12/D12	=F11*(1-E11)	=F12-F13	=H11+G12
13	11	0	3	=D12-B12-C12	=B13/D13	=F12*(1-E12)	=F13-F14	=H12+G13
14	12	2	1	=D13-B13-C13	=B14/D14	=F13*(1-E13)	=F14-F15	=H13+G14
15				=D14-B14-C14	=B15/D15	=F14*(1-E14)		=H14+G15
16	Totals	=SUM(B2:B16)	=SUM(C2:C16)					

as 837 vaccinations per 1000 births (511/610*1,000). That means, as noted above, that the deaths of a number of children who died in late infancy would not be recorded in the Vaccination Register. This problem is, of course, overcome where the Infant Death Register, containing all deaths occurring in the first year of life, has survived.

Conclusion

The English government began to pay for vaccination against smallpox from 1840. Vaccination itself, however, was voluntary. Repeated epidemics led to a hardening of the government's attitude, so that in 1853, vaccination was made obligatory. It was not until 1872, however, that as William Ogle, Farr's successor at the General Register Office, put it, 'the proper mechanism existed for enforcing that obligation'.⁴¹ The legislation generated an enormous amount of documentation at the local level. In addition to the Vaccination Registers used to monitor the system, local Registrars had to provide the Vaccination Officer with copies of the Civil Registers of Births and a partial copy of the Registers of Deaths. Probably only about 5 per cent of the Vaccination Registers have survived, and 1 per cent of the Infant Death Registers, although it is not unlikely that more will be discovered. The Registers themselves were analysed annually by the Local Government Board and this too produced a vast amount of documentation. For example, from 1872 until 1904, the experience of vaccination, each year, in over 600 Registration Districts was published. This

not only provided the numbers of births, of vaccinations, and of deaths before vaccination (see Table 1) but, by doing so, also provided an insight into the changing attitudes towards the State's first major health initiative. Much, it has been suggested, might be made of this. Finally, the Vaccination Registers themselves provide us with estimates of infant mortality not just for sub-registration districts, but also for areas within them and by social class.⁴² Such estimates are enhanced when other nominative sources, such as the Infant Death Registers (Figure 2) and Cemetery Records, which provide the ages and names of the deceased, can be drawn upon. These sources provide the local population historian with a means of addressing aspects of infant mortality at a micro-level, being analogous to the parish registers but much more detailed. They are unrivalled for this purpose and will continue to be so until the civil registers of births and deaths are made freely available.

NOTES

1. I. and J. Glynn, *The life and death of smallpox* (London 2004), 52; P. Razzell, *The conquest of smallpox. The impact of inoculation on smallpox mortality in eighteenth century England* (Firle, new edition, 2003).
2. Glynn and Glynn, *Smallpox*, 134.
3. M. Drake, *Population and society in Norway, 1735–1865* (Cambridge 1969), 51.
4. Drake, *Norway*, 53.
5. Drake, *Norway*, 13.
6. Glynn and Glynn, *Smallpox*, 136.
7. *Royal Commission to inquire into vaccination. First Report*, British Parliamentary Papers (hereafter BPP) 1889, xxxix, p.488, Q.595.
8. Minutes of evidence, *Royal commission on vaccination. First report*. BPP, 1889, xxxix: reply to Question 32.
9. S. Davies, 'The historical origins of health fascism', www.forces.org/articles/forest/fascism.him. For the legislation see 16–17 Vict. c.100, 1853; 30 & 31 Vict. c.84, 1867; 34 & 35 Vict. c. 98, 1871.
10. N. Durbach, "'They might as well brand us": working-class resistance to compulsory vaccination in Victorian England', *Social History of Medicine*, 13 (2000), 45–62.
11. *Report of the Medical Officer of the Local Government Board*, BPP, 1908, xxx, 11.
12. A. Clark, 'Compliance with infant smallpox legislation in nineteenth century England: Hollingbourne, 1876–88', *Social History of Medicine*, 17 (2004), 175–98.
13. *Report of the Medical Officer of the Local Government Board*, BPP, 1878–79, xxix, 5.
14. G. Newman, 'Report of the Medical Department', *Forty-eighth annual report of the Local Government Board 1918–1919*, BPP, 1919, xxiv: vi.
15. The registration districts contain the sub-registration districts that have been the locus of studies of infant mortality in the period 1871–1910. These have been carried out by research students at the Open University under the direction of Peter Razzell and myself. For reports on this research see: M. Drake and P. Razzell, *The decline of infant mortality in England and Wales: a medical conundrum*, Interim report to the Wellcome Trust, 1997; M. Drake, 'Infant mortality: some family and community approaches', *Family and Community History*, 6 (2003), 107–112; S.M.Smith, 'Who you are or where you are? Determinants of infant mortality in Fulham 1876–88', *Family and Community History*, 6 (2003), 113–20; L.M. Davies, 'Faith street, South Kirkby – "That troublesome place": infant mortality in a Yorkshire coal-mining community, 1894–1911', *Family and Community History*, 6 (2003), 121–7; T. James, 'Neonatal mortality in Northamptonshire: Higham Ferrers 1880–1890', *Family and Community History*, 6 (2003), 129–39; A. Clark, 'Family migration and infant mortality in rural Kent, 1876–1888', *Family and Community History*, 6 (2003), 141–50; Clark, 'Compliance with infant smallpox vaccination legislation', 175–98.
16. 'Digest by Dr. Seaton of the Vaccination Officers' returns with regard to children whose births were registered in 1873', *Report of the Medical Officer of the Local Government Board*, BPP, 1876, xxxviii, 354.

17. Digest by Dr. Seaton, 362, 364, 367.
18. *Report of the Medical Officer of the Local Government Board*, BPP, 1877, xxxvii, pt ii, 411. See also G. Mooney, ' "A tissue of flagrant anomalies": smallpox and the centralisation of sanitary administration in nineteenth-century London', *Medical History*, 41 (1997), 261–90.
19. I. Dewhurst, *A history of Keighley* (Keighley 1974), 79.
20. *Report of the Medical Officer of the Local Government Board*, BPP, 1882, xxx. Pt. 2, 575.
21. In 1883, *The Times* reported that the Leicester Guardians had decided not to 'apply for distress warrants for unpaid fines'. *The Times*, 10 January 1883. p.9.col. f. See also *The Times*, 12 November 1880, p.7.col.f; and 19 February 1886, p.13. col. f.
22. *Return of the number of persons who have been imprisoned or fined for non-compliance with the Act relating to the vaccination of children*, BPP, 1880, lix, 449.
23. N. Durbach, 'They might as well brand us', 58.
24. *Return of the number of prosecutions in England and Wales under the Vaccination Act of 1867 for 1875–1878*, BPP, 1880, lix, 299.
25. *Report of the Medical Officer of the Local Government Board*, BPP, 1894, xl, 371–372.
26. *Report of the Medical Officer of the Local Government Board*, BPP, 1898, xl, 7–8.
27. *Final Report of the Royal Commission on Vaccination*, BPP, 1896, xlvii, 895.
28. *Report of the Medical Officer of the Local Government Board*, BPP, 1901, xxvi, 9.
29. Durbach, 'They might as well brand us', 48.
30. Durbach, 'They might as well brand us', 48.
31. G. Mooney, 'A tissue of flagrant anomalies', 284.
32. *Report of the Medical officer of the Local Government Board 1897*, BPP, 1900, xxxiv, 42.
33. *The Times*, 19 September 1862, p.7 col. f.
34. 'A return of the number of public vaccinations in the metropolis', BPP, 1860, lviii, 989–96.
35. Evidence supplied by Valerie Dodgson, former research student of the Open University.
36. R.L.Woods., P.A. Watterson., and J.H. Woodward, 'The causes of rapid infant mortality decline in England and Wales, 1861–1921', *Population Studies*, 42 (1988), 343–66; 43 (1989), 113–32.
37. D. Armstrong, 'The invention of infant mortality', *Sociology of Health and Illness*, 8 (1986), 211–32.
38. For a review of these holdings see Drake and Razzell, *The decline of infant mortality*, and Drake, 'Infant mortality', 107–12.
39. The measure was demonstrated to research students and their supervisors on the Wellcome Trust sponsored project at the Open University, under the auspices of the Open Studies in Family and Community History Research Group (OSFACH), by Eilidh Garrett and Jim Oeppen of the Cambridge Group for the History of Population and Social Structure.
40. G.W. Baird, 'The final conquest of infant mortality, 1871–1948: a medical conundrum. The case of Leamington Spa', Unpublished Open University MPhil thesis, 1998.
41. Evidence of William Ogle (Superintendent of Statistics, General Register Office) to the *Royal Commission to inquire into Vaccination*, *First Report*, BPP, 1889 xxxix, p.683, Q. 477.
42. See the articles cited in footnote 15 by Clark, Davies, James and Smith for illustrations of this.