Incidence of leukaemia in young people in the vicinity of Hinkley Point nuclear power station, 1959-86

P D Ewings, C Bowie, M J Phillips, S A N Johnson

Abstract

The incidence of leukaemia and non-Hodgkin's lymphoma in young people (aged under 25) living in a predefined area around the nuclear power station at Hinkley Point, Somerset, was examined for the period 1959-86 by using cancer registry data. During the period since Hinkley Point began operations—that is, 1964-86—there were 19 cases in the area compared with 10.4 expected from national rates, giving a standardised registration ratio of 1.82 (95% confidence interval 1.10 to 2.85). The incidence in the rest of Somerset was also high, however (standardised registration ratio 1.18; 95% confidence interval 0.98 to 1.41), and the high rate around Hinkley Point may simply have been reflecting the high local incidence (ratio of the two standardised registration ratio's 1.54; 95% confidence interval 0.90 to 2.52). Analysis of predetermined five year periods showed that the excess cases in the Hinkley Point area were concentrated in the 10 years 1964-73 after commissioning of the station, at a time when rates in the rest of Somerset were close to the national average. In particular the nine cases occurring in the five years 1969-73 were about four times the number expected from national rates (standardised registration ratio 3.96; 95% confidence interval 1.81 to 7.52). Rates in the Hinkley Point area after 1973 were fairly low, especially as compared with the rest of Somerset. In the five years 1959-63 (that is, before Hinkley Point was commissioned) rates throughout

Somerset (including the Hinkley Point area) were higher than the national rate.

These findings should be interpreted with caution, and further studies are required to test the plausibility of theories relating to radiation and viruses.

Introduction

In the past five years there has been much discussion about the incidence of cancer, and in particular childhood leukaemia, in the vicinity of nuclear installations.¹⁻⁶ Hinkley Point is a nuclear installation situated on the north coast of Somerset (fig 1). It contains two nuclear power stations: station A, containing two magnox reactors commissioned in 1964; and station B, containing two advanced gas cooled reactors commissioned in 1977. A public inquiry is currently taking place into the proposed building of a third station, which would use a pressurised water reactor.

The incidence of leukaemia has been the subject of three internal reports to the Somerset Health Authority.⁷⁻⁹ The rates quoted in these reports were calculated by using a locally compiled register of patients of all ages developing the disease in the catchment area of Musgrove Park Hospital, Taunton, since 1971. The Leukaemia Research Fund's centre for clinical epidemiology had supplied expected numbers of cases based on their study covering a large part of Britain.^{10,11} Our reports identified a high prevalence of leukaemia throughout the study area when compared with the Leukaemia Research Fund's data. For example, even if attention was confined to the three years for which Leukaemia Research Fund data were available (1984-6) the 111 cases of leukaemia in people under 85 years of age in the study area were 61% more than expected (standardised incidence ratio 1.61; 95% confidence interval 1.32 to 1.94).

Analyses of the geographical distribution of cases on the local register found no evidence of clustering. In particular, rates in the vicinity of Hinkley Point were not unduly high, though no specific hypothesis was formulated regarding the nuclear installation. The third Somerset Health Authority report, however, contained an additional analysis testing a specific hypothesis about leukaemia in young people living in the vicinity of Hinkley Point by using cancer registry data. This paper reports the results.

A prior hypothesis requires exact definition of time period, geographical boundary, diagnosis, methods of analysis, etc. Clusters of cases can quite easily be established if, for example, geographical boundaries are selected after inspection of the data.¹² In this study the methods employed follow as closely as possible those used in recent analyses of data relating to the Dounreay nuclear establishment in Caithness.^{5,6} This ensures a degree of objectivity in that the decisions regarding geographical boundaries and so on are established in advance.

Department of Public Health, Somerset Health Authority, Taunton, Somerset

P D Ewings, PHD, district statistician
C Bowie, FFCM, director of public health

Department of Haematology, Musgrove Park Hospital, Taunton, Somerset

M J Phillips, FRCPATH, consultant haematologist
S A N Johnson, MRCPATH, consultant haematologist

Correspondence to:
Dr P D Ewings, District Headquarters, Somerset Health Authority, Taunton, Somerset TA2 7PQ.

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FIG 1—Location of Hinkley Point

FIG 2—Zones around Hinkley Point used in analysis showing main centres of population

Subjects and methods

The South Western Regional Cancer Registry was used to identify cases registered in the current Somerset health district since 1959. All cases of leukaemia and non-Hodgkin's lymphoma in patients aged under 25 at the time of registration were included. As in the Dounreay analysis undertaken by the Committee on Medical Aspects of Radiation in the Environment,⁶ cases of non-Hodgkin's lymphoma were included because of possible confusion in the past between certain types of leukaemia and non-Hodgkin's lymphoma. A total of 169 cases were identified, 121 registered as leukaemia and 48 as non-Hodgkin's lymphoma.

TIME PERIODS

The main time period of interest was that since Hinkley Point began operations—that is, 1964-86. Conventional five year periods centred on census years were also used, including the five year period 1959-63 before the commissioning of station A.

GEOGRAPHICAL AREAS

The original Dounreay analysis used concentric circles around the nuclear establishment to construct areas for study.⁵ Successive halving of an arbitrary starting figure of 100 km resulted in circles of radii 25 and 12.5 km as the basis for the main areas for study. In a sensitivity analysis the Dounreay investigators continued the halving process down to 3.125 km and indeed used all radii from 3.125 km to 25 km in steps of 3.125 km.⁶ In our study the 12.5 km circle was selected to produce the main area of interest. Other radii from 3.125 km to 15.625 km were used to monitor the sensitivity of the main choice. Radii larger than 15.625 km would have complicated matters by including parts of Avon and Wales and indeed were unnecessary; the Hinkley Point area was not as sparsely populated as that around Dounreay and the 12.5 km circle covered a sufficiently large population. Figure 2 shows the circles selected.

The requirement of population figures for denominators in calculating incidences necessitates contortion of the selected circles to fit administrative boundaries. Generally the smallest areas for which population data are available are census enumeration districts. In Scotland these are conterminous with postcode areas, and the postcoding of all cases on the Scottish Cancer

Registry since 1968 therefore made the calculation of incidences for small areas fairly straightforward for the Dounreay investigators. In England and Wales no such conterminosity exists between enumeration districts and postcode areas. Moreover, for the three censuses spanning the period covered by this study enumeration districts changed, especially in areas of substantial development. This study therefore used the smallest administrative areas in practicable terms—that is, civil parishes and electoral wards. Parishes are generally smaller than wards in rural areas, but wards were used where the 12.5 km circle transected the town of Bridgwater. The selected circles were thus contorted to fit parish and ward boundaries according to whether the greater part of each administrative area appeared to lie within the circle. For the 12.5 km circle a total of 25 parishes and wards were included.

STATISTICAL METHODS

Population figures for the circular areas around Hinkley Point and (for consistency) for the rest of the Somerset health district were calculated from the small area statistics available at parish and ward level at the time of the 1961, 1971, and 1981 censuses. The small area statistics are actually inconsistent with population estimates (the population estimate for Somerset in 1981 was about 3% higher than the small area statistics equivalent), but population estimates as such are not available for parishes and wards and the use of small area statistics is unlikely to introduce substantial error. Linear interpolation was used to produce population figures for years between the censuses and backwards extrapolation for 1959 and 1960. A reversal in birth trends in recent years made simple forward extrapolation from the 1971-81 trend unrealistic. Population figures for 1982-6 were obtained instead by changing the 1981 small area statistics figures in proportion to the changes in population estimates since 1981 for the smallest areas available—namely, the appropriate district council areas.

National cancer registry rates in five year age and sex bands were used to obtain the expected number of cases in the areas studied. Published rates are available for each year from 1961 to 1984 inclusive. Rates for 1959 and 1960 were estimated as the average of the rates for the 10 years 1961-70. Similarly the 10 year period 1975-84 was used to estimate the rates for 1985 and 1986. Standardised registration ratios were calculated in the usual way by dividing the observed number of cases in a given area and time period by the number expected. In accordance with presentations by

TABLE 1—Registrations of leukaemia and non-Hodgkin's lymphoma in people aged under 25 within 12.5 km radius of Hinkley Point and in remainder of Somerset health district during 1964-86

	1981 Population	No of cases	Expected No (national rates)	p Value
Leukaemia				
<12.5 km	12 670	13	7.91	0.060
Somerset health district residue	112 700	87	75.56	0.11
Somerset health district total	125 370	100	83.47	0.043
Non-Hodgkin's lymphoma				
<12.5 km	12 670	6	2.4	0.043
Somerset health district residue	112 700	31	24.37	0.11
Somerset health district total	125 370	37	26.88	0.037
Leukaemia and non-Hodgkin's lymphoma				
<12.5 km	12 670	19	10.42	0.011
Somerset health district residue	112 700	118	99.93	0.042
Somerset health district total	125 370	137	110.35	0.0079

the Committee on Medical Aspects of Radiation in the Environment," for example, statistical significance was assessed by using the one sided cumulative Poisson probability of obtaining the observed number of cases (or more) given the expected number. To explore the likely range of values, however, confidence intervals are also presented when appropriate.

We know from our previous work that there is a high incidence of leukaemia (at all ages) throughout the west of Somerset.^{7*} It may be the case that any observed excess of cases in the specific areas around Hinkley Point relative to national rates may simply be a reflection of high rates throughout this area. Standardised registration ratios for the whole of Somerset were therefore calculated as an indicator of local incidence generally. When appropriate, direct comparison between the rate in the Hinkley Point area and that for the rest of Somerset is made, using results on independent Poisson variables—that is, the number of cases in the Hinkley Point area, conditional on the total number of cases in Somerset, should behave according to the binomial distribution.

Results

A total of 22 cases were registered in the 12.5 km area between 1959 and 1986, three of these occurring before Hinkley Point was commissioned in 1964. The cases were spread throughout the 12.5 km area without concentration in any particular patch. They also covered the entire age range under study, the youngest patient being 1 year old at registration and the oldest 24.

Main hypothesis—Table I shows the main results relating to the 12.5 km area around Hinkley Point for

the period 1964-86. The conventional p value shows that the rate for the 12.5 km area was significantly high for leukaemias and non-Hodgkin's lymphomas combined, but so too was the rate for the rest of the Somerset health district at the 5% level. The Hinkley Point area may simply have been reflecting high rates throughout Somerset. Clearly the important comparison was between the 12.5 km area and the rest of the Somerset health district. Table II gives the standardised registration ratios for the two areas based on the national rates and a relative risk for the 12.5 km area compared with the Somerset health district residue based on the ratio of the two standardised registration ratios.¹³ Though the Hinkley Point area had higher rates than the rest of Somerset, these rates were within the bounds of random fluctuation in Somerset. The one sided p values for the 12.5 km area compared with the Somerset health district residue were 0.15 for leukaemia, 0.13 for non-Hodgkin's lymphoma, and 0.058 for both combined.

Changing geographical boundaries—Table III shows the results of using circles around Hinkley Point of varying radii. Note that "Somerset health district residue" was that part of the Somerset health district outside the 15.625 km area and as such was different from that used in tables I and II. For leukaemias and non-Hodgkin's lymphomas combined the standardised registration ratio for every area around Hinkley Point was greater than 1.0 and greater than that for the rest of the Somerset health district. Direct comparison with the Somerset health district residue gave a relative risk of 1.33 for the 15.625 km area (95% confidence interval 0.88 to 1.99) with a one sided p value of 0.090. Thus the problem of interpretation remained, in that the rates around Hinkley Point may simply have been reflecting high rates throughout Somerset. This sensitivity analysis confirms, however, that the choice of the 12.5 km circle as the main area did not produce any peculiarities and that the area seemed to reflect incidence in the vicinity of Hinkley Point.

Changing time periods—Table IV gives the results for the 12.5 km area for conventional five year periods. Standardised registration ratios are given for this area and the Somerset health district residue based on national rates, and the ratio of the two standardised registration ratios is also given. The excess cases for the 12.5 km area were concentrated in the 10 years after the commissioning of Hinkley Point—that is, 1964-73. In particular, the rate for 1969-73 was about four times that expected from national rates, with an associated one sided p value of 0.00059 (that is, about one in 1700). Interestingly, the rates for the rest of Somerset during the 10 years were close to the national average. Rates for the Hinkley Point area subsequent to 1973 were fairly low, especially compared with the rest of Somerset. It is also noteworthy that rates throughout Somerset (including the 12.5 km area) were fairly high before Hinkley Point began operations.

Discussion

The cancer registry system has some deficiencies,^{14 15} and this is particularly true for the earlier years covered in this study. It is implicitly assumed in such studies that the completeness and accuracy of the register for the area under study are comparable to the area used for comparison. Examinations of a local register started in 1971 showed that, of 48 cases of leukaemia in the under 25 year age group in part of Somerset (specifically the catchment area of Musgrove Park Hospital in Taunton), four cases were missing from the regional cancer registry. We cannot be certain whether this omission rate is close to the national average. Possibly Somerset has higher reporting rates than the national average, but it is unlikely that the area around Hinkley

TABLE II—Standardised registration ratios (95% confidence intervals) for 1964-86 (people aged under 25)

	Leukaemia	Non-Hodgkin's lymphoma	Leukaemia and non-Hodgkin's lymphoma
<12.5 km	1.64 (0.88 to 2.81)	2.39 (0.88 to 5.20)	1.82 (1.10 to 2.85)
Somerset health district residue	1.15 (0.92 to 1.42)	1.27 (0.86 to 1.81)	1.18 (0.98 to 1.41)
Ratio of 12.5 km area to Somerset health district residue	1.43 (0.73 to 2.57)	1.88 (0.64 to 4.57)	1.54 (0.90 to 2.52)

TABLE III—Registrations of leukaemia and non-Hodgkin's lymphoma during 1964-86 in people aged under 25. Sensitivity to choice of geographical boundary (figures in parentheses are 95% confidence intervals)

	1981 Population	No of cases	Standardised registration ratio	p Value
Leukaemia				
<3.125 km	420	1	3.23 (0.08 to 17.97)	0.27
<6.25 km	840	1	1.75 (0.04 to 9.77)	0.43
<9.375 km	2 440	4	2.34 (0.64 to 5.99)	0.095
<12.5 km	12 670	13	1.64 (0.88 to 2.81)	0.060
<15.625 km	25 130	22	1.37 (0.86 to 2.08)	0.091
Somerset health district residue	100 240	78	1.16 (0.91 to 1.44)	0.11
Somerset health district total	125 370	100	1.20 (0.97 to 1.46)	0.043
Non-Hodgkin's lymphoma				
<3.125 km	420	0	0 (0 to 37.85)	1.0
<6.25 km	840	0	0 (0 to 20.85)	1.0
<9.375 km	2 440	1	1.82 (0.05 to 10.15)	0.142
<12.5 km	12 670	6	2.39 (0.88 to 5.20)	0.043
<15.625 km	25 130	11	2.15 (1.08 to 3.86)	0.016
Somerset health district residue	100 240	26	1.19 (0.78 to 1.75)	0.209
Somerset health district total	125 370	37	1.38 (0.97 to 1.90)	0.037
Leukaemia and non-Hodgkin's lymphoma				
<3.125 km	420	1	2.46 (0.06 to 13.69)	0.33
<6.25 km	840	1	1.34 (0.03 to 7.46)	0.53
<9.375 km	2 440	5	2.21 (0.72 to 5.16)	0.079
<12.5 km	12 670	19	1.82 (1.10 to 2.85)	0.011
<15.625 km	25 130	33	1.56 (1.07 to 2.19)	0.010
Somerset health district residue	100 240	104	1.17 (0.95 to 1.41)	0.068
Somerset health district total	125 370	137	1.24 (1.04 to 1.47)	0.0079

TABLE IV—Observed numbers of registrations of leukaemia and non-Hodgkin's lymphoma, standardised registration ratios, and ratios of standardised registration ratios in conventional five year periods among people aged under 25 (95% confidence intervals in parentheses)

	Leukaemia		Non-Hodgkin's lymphoma		Leukaemia and non-Hodgkin's lymphoma	
	Observed registrations	Standardised registration ratio	Observed registrations	Standardised registration ratio	Observed registrations	Standardised registration ratio
1959-63						
<12.5 km	2	1.59 (0.19 to 5.74)	1	2.09 (0.05 to 11.65)	3	1.73 (0.36 to 5.05)
Somerset health district	19	1.47 (0.89 to 2.30)	10	1.99 (0.96 to 3.66)	29	1.62 (1.08 to 2.32)
Ratio of standardised registration ratios	—	1.08 (0.12 to 4.49)	—	1.05 (0.02 to 7.39)	—	1.07 (0.21 to 3.44)
1964-8						
<12.5 km	4	2.96 (0.81 to 7.59)	1	1.75 (0.04 to 9.74)	5	2.60 (0.85 to 6.08)
Somerset health district	17	1.26 (0.73 to 2.01)	3	0.52 (0.11 to 1.51)	20	1.04 (0.63 to 1.60)
Ratio of standardised registration ratios	—	2.35 (0.58 to 7.22)	—	3.37 (0.06 to 42.20)	—	2.50 (0.74 to 6.91)
1969-73						
<12.5 km	7	4.01 (1.61 to 8.24)	2	3.81 (0.46 to 13.75)	9	3.96 (1.81 to 7.52)
Somerset health district	16	0.94 (0.54 to 1.52)	5	0.96 (0.31 to 2.24)	21	0.94 (0.58 to 1.44)
Ratio of standardised registration ratios	—	4.27 (1.48 to 10.94)	—	3.97 (0.38 to 24.30)	—	4.21 (1.69 to 9.60)
1974-8						
<12.5 km	0	0 (0 to 1.89)	1	1.93 (0.05 to 10.75)	1	0.41 (0.01 to 2.26)
Somerset health district	24	1.32 (0.84 to 1.96)	10	2.04 (0.98 to 3.75)	34	1.47 (1.02 to 2.06)
Ratio of standardised registration ratios	—	0 (0 to 1.55)	—	0.95 (0.02 to 6.67)	—	0.28 (0.01 to 1.64)
1979-83						
<12.5 km	2	1.14 (0.14 to 4.10)	1	1.78 (0.04 to 9.89)	3	1.29 (0.27 to 3.78)
Somerset health district	17	1.07 (0.62 to 1.71)	10	1.93 (0.93 to 3.56)	27	1.28 (0.84 to 1.86)
Ratio of standardised registration ratios	—	1.07 (0.12 to 4.48)	—	0.92 (0.02 to 6.46)	—	1.01 (0.20 to 3.28)
1984-6						
<12.5 km	0	0 (0 to 3.32)	1	3.00 (0.08 to 16.73)	1	0.69 (0.02 to 3.87)
Somerset health district	13	1.20 (0.64 to 2.05)	3	0.91 (0.19 to 2.66)	16	1.13 (0.65 to 1.84)
Ratio of standardised registration ratios	—	0 (0 to 3.37)	—	3.30 (0.07 to 43.63)	—	0.61 (0.02 to 4.16)

Point has reporting rates vastly different from the rest of Somerset. Nevertheless, the small numbers in our series can make just one error alter the significance of a result considerably.

The methods used in the Dounreay analysis were adopted in this study to ensure a degree of objectivity. There is, however, one aspect that was not replicated—namely, the justification for using the Poisson model for describing the distribution of leukaemia cases in the study area. The Poisson distribution is appropriate if events occur randomly in time and space throughout a population. If, however, this is not the case (for example, a disease caused by a virus might be expected to occur in time-space “clusters”) then a higher than average incidence in a given area and time period would not be as rare as the Poisson model would suggest. Indeed, variation in excess of that expected from Poisson theory has been found in a recent study of mortality from leukaemia.¹⁶

In the Dounreay analysis the investigators justified using the Poisson model by showing that randomly constructed areas throughout Scotland of similar size to the area studied around Dounreay contained numbers of cases of leukaemia that were consistent with numbers from a Poisson distribution. Similarly, in the report by the independent advisory group chaired by Sir Douglas Black the distribution of leukaemia in rural districts throughout England and Wales similar to the one under study (Millom rural district, near the Sellafield nuclear plant) was found to conform to the Poisson model.¹ It was not possible independently to assess the suitability of the Poisson model for use in our study. The methods of the Dounreay investigators could not be replicated, as the geographical building blocks used in our study were too large to construct suitable areas. The checks made

to ensure the validity of the Poisson assumption in the Black and Dounreay reports give some support to its use here. There is no reason to suppose that the area around Hinkley Point should behave any differently in this respect from small rural districts throughout England and Wales or indeed from areas throughout Scotland similar to the area studied around Dounreay.

The results presented for the Hinkley Point area are similar to those relating to other nuclear installations such as Sellafield¹ and Dounreay⁶ in that there appears to be an excess of cases of leukaemia in young people. The common methodology of the Dounreay and Hinkley Point analyses suggests that the results may be viewed in conjunction with each other. The temporal pattern of the cases in this study contrasts sharply with that found at Dounreay, where the excess cases were concentrated in the most recent period studied rather than the period after commissioning of the station. Nevertheless, it appears that the conclusion of the report on Dounreay when comparing the data with those from Sellafield—namely, that some features of these two plants “leads to an increased risk of leukaemia. . .”—could be extended to include Hinkley Point. The nature of the operations at Hinkley Point, however, are very different from those at Sellafield and Dounreay, which contain the only two reprocessing plants in the United Kingdom.

Whether viewed in isolation or in conjunction with results for other nuclear installations, there is no ready explanation for the results relating to Hinkley Point. The possibility that they are simply a chance finding can never entirely be dismissed, but the *p* values quoted, and in particular the *p* value for the 1969-73 period, show how unlikely it is that the excess cases were due to random fluctuation. It is important to note that the high incidence of leukaemia was established as

the result of a prior hypothesis rather than through casual observation.

The suggestion that there is an association between some nuclear establishments and a raised incidence of leukaemia in young people in their vicinity is not a suggestion of a cause and effect relation. Detailed analyses of the Sellafield¹ and Dounreay² data showed that current knowledge regarding exposure to radiation and dose-risk estimates did not permit the possibility that the excess cases of leukaemia could have arisen through radioactive emissions from the nuclear plants. We have briefly examined exposure to radiation in the Somerset area and concluded that radioactive waste disposal from Hinkley Point contributes a small fraction of total exposure.³ The timing of the cases of leukaemia in the 12.5 km area suggests that, if radiation from Hinkley Point was responsible, a large release soon after the first station was commissioned would provide a better explanation than the authorised routine discharges. Though we have not undertaken a complete analysis, it is likely that the release would need to have been thousands of times the annual reported releases. The Central Electricity Generating Board has no record of such a release and Her Majesty's Inspectorate of Pollution confirms that there is no evidence of large scale unreported releases during the 1960s and 1970s.

Though radiation is at present the only known cause of childhood leukaemia, it is almost certain that there are other causes, and indeed many factors may need to be present. Probably at least some types of leukaemia have a virus implicated in their aetiology. A recent study has given some credence to the theory that the high incidence of leukaemia in young people near some nuclear installations could be the result of a large workforce coming together to build the installations, so introducing viruses to a previously isolated community with particular susceptibility.¹⁷ The study found a high level of mortality from leukaemia in a Scottish new town created over a fairly short period in a previously isolated rural area. The temporal pattern of the cases of leukaemia in the Hinkley Point area fits well with this theory, as the excess cases occurred during the 10 years after the building of the first station.

There are other possible causes for the pattern of cases of leukaemia found in this series—for example, exposure to some unknown toxin causing cancer. Too little is known about leukaemogenesis to draw further conclusions. What seems clear is that it is no longer a question of Do raised levels of leukaemia in young people occur around (some) nuclear installations? but Why? Radiation may remain a possible explanation,

but it is well to remember that nuclear establishments have many things in common apart from radioactive emissions, and the observed association may not have a direct cause and effect basis. We intend to conduct further work in an attempt to shed more light on the results presented so far. We shall examine the incidence of other diseases in the area to see whether there is any support for the possibility that radiation could be the cause. We shall attempt to discover more about the people affected to see if they were born in the area and whether they have familial links with any power stations. These results could test the plausibility of both the radiation and virus theories.

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ONE HUNDRED YEARS AGO

The average age at which children leave elementary schools is 12 in the towns and 11 in the rural districts, but in London the educational period is commonly prolonged to the age of 13; the larger number of these children do not pass beyond the fourth standard. We have about three millions of the pauperised class, and something like another three millions who are just a shade higher in the social scale, and the educational neglect of the children appears to be a main cause of this social defect. It is generally recognised that in Germany the educational system is greatly in advance of our own; all over Germany the attendance at school is universal and compulsory up to the age of 14 for boys. As an extension of the ordinary education there is also a system of evening continuation classes to which children are obliged to go up to the age of 17. It is suggested that the evening classes should be framed, to a large extent, upon the peculiar needs of the locality where they are opened, and that in rural districts evening classes should only be conducted in the winter, so as not to interfere with the field work of the summer. When the plan was recently brought before the House of Commons by Mr. Samuel Smith, M.P., it met with much general approval, and was supported by Sir Lyon Playfair and Mr. Mundella. All will agree that evening schools may do much good, and

we have no desire to raise difficulties, but it will be remembered that Dr. Farquharson had occasion to draw the attention of Parliament to the increase of myopia among school children. Some members of the profession think the danger to eyesight from night work so great for children, that they wish to abolish evening lessons. Mr. S. Smith, and those who desire to found evening continuation classes at board schools, need to consider the hygienic conditions under which their evening classes will be held, both as to eye-conditions, and as to the cleanliness and ventilation of the schools. To quote the success of German learning is not to satisfy us of the safety of uniform evening work for growing lads. Germany is a country of myopics, and many surgeons think that our population is undergoing a like change. Hypermetropic eyes are also exceedingly common among school children, and convergent squints are very frequent. It would, then, be necessary that any school at which it is proposed to hold evening classes should have good artificial lighting, as well as suitable desks for any writing class-work; while it must be remembered that desks and benches must be adapted to the stature of the pupils, and those fitted for young children are not safe for lads of older years. (*British Medical Journal* 1889;i:664)