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Did smallpox reduce height? A final comment

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There are now many areas of agreement between myself and Leunig and Voth over the Marine Society Register evidence on smallpox and height. However, the tone and content of their latest reply is misleading, as it seeks to reassure readers that the overall quality of their data is reliable, and that these data support the argument that smallpox reduced average height by up to 1 inch. What they do not bring out clearly is that by examining the original registers they have been forced to concede that the evidence cited in their article and first reply was almost entirely flawed.[1]

They now acknowledge that 'in November 1844 the Marine Society ceased to register whether boys had the smallpox' and 'that for much of 1770 the Marine Society did not ask whether boys had suffered from smallpox.[2] The number of 'no smallpox' cases resulting from this non-registration of smallpox during 1770-5 and 1844-73 was 2,149 out of a total of 3,177 'no smallpox' cases in the whole sample for 1770-1873, i.e. 67.6 per cent of the total. Data for the two periods 1770-1873 and 1770-5 formed the sole basis of their tables and figures in their articles and first reply,[3] and as the great majority of the 'no smallpox' cases in these two periods are now acknowledged by Leunig and Voth to be spurious, the basis of their original claims for the effect of smallpox on height is clearly invalidated.

They attempt to defend the overall quality of the data by examining them in detail and subjecting them to the 'literacy test', on the assumption that accurate recording of literacy (sharing the same column in the registers as smallpox) is an effective way of evaluating the registration accuracy of smallpox. However, the logic of Leunig and Voth's use of this test is flawed. By applying the test to all 'no smallpox cases' they are analysing both genuine and spurious cases, so that, for example, all the spurious 'no smallpox cases' in 1844-73 (1,980 cases) are included in the analysis. These represent all boys entering the Marine Society in this period, and it is therefore not surprising that the literacy characteristics of this sample are representative of the general population.

Leunig and Voth attempt to deal with the problem of the accuracy of the data by confining their analysis to the period 1777-78, when they

[1] See Voth and Leunig, 'Did smallpox reduce height?'; Leunig and Voth, 'Smallpox did reduce height'.

[2] Leunig and Voth, 'Smallpox really did reduce height: a reply to Razzell', pp. 110-114.

[3] Voth and Leunig, 'Did smallpox reduce height?' pp. 551-3; Leunig and Voth, 'Smallpox did reduce height', pp. 373, 375.

believe the registration of smallpox was of a high quality. This means that their analysis is based on only 151 'no smallpox cases', a fraction of their original 3,177 'no smallpox' cases. But not only is their sample now very small, there are good reasons to believe that even this rump of 'no smallpox' cases is unreliable. Of the 151 'no smallpox' cases in 1777-8, only 6 (4.0 per cent) had marks in the reading/writing column, significantly below the 35.6 per cent of boys who were listed as illiterate in the whole period 1770-1873. This would indicate that the registration of smallpox was not accurate during the period 1777-8, and it is surprising that Leunig and Voth did not notice this themselves, as their own literacy test indicates an almost complete lack of reliability in the registration of smallpox in the 1777-8 period.

We may conclude from a review of the evidence that smallpox was probably never accurately recorded at any period in the existence of the Marine Society Register. The issue of the impact of smallpox on average height cannot be settled by analysis of the Marine Society dataset, as it is fundamentally flawed in its registration of smallpox. Only a dataset with reliable information on both smallpox and height will settle the question of the relationship between smallpox and height.

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Footnote references

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