Introduction

There was a time when only the affluent could afford a doctor. Everyone practised what was called ‘domestic medicine (and) took it for granted that there were everyday ills and spills with which a resourceful lay person could cope...’ Later, with the establishment of the British National Health Service, in 1948, came free access at the point of need: everyone in the UK had equal access to health services. The socio-economic influence on health care and on health itself was expected to disappear but it did not. Twenty-five years later there were still stark health inequalities in British society, famously expressed by the ‘inverse care law’ coined by Julian Tudor Hart. However, isolating and measuring these inequalities as they permeate primary care has been largely ignored and they are still bereft of an evidence base. One notable exception was the work of Brian Jarman but even he used highly subjective data (essentially an opinion poll of a sample of UK general practitioners) to derive his ‘under band: doctor consultations are higher in lower bands.

Keywords: ALSPAC data, consulting behaviour vs disease occurrence, Council Tax Valuation Band, infant morbidity, socio-economic influence

Background: The discrepancy between the occurrence of disease and the risk of consulting a doctor is well known, but whether or not it is socially governed is uncertain and could have important implications for primary care manpower and resource allocation. The aim of the study was to investigate whether (i) reported occurrence of common symptoms in infancy and (ii) consulting rates for those symptoms, are associated with socio-economic status as marked by Council Tax Valuation Band (CTVB).

Methods: Compound cross-sectional analysis of data was obtained from sequential parental questionnaires. Data were taken from Avon Longitudinal Study of Parents and Children of over 14000 responders from Avon county since 1991. Comparative analyses by CTVB and other covariables were carried out.

Results: Final study group of nearly 10 000: diarrhoea, wheeze and accidental injuries moderately associated with CTVB but consulting behaviour for all morbidity bar earache strongly associated with CTVB, the lower the band the higher the clinical burden. Conclusion: The children from more modest homes are more likely to be taken to a doctor for everyday symptoms: for infant morbidity, the lower the CTVB of home address, the higher the clinical burden for UK general practices.

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Scandanavia.9,15 We have therefore used data from the Avon Longitudinal Study of Parents and Children (ALSPAC) (http://www.alspac.bris.ac.uk) to investigate the influence, in infancy, of socio-economic status on (i) disease occurrence and (ii) consulting tendency, using a new, proxy marker of socio-economic status.

ALSPAC was initiated in 1990. In order to be eligible, women had to be pregnant with expected dates of delivery between 1 April 1991 and 31 December 1992 and living in Avon, UK. Data have been collected regularly on the mothers and their offspring since recruitment.16 This longitudinal study of childhood aims to reveal how physical and social environment interact, with genetic inheritance, to affect all aspects of a child’s health and development. It is already seen as a valuable database (well over 380 papers published so far). This new study compares some of these data to a novel marker of socio-economic standing at household level—Council Tax Valuation Band (CTVB).

In 1992 the British Government replaced the Community Charge (’Poll Tax’) with a new tax—the Council Tax.17 Homes were to be allotted an ‘open market’ value, as at 1 April 1991, based on size, layout, character and locality, and placed into one of eight ‘Valuation Bands’. The bands were so structured that the most modest homes—estimated value then £40 000 and £52 000 in band B and so on progressively up to £40 000—were placed in band A, the next group—between £40 000 and £32 000 in band B and so on progressively up to the most expensive homes—values exceeding £320 000—in band H. The allotted bands, A–H, then dictate the amount of the annual tax. All UK Local Authorities were mandated to levy the new tax and to publish lists showing the CTVB of all properties in their jurisdiction: these are now available, for England and Wales, on a web site published by the Valuation Office Agency (http://www.voa.gov.uk/council tax/index.htm).

We first examined this new ‘ecological attribute’ of all patients, the CTVB of their residence, in a small study reported in 2000.18 We demonstrated an association between CTVB and (i) established socio-economic indicators namely home ownership and car access and (ii) clinical demand in a typical UK general practice. We have also reported that CTVB is, in UK general practice, a significant predictor of clinical contacts19 and of the overall costs of care.20 CTVB is also significantly associated with mortality rates.21 These, and other studies published by our research unit, were the only reports in the literature that used CTVB as a marker linking clinical parameters to the socio-economic status of patients until Fone and colleagues, working in South Wales, corroborated our findings.22

In this study, for which there seems no precedent, we aim to test two hypotheses: (i) that CTVB of home address is a predictor of reported occurrence of common presenting symptoms in infants and (ii) that CTVB of home address is a predictor of tendency of parents to consult doctors for those common presenting symptoms in their infants.

Methods

We investigated data provided in the 6- and 18-month ALSPAC questionnaires, excluding multiple births and those responders who had cooperated at only one of the intervals. We restricted analyses to those questions that were identical at each life interval and to common presentations i.e. those for which the ‘yes’ answer was ‘delivered’ by at least 20% of responders. The questionnaires, all of the same format, sought categorical replies from parents or guardians, e.g. ‘has your baby ever had diarrhoea? (i) yes and saw a doctor or (ii) yes but did not see a doctor or (iii) no, never had’. Aggregated responses to such questions, the clinical data, were matched to the CTVBs of responders’ home addresses. These were determined by electronic linkage supplemented by manual searching of the ‘Council Tax’ website (http://www.voa.gov.uk/council tax/index.htm) when linkage failed. The response data were then aggregated longitudinally omitting those responders whose CTVB had changed between the two study intervals. Response rates were then compared by: (i) infant gender, (ii) infant birth order (whether or not first-born live child), (iii) maternal age at delivery, (iv) maternal cigarette smoking habit and (v) CTVB of maternal home address.

The clinical presentations investigated were: common cold, cough, fever, diarrhoea, vomiting, rash, wheeze, earache and accidents. The occurrence rates (at least one episode of a condition) as reported by the parents, and whether or not a doctor was consulted, were compared between groups classified by the CTVB of residence for each of the nine clinical presentations.

Statistics

Analysis was carried out using the Statistical Package SPSS. The data were investigated using Pearson Chi-Square test with appropriate degrees of freedom. Significant outcomes (<0.05) were then subjected to logistic regression analyses in order to construct a predictive model. Any associations between disease consultation and possible additional covariables were determined by the odds ratio. An odds ratio >1 indicated that the covariable increased the chance of consulting for a particular condition. The P-values obtained in the regression analysis showed the significance of any association between disease consultation, possible covariable and CTVB. If the CTVB was a significant predictor for consulting a doctor when considered with the covariable, then CTVB was considered as a significant predictor of consulting behaviour. The rate ratios for consulting a doctor were calculated for each of the five conditions where there was a significant predictive difference after regression analyses.

Ethical consent

All data collection was discussed in detail with the ALSPAC Ethics and Law Advisory Committee as well as being approved by the local research ethics committees.

Results

ALSPAC recruited 14 541 pregnant women resident in Avon, UK with expected dates of delivery 1 April 1991 to 31 December 1992. The number of pregnancies for which the mother enrolled in the ALSPAC study had either returned at least one questionnaire or attended a ‘Children in Focus’ clinic by 19 July 1999 was 14 541. Out of the initial 14 541 pregnancies, all but 69 had a known birth outcome. Of these 14 472 pregnancies, 195 were twin, three were triplet and one was a quadruplet pregnancy. There were therefore 14 676 fetuses in the initial ALSPAC sample of which 14 062 were live births and 13 988 alive at 1 year. The triplet and quadruplet children were omitted for reasons of confidentiality.

It was possible to match 10 877 addresses to a stable CTVB (77.3%). In the immediate post-natal period these were distributed respectively: CTVB A: 1638, 15.1%; CTVB B: 4070, 37.4%; CTVB C: 2513, 23.1%; CTVB D: 1481, 13.6%; CTVB E: 720, 6.6%; CTVB F: 308, 2.8%; CTVB G: 139, 1.3% and CTVB H: 8, 0.1%. There were insufficient numbers for valid separate analyses in CTVBs F, G, H so these bands were aggregated with band E in a group thereafter called band...
The results are striking. In only three of eight common GP clinical presentations in early childhood are there any indications of a significant socio-economic influence on reported occurrence: for diarrhoea; for wheeze and for accidental injury. On the other hand earache is the only exception to what is otherwise a universal finding—that there is an almost 50% (average) difference in consulting tendency across the Council Tax Bands for all common illnesses (56% higher risk for those conditions that remained having predictive effect after logistic regression analyses). This latter finding corroborates, both in trend and scale, earlier work in which we compared overall general practice workload with CTVB of patient residence. The exceptional finding for earache might merit further investigation.

Whilst we recognize that these conclusions are based on data that were collected up to 18 years ago and that the interface between patients and UK primary care is now more in the nature of teamwork and more diversified, the numbers involved are very large and there was little attrition over the 18-month study span. Triangulating the data against primary care records would be of great benefit in validating the findings but these record linkages were not in place in the UK in the 1990s. Recruitment bias in this cohort has been described elsewhere, identifying more mature, better-educated and home-owning parents as more likely to respond. There is a suggestion that this may lead to an overall underestimate of clinical workload but our analyses by CTVB can compare true workloads across social groups and correct for this potential distortion. The data available to us did not include any information about the outcome of the consultations, the routes by which consultations was sought (although the age of the data mean that they preceded NHS-Direct telephone advice or the possibility of visiting drop-in centres), the outcome of the consultations, nor whether the doctor (virtually always a general practitioner in the era of the data)
deemed the visit to warrant attention. However, in terms of healthcare utilization it is the parents’ perception that is of importance.

Critics might also point to UK societal changes in the last 18 years. However, British society has not lost its in-built wealth differentials. Indeed, there is good evidence that the situation has worsened in that time; that the poor are relatively poorer \(^{24}\) and a new, global, economic recession is hardly likely to reverse the trend. We therefore feel justified in highlighting, on the evidence of this work:

(i) that socio-economic status influences only some true morbidity in infancy and that to a limited extent; and

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### Table 3

The five conditions remaining where CTVB was a significant ‘predictor’ for consulting a doctor after logistic regression analyses, showing other significant covariables in each case

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Covariable</th>
<th>Logistic regression value</th>
<th>Odds (CI)</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold</td>
<td>Maternal age</td>
<td>&lt;0.001</td>
<td>1.02 (1.01–1.04)</td>
<td>Decreasing maternal age increases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
<tr>
<td></td>
<td>Parity</td>
<td>0.005</td>
<td>1.15 (1.04–1.28)</td>
<td>Having no previous children increases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
<tr>
<td></td>
<td>Smoking</td>
<td>0.039</td>
<td>1.14 (1.01–1.28)</td>
<td>Smoking increases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>0.017</td>
<td>1.12 (1.02–1.24)</td>
<td>Being a male child increases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
<tr>
<td>Cough</td>
<td>Maternal age</td>
<td>&lt;0.001</td>
<td>1.03 (1.02–1.04)</td>
<td>Decreasing maternal age increases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
<tr>
<td></td>
<td>Parity</td>
<td>0.011</td>
<td>0.88 (0.79–0.97)</td>
<td>Having no previous children decreases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
<tr>
<td></td>
<td>Smoking</td>
<td>0.010</td>
<td>1.18 (1.04–1.34)</td>
<td>Maternal smoking increases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>&lt;0.001</td>
<td>1.22 (1.10–1.34)</td>
<td>Being a male child increases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
<tr>
<td>Wheeze</td>
<td>Maternal age</td>
<td>&lt;0.001</td>
<td>1.03 (1.02–1.05)</td>
<td>Decreasing maternal age increases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
<tr>
<td></td>
<td>Parity</td>
<td>&lt;0.001</td>
<td>0.52 (0.47–0.59)</td>
<td>Having no previous children decreases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
<tr>
<td></td>
<td>Smoking</td>
<td>&lt;0.001</td>
<td>1.27 (1.11–1.44)</td>
<td>Maternal smoking increases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>&lt;0.001</td>
<td>1.55 (1.39–1.73)</td>
<td>Being a male child increases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>Maternal age</td>
<td>&lt;0.001</td>
<td>1.03 (1.02–1.04)</td>
<td>Decreasing maternal age increases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
<tr>
<td></td>
<td>Parity</td>
<td>&lt;0.001</td>
<td>1.29 (1.16–1.43)</td>
<td>Having no previous children increases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
<tr>
<td></td>
<td>Smoking</td>
<td>&lt;0.001</td>
<td>1.28 (1.13–1.45)</td>
<td>Maternal smoking increases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
<tr>
<td></td>
<td>Gender</td>
<td>&lt;0.001</td>
<td>1.24 (1.12–1.37)</td>
<td>Being a male child increases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
<tr>
<td>Vomiting</td>
<td>Maternal age</td>
<td>&lt;0.001</td>
<td>1.04 (1.02–1.05)</td>
<td>Decreasing maternal age increases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
<tr>
<td></td>
<td>Parity</td>
<td>&lt;0.001</td>
<td>1.32 (1.18–1.46)</td>
<td>Having no previous children increases the likelihood of consulting additionally to the effect of CTVB</td>
</tr>
</tbody>
</table>

CI: confidence interval.

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### Table 4

Rate ratios for consulting a doctor (E+ at RR 1.0) for each of the five conditions where CTVB was a significant ‘predictor’ for consulting after logistic regression analyses

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Rate ratio for consulting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Cold</td>
<td>1.55</td>
</tr>
<tr>
<td>Cough</td>
<td>1.30</td>
</tr>
<tr>
<td>Wheeze</td>
<td>1.72</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>1.71</td>
</tr>
<tr>
<td>Vomiting</td>
<td>1.67</td>
</tr>
</tbody>
</table>

Critics might also point to UK societal changes in the last 18 years. However, British society has not lost its in-built wealth differentials. Indeed, there is good evidence that the situation has worsened in that time; that the poor are relatively poorer\(^{24}\) and a new, global, economic recession is hardly likely to reverse the trend. We therefore feel justified in highlighting, on the evidence of this work:

(i) that socio-economic status influences only some true morbidity in infancy and that to a limited extent; and
(ii) that socio-economic status strongly influences, however, tendency to consult doctors for almost all common clinical presentations in infancy.

In other words we have uncovered evidence of a contrast in illness rates and illness behaviour. In respect of the appearance of symptoms in early infancy, in the UK at least, there appears to be little difference in occurrence across the social spectrum. At the same time, however, the decisions of parents to seek professional health care, or not, is significantly governed by social standing as marked by housing quality. The relative strengths of the personal, domestic and ecological features are beyond the scope of this study and remain to be explored. However, a possible rationale could include:

(i) children from homes in the lowest CTVBs having more repeat episodes of illness, or episodes of greater severity; and

(ii) impecunious parents being more likely to want their ailing children to see a general practitioner because their disadvantaged personal and home environments make it more difficult for them to cope and create a higher level of background anxiety.

Regardless of the explanation, this study provides good evidence of a sliding scale for consulting tendency starting with CTVB 'A' being the highest. And it is worth noting, immediately, that this differential burden is additive when overall workload in primary medical care is considered. After all, it applies to virtually all of the common illnesses we see in infants in primary care where a small shift in consulting behaviour can represent a huge shift in workload.

That very young mothers and the inexperienced tend to consult at a rate above average is no surprise—the link to mother’s parity having been detected before. However, it is interesting to note, that for the symptoms of cough and wheeze, consultations are lower for firstborns while both wheeze and diarrhoea provoke more consultations for the children of mothers who smoke cigarettes. The link between wheeze and maternal smoking could be expected but the latter is, perhaps, worthy of further urgent investigation.

CTVB has the potential to become a powerful social science tool. It has been applied consistently across the UK, it is set at a property level, is in the public domain, is stable, categorical, and overcomes the well-known ecological fallacy of area statistics. CTVB’s inherent link to address means that it can be applied automatically through record linkage: standardization of address formats and the development of unique property identifiers should aid the accuracy of the process and minimize clerical overheads. These attributes suggest that CTVB could be distributed alongside routinely collected data sets as a matter of course. Ethically, its inclusion should not be contentious due to its public domain status and its having low potential to disclose an individual’s actual identity. And as a public domain measure should encompass illness and consulting—ones that enable the parents of young children to have the confidence to cope with more childhood symptoms; and

(iii) that we have uncovered yet more evidence for the usefulness and validity of CTVB as a marker of socio-economic status in the context of UK health services.

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Conflicts of interest: None declared.

Key points

- Few of the common symptoms occurring in early infancy show any association with parental status as marked by Council Tax Band of home address.
- However, the rate at which parents consult doctors for those symptoms in their children is shown to be strongly associated with Council Tax Band of home address.
- Here is more evidence that Council Tax Band could be a useful marker of UK health care utilization.

References


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