THE ASSESSMENT OF LEVELS OF DISADVANTAGE IN PRIMARY SCHOOLS FOR DEIS

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Policies that involve providing additional resources to address the educational problems of children from disadvantaged backgrounds often give rise to debate about whether such resources should be directed at schools, individual children and their families or geographic areas. In Ireland some initiatives are targeted at families (e.g., the Back to School Clothing and Footwear Allowance) and some are targeted at geographic areas (e.g., the educational components of Area Partnership Companies). However, since 1984, most initiatives have been targeted at schools that have been assessed as having high concentrations of disadvantage. These include the Disadvantaged Areas Scheme (DAS), the Home/School/Community Scheme, Breaking the Cycle (BTC), the most important elements of Giving Children an Even Break (GCEB), and the School Support Programme under Delivering Equality of Opportunity In Schools (DEIS) which is the most recent initiative in this area. [For a description of these and other schemes, see the Social Inclusion page of the website of the Department of Education and Science, www.education.ie; for an account of evaluations of these schemes, see Archer and Weir (2004).]

A number of issues have been raised about the methods used to establish which schools had sufficiently high concentrations of disadvantage to warrant inclusion in schemes (e.g., Educational Disadvantage Committee, 2003; Kellaghan, Weir, ÓhUallachain, & Morgan, 1995; Weir, 1999; Weir & Archer, 2005). For example, the absence of centrally held data on socioeconomic variables for primary schools (e.g., the number or proportion of pupils in the school with parents who are unemployed) has meant that it was necessary to rely on information supplied by the schools using an application form, as in DAS and BTC, or surveys of all schools (GCEB and DEIS). The Educational Disadvantage Committee (2003) noted "that information on socioeconomic indicators such as medical card possession is not readily available in most schools and that, as a result, many school principals are forced to estimate/guess the number of pupils in the relevant category. There is a suspicion that some

principals 'err on the side of caution'; while other principals do the opposite" (p.3). Other matters that have been addressed include: the value of using more than one socioeconomic indicator; possible differences between the meaning of indicators in urban and rural settings; the difficulties created by the fact that, in most schemes, a cut-off point rather than a sliding scale is used to decide whether a school is or is not allocated significant additional resources; and the arguments for and against using educational as well as socioeconomic measures in the assessment of disadvantage.

In relation to the last of these matters (the use of educational variables), the selection of schools to participate in schemes at post-primary level has always involved the use of measures of attainment (e.g., retention rate) and/or achievement (e.g., examination results) in conjunction with socioeconomic measures. Indeed, in the case of the School Completion Programme, retention rates were the only measures used. At primary level, however, suggestions that measures of achievement be included (e.g., Kellaghan et al, 1995; Weir, 1999) have never been implemented. For DAS, socioeconomic variables were selected on the basis of a judgement (influenced no doubt by the results of previous research) that these variables were good predictors of educational outcomes. The application form for BTC and the questionnaire for the GCEB survey both included questions that required principals to estimate the proportion of pupils in the school who were achieving at or below a specified low level of achievement in English reading and mathematics. While answers to these questions were not used in the calculation of levels of disadvantage in schools, they did play a part in the choice of socioeconomic variables and the assignment of weights to these variables. Zero-order correlations between socioeconomic and educational variables were taken into account when decisions were made about the inclusion and weight assigned to various socioeconomic variables. These correlations also influenced the decision to use different combinations of variables to assess levels of disadvantage in schools in urban and rural settings. For the most part, however, these decisions were a matter of judgement.

Despite the acknowledged shortcomings of relying on information supplied by principals to assess levels of disadvantage in schools, it was clear that the assessment of disadvantage for DEIS would also have to rely on a survey of schools. In the planning of that survey, a ministerial policy decision meant that no measure of

learning outcomes in a primary school could contribute directly to the assessment of that school's level of disadvantage. However, it was agreed, following discussion with a specially convened advisory group, that the choice of particular variables and the weight to be assigned to these variables would be determined by their association with an educational measure (an estimate provided by school principals in the survey of the percentage of pupils in the school at or below the 10th percentile in reading).It was decided to try to produce a single scale of disadvantage for all primary schools using recently developed statistical methods called mixed logistic regression models. In particular an attempt was to be made to determine the combination of socioeconomic variables that best predicted an educational variable.

The remainder of this report contains a description of the model building exercise and the index that resulted from that exercise. A number of administrative and political constraints that emerged when the implications of using the new index to allocate resources began to be considered seriously are then discussed. This discussion is followed by an account of the development of a resource allocation formula which was an attempt at a compromise that would retain some of the strengths of the model-based index and would recognise the constraints in which policy implementation in general and resource allocation in particular have to operate. Finally, the use of the 'compromise' index to allocate resources in the context of DEIS is described.

In order to identify schools to participate in DEIS the ERC carried out a survey of all primary schools in May and June of 2005 to assess levels of disadvantage in these schools. Principals were asked to report on the number of pupils from families with a variety of socioeconomic characteristics associated with poverty. In the analysis of data from that survey, the assessment of levels of educational disadvantage was guided by the definition of disadvantage in Section 32 (9) of the Education Act, (1998) which refers both to learning outcomes and to social and economic factors (by implication, poverty). As already noted, a policy decision by the Minister had been made at an early stage that no measure of learning outcomes in a primary school should contribute directly to the assessment of that school's level of disadvantage. Therefore, the variables to be taken into account in ranking schools for the identification of primary schools for DEIS would be confined to the socioeconomic and demographic context. However, it was agreed with the advisory group that the

choice of particular variables and the weight to be assigned to these variables would be determined by their association with an educational measure (an estimate provided by school principals in the survey of the percentage of pupils in the school at or below the 10th percentile in reading).

The modelling exercise

The aim of the modelling exercise was to produce a single scale of disadvantage for all primary schools using mixed logistic regression models. A series of analyses was carried out to determine the combination of context variables that best predicted the educational variable. The survey yielded data on the percentage of pupils in the school from families with a range of socioeconomic characteristics that have been found in previous research, including a survey to select schools for Giving Children an Even Break (the predecessor of DEIS) carried out for the DES in 2000, to be associated with low levels of educational achievement. The variables indentified in the 2000 survey were: unemployment, medical card possession, local authority accommodation, lone parenthood, and low levels of parental education.

Each of these variables was included at least in the initial stages of the analysis designed to yield a new index. A variable based on the percentage of pupils for whom a free books grant had been paid (available from DES databases) was also included, as were the percentages of pupils from Traveller and non-Irish families. In view of the findings of a 2003 survey of literacy in designated disadvantaged primary schools that family size is associated with achievement, the percentages of pupils with four or more siblings was also included. Finally, school location (urban or rural) and the gender composition of the school (all boys, all girls, and mixed) were included (a school was regarded as a single gender school if 90% or more of its enrolment was of the same gender). There is a widespread belief, supported by some empirical evidence, that educational disadvantage is qualitatively different in urban and rural areas and, in particular, that the relationship between socioeconomic factors and educational outcomes is weaker in rural settings than it is in urban settings. There is also mounting evidence that the impact of socioeconomic factors such as poverty is mediated through gender with the impact on boys being considerably greater.

As noted already, the analysis involved a form of statistical modelling which selects the variables that jointly best predict achievement and assigns weights to these variables in accordance with the size of their contribution to the prediction of achievement. It also involved the use of some innovative techniques to take account of the fact that some school level aggregates are based on very small numbers of pupils (shrinkage estimates).

On the basis of an initial analysis of the socioeconomic variables outlined earlier, it was decided that the parent education variable and medical card possession could be eliminated because they had high missing rates (the principal had completed the survey form but had not answered these questions) and because they were highly correlated with other socioeconomic variables. Strong interrelationships also led to the removal of Local Authority accommodation because its contribution to achievement is largely accounted for by unemployment, lone-parent status and the other retained variables. The percentage of non-national families was excluded because it had a weak relationship with achievement and initial exploratory modelling suggested that it was unlikely to be retained during the later selection of variables with the more advanced statistical models.

The inclusion of gender composition and location also contributed significantly to the accuracy of prediction in ways consistent with the hypotheses that the impact of socioeconomic variables on achievement is greater in urban than in rural settings and there are additional differences in achievement related to gender composition.

Based on the results of analyses, a scale/index was developed and used to produce rankings of schools. This scale has a number of strengths. It is based entirely on the data and, as a result is more likely to reflect the reality of different levels of disadvantage in schools.[1] The index can also be used to readily predict the percentage and, therefore, the number of pupils from disadvantaged backgrounds in each school. Finally, because location is built into the formula, it is possible to produce a national list in which all schools (urban and rural) are ranked according to level of disadvantage.

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[1] Shortcomings of the data (e.g., that they rely largely on estimates provided by school principals) are acknowledged

However, use of the scale would result in difficulties in terms of policy implementation. Some of these difficulties are described below.

Constraints

Because gender composition emerged as an important variable in the model, the ranking of schools based on the model contained far more all boys schools than all girls schools above the expected cut-points for involvement in aspects of DEIS. Inspection of the ranking of urban schools revealed several cases where boys' and girls' school serving the same families were on different sides of an important cut-point (top 150 or top 300). Selecting a boys' school but not its associated girls' school for DEIS would give rise to considerable difficulties because so many aspects of existing and proposed strategy for disadvantage are family or community based (e.g., early education, parental involvement). Unfortunately although it would be possible to eliminate gender differences at the resource allocation phase of DEIS, it was felt that the procedure was already difficult to explain in a transparent way without adding the complication of a further adjustment.

Another issue relating to gender is the fact that there already exists positive discrimination towards boys' schools and schools above the post bar in GCEB in the procedures for the allocation of Learning Support and Resource teachers. It is possible to use the statistical model to examine whether the positive discrimination is adequate to deal with the scale of the particular difficulties experienced by boys from disadvantaged backgrounds. The model provides a way of estimating the number of learning support teachers that each school would need in line with the Learning Support Guidelines and the most recent memorandum on the General Allocation Model SP ED 02/05).

Some concern was also expressed about the inclusion of location in the model in view of the possibility that the DES might want to review the definition of rural areas in the context of the implementation of DEIS.

The alternative formula

It was decided to try to develop an alternative formula for resource allocation purposes which would not involve gender or location and which would be as simple as possible to explain. Two criteria were used in selecting this alternative.

1. The correlation between the score generated by the resource allocation formula and the model-based scale score should be maximised.

2. The correlation between the score generated by the resource allocation formula and the educational measure should be maximised.

Several possibilities were explored before a satisfactory formula was identified. That formula uses all the five variables in the model-based scale except gender and location (i.e., unemployment, lone parenthood, travellers, large families and free book grants). Local Authority accommodation is also included as its inclusion reduces the risk of underestimating the level of disadvantage in any school in an area with a lot of low paid employment. The inclusion of this variable led to a small increase in the correlations specified in the two criteria outlined above. All six variables are percentages and each is given equal weight[2]. A single ranking of all schools was produced as well as separate rankings for urban and rural settings. The overall ranking, unlike the one based on the model, does not adequately reflect the weaker relationship between educational and socioeconomic variables in rural settings.

Use of the new index

Under the terms of DEIS as announced by the Department of Education and Science (2005), the alternative formula and the rankings yielded by the application of that formula were intended to provide the basis for the selection of schools for inclusion in the urban and rural dimensions of the School Support Programme and, in the case of the urban dimension, the assignment of schools to Band 1 or 2. The formula was also to provide the basis for allocation of funding to all schools with any level of disadvantage on a sliding scale (referred to in the DES as 'dispersed disadvantage'). Before final decisions were made about the selection of schools or the allocation of

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[2] No formula involving extra weightings (e.g., doubling percentage unemployed) resulted in larger correlations.

funding, a quality assurance process was carried out jointly by the ERC and the DES. As part of this process, rankings were scrutinised by the Inspectorate and members of the Department's regional offices. Where concerns were expressed about the placement of a school in the ranking, the relevant questionnaire was checked (e.g., for data entry errors). Following the checking process, a number of questionnaires were identified as requiring further contact with the schools to resolve an issue with the data that had been submitted (e.g., schools with missing data on any of the key variables were contacted).

In early 2006, the Department invited primary and second-level schools identified as having high levels of disadvantage to participate in the SSP. Schools that did not qualify for the SSP were advised that they could apply for a review of their case if they considered they had levels of disadvantage that would warrant their inclusion. A review process was established which was directed by an independent chairperson and supported by a staff member from both the Educational Research Centre and the Department of Education and Science.

Since 2005, levels in all newly established primary schools, including those resulting from amalgamations, have been assessed using slightly modified versions of the 2005 questionnaire. The formula applied was exactly the same as that used in 2005.

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