

Time to revisit school decile groupings in health research?

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In research on youth tobacco use, the convention has been to group school deciles into the categories low-, medium- and high-decile. But we argue that this convention is no longer always appropriate. Health researchers should take a more considered approach to grouping school deciles, and, where sample size allows, quintiles should be used as standard practice in research on smoking.

School decile is an ecological (school-level) measure of the socio-economic position of a school's student community. It is determined by the Ministry of Education for funding purposes. Decile determinations are based on Census data on five indicators aggregated at the small area (meshblock) level: household income, household crowding, parental educational qualifications, proportion of parents on income support benefits and occupational skill level of employed parents. Decile 1 schools are the 10% of schools with the highest proportion of students from low socio-economic mesh-blocks, and Decile 10 schools are the 10% with the lowest proportion of such students.¹

It is important to note that school decile is an imperfect ecological measure of socio-economic status (SES) for use in health research since it is not a measure of the overall mix or 'average' level of deprivation in a school. Rather, school decile is a measure of the proportion of students from low socio-economic neighbourhoods. Furthermore, when used as a proxy for individual SES, school decile (an ecological measure whereby all students within a school are assigned the same value) has inherent limitations, since schools typically include students from a wide range of backgrounds. Although school decile is a useful indicator for ecological analyses that explore school-level outcomes

(such as smoking prevalence), it has limitations particularly when used as proxy for individual deprivation or SES. However, despite its limitations, school decile has often been deemed more practical or reliable for school-based surveys than alternatives such as student self-report indicators of household income. For example, the New Zealand Youth Tobacco Monitor (comprising the annual ASH Year 10 Snapshot Survey and the biennial Youth Insights Survey) has used school decile as a proxy for SES from its inception.²

It is common practice to group school deciles into low (1–3 or 1–4), medium (4–7 or 5–7) and high (8–10) for reporting (eg, in ASH Year 10 Snapshot survey reports,³ Te Hiringa Hauora/Health Promotion Agency reports,⁴ Youth 2000 research⁵ and ASPIRE 2025 research⁶). We can find no record of the original rationale for dividing deciles into three groups, but in youth smoking research the practice has continued unquestioned for two decades, presumably for consistency with previous research and, in some cases, due to the constraints of sample size.

We argue that these groupings are now generally inappropriate in research on adolescent smoking, both for presentation purposes and when adjusting for school decile in analysis. Over the years, smoking has become increasingly concentrated in low-decile schools.³ As a result, there is now much more variation in smoking prevalence in school deciles 1–4 (more deprived) compared to school deciles 8–10 (less deprived).

We illustrate this phenomenon using pooled 2016–2018 data from the Youth Insights Survey, a nationally representative self-report survey of Year 10 students (14 to 15 year olds) conducted in schools every two years until 2018 by Te Hiringa Hauora.

(Further detail about the survey design, methods and response rates are available in methodology reports on Te Hiringa Hauora website: www.hpa.org.nz.) Table 1 shows considerable variation in current (at least monthly) smoking prevalence at the lower end of the school decile range. The prevalence of current smoking in Decile 1 schools was 11.3%—almost double that in Decile 4 schools (6.0%). In contrast, there was relatively little variation at the upper end of the school decile range, with current smoking prevalence among students in deciles 7 to 10 being 2–3%.

Grouping school decile into low, medium and high is problematic because:

- it hides potentially important variation in risk factors and health or behavioural outcomes within decile groups
- it may mislead policymakers, funders and those designing interventions as to appropriate targeting or resourcing (eg, using resources to target Decile 4 schools to the same extent as Decile 1 schools)

- it may result in inadequate adjustment and residual confounding if broad decile groups are used in regression analyses to adjust for confounding (where more detailed categorisation would be expected to provide better adjustment).

We recommend that, to overcome these problems and provide a more accurate and nuanced picture, health researchers should report adolescent smoking by quintiles, where sample size is large enough to do so.

The same problems may apply to other youth health topics that are strongly patterned by socio-economic status (eg, food insecurity,⁷ residential mobility,⁸ oral health⁹ and private health insurance coverage⁹), where we might expect exposures or outcomes to be heavily concentrated at one end of the school-decile spectrum rather than being more evenly distributed. Therefore, we urge researchers to carefully consider the most appropriate school-decile grouping for their particular analysis, rather than using low, medium and high by default.

Table 1: Current smoking by school decile, showing alternative decile groupings.

School decile	School deciles			Deciles grouped low, medium, high			Quintiles		
	n current smoker / n total	Smoking % unweighted	Smoking % weighted	n current smoker / n total	Smoking % unweighted	Smoking % weighted	n current smoker / n total	Smoking % unweighted	Smoking % weighted
1	23 / 198	11.6	11.3	104 / 1302	8.0	8.7	43 / 411	10.5	11.3
2	20 / 213	9.4	11.4				61 / 891	6.9	7.4
3	33 / 442	7.5	8.9				71 / 1392	5.1	5.0
4	28 / 449	6.2	6.0				44 / 1563	2.8	2.9
5	25 / 558	4.5	4.1	94 / 2153	4.4	4.3	32 / 1212	2.6	2.8
6	46 / 834	5.5	5.6				53 / 2014	2.6	2.8
7	23 / 761	3.0	3.2				21 / 802	2.6	2.7
8	21 / 802	2.6	2.7				12 / 589	2.0	2.2
9	12 / 589	2.0	2.2	20 / 623	3.2	3.4			
10	20 / 623	3.2	3.4						

Data source: Youth Insights Survey, 2016 and 2018 (pooled). Weighted estimates are calibrated to the gender and ethnicity distribution of Year 10 students in New Zealand and account for sample selection (school and class level) and non-response (school, class and student level).

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