To validate the index the authors correlate it with the level of prescribing of certain drugs, hormone replacement therapy, and tamoxifen, which they regard as indicators of the social class composition of the practice population. This procedure involves unsupported assumptions, particularly in relation to hormone replacement therapy. An underlying problem with the authors' use of PACT data is the implicit assumption that prescribing is a standardised procedure in which general practitioners diagnose and treat disease systematically. The literature does not support this assumption; indeed, it shows great variation among doctors, much of which can be explained only by personal idiosyncrasy.² It seems dangerous to base an objective measure of deprivation on such subjective behaviour.

Although the correlation between exempted prescriptions and deprivation at health authority level is high, the measure proposed by Lloyd and colleagues is intended for practice based research rather than epidemiological research on larger populations. For example, the authors suggest that it would be useful in researching topics such as prescribing. Given that PACT data are Britain's main source of prescribing data and also provide the data for the authors' deprivation index, however, this suggestion seems tautologous. Further efforts are needed to develop a reliable and valid measure of deprivation at the practice level.

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- Lloyd DCEF, Harris CM, Clucas DW. Low income scheme index: a new deprivation scale based on prescribing in general practice. *BMJ* 1995;310:165-9. (21 January.)
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Poor correlation with Jarman index may be due to changes in deprivation since 1981

EDITOR,—David C E F Lloyd and colleagues compare three deprivation indices—the Jarman, Townsend, and Carstairs indices—and show that the correlation between the Jarman index and the two other indices is not as good as that between the Townsend and Carstairs indices themselves.¹ I note that the Townsend and Carstairs indices were based on data for 1991 whereas the Jarman index was based on data for 1981. We should not necessarily conclude that the Jarman index is less good. Perhaps the pattern of deprivation has changed over the past 10 years, explaining the slightly worse correlation between the Jarman index and the Townsend and Carstairs indices.

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- Lloyd DCEF, Harris CM, Clucas DW. Low income scheme index: a new deprivation scale based on prescribing in general practice. *BMJ* 1995;310:165-70. (21 January.)

May perpetuate variation in prescribing unrelated to patients' need

EDITOR,—Measures based on entitlement to free prescriptions because of low income are attractive as indices of deprivation, but there are inherent drawbacks to an index based on the number of

prescriptions rather than of people receiving (or entitled to) them.

Firstly, as David C E F Lloyd and colleagues comment about their proposed low income scheme index, the "deprivation score is calculable but is affected by the individual habits of prescribers."¹ The effect is simply illustrated if different relative prescribing rates (1-3) are used for a population (population A; table). Although the effect will be most pronounced at practice level, the prescribing habits of practitioners within a family health services authority may be subject to the same local influences, with consequent effect on the proposed deprivation score at health authority level.

Effect of relative prescribing rates, demography, and proportions of people entitled to free prescriptions because of low income on low income scheme score

Population group	Population		Relative prescribing rate		
	A	B	1	2	3
<i>Example 1</i>					
Entitled to free prescriptions	10		1.25	1.5	2.0
Not entitled to free prescriptions	90		1	1	1
Low income scheme score (%)			12.2	14.2	18.2
<i>Example 2</i>					
Entitled to free prescriptions	10	10	2		
Not entitled to free prescriptions:					
Aged < 65	70	50	1		
Aged ≥ 65	20	40	3		
Low income scheme score (%)	13.3	10.5			

Secondly, the acknowledged influence of patients' age on prescribing need² means that the value of the proposed index depends on the demography of those not exempted because of low income, which is illustrated by populations A and B in example 2 in the table. Note that population A, with fewer elderly people, has a higher low income scheme index for the same proportion of people entitled to free prescriptions because of low income.

By definition, the low income scheme index is strongly driven by the distribution of poverty among people of working age, and high correlations with the Townsend, Jarman, and Carstairs indices of deprivation are therefore to be expected. All the indices have imperfections, but no absolute definition of deprivation is available as a true comparator. Indeed, the various physical and social components of deprivation may be of different relative importance, depending on the context in which the index is to be used. The low income scheme index is derived from the current distribution of prescribing resources, which is largely historic and influenced by practitioners. This may or may not make it a suitable index for studying the relation between population deprivation and the uptake of drugs, but its use in determining future allocation of resources may have the undesirable effect of perpetuating variations in prescribing unrelated to patients' need.

At family health services authority or local authority level there is potential for an index based on the Department of Social Security's rates for income support and family credit, which would be population based rather than prescription based and would take into account deprivation among elderly people and children. Whether such an index would have any substantial advantage over those already available is for debate.

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Authors' reply

EDITOR,—Nicky Britten and colleagues say that we did not validate our index at practice level in the way that we did at family health services authority level. This would have required the postcode of every patient; not only is this impractical but we have already established, in a paper submitted for publication, that attributing census data to practices can give severely misleading results. R S James' comment, although possibly true, is not relevant until Jarman figures based on the 1991 census become available.

We acknowledged the overlap between categories, exempting people from prescription charges and assumed that it would not differ significantly among areas. The table presented by Sarah J Roberts supports this assertion since a doubling of the population aged over 65 changes the index by less than 3%—an impressive demonstration of robustness. The criticism of Britten and colleagues that patients will choose a disease based category of exemption in preference to one that is income based according to the degree to which poverty is stigmatised in different areas is interesting, but there is no evidence for it. We do not understand the meaning of their sentence "Prescribing analysis and cost (PACT) data depend on the provision and quality of services, which further confound the index."

Our choice of drugs in the second part of the validation was scarcely based on dubious assumptions, given what is known about the distribution of cardiovascular disease, childhood infections, and breast cancer, and we described at some length our reason for including hormone replacement therapy. We are well aware of the variation in practices' prescribing habits, but our study was based on patients' claims, not doctors' idiosyncrasies. No tautology is involved. Roberts's example 1 in the table presents changes in the index depending on assumptions about general practitioners' prescribing, but perhaps she has neglected to consider that the index is based on cost, not items. While there has been speculation that some general practitioners will prescribe cheap items for patients exempted from charges and suggest to other patients that they should buy the drugs, it is not clear that there would be a twofold difference in the resultant cost.

We agree that research needs a reliable and valid measure of deprivation at practice level (we acknowledged in our paper that our index might not be suitable for resource allocation). Despite its imperfections the low income scheme index is the best available at the moment.

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Academic integrity

Proper review makes funding irrelevant

EDITOR,—In writing on academic integrity Richard Smith discusses conflicts of interest and suggests that authors of papers in scientific journals should state their source of funding on the basis that any bias in their work may thereby be made apparent to readers.¹ This seems to be logically inconsistent.