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# Incidence of schizophrenia in ethnic minorities in London: ecological study into interactions with environment

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## Abstracts

**Objective** To determine whether the incidence of schizophrenia among people from non-white ethnic minorities is greater in neighbourhoods where they constitute a smaller proportion of the total population.

**Design** Ecological design including retrospective study of case records to calculate the incidence of schizophrenia in the ethnic minority population across electoral wards and multi-level analysis to examine interaction between individuals and environment.

**Setting** 15 electoral wards in Camberwell, South London.

**Participants** All people aged 16 years and over who had contact with psychiatric services during 1988-97.

**Main outcome measure** Incidence rates of schizophrenia according to Research Diagnostic Criteria.

**Results** The incidence of schizophrenia in non-white ethnic minorities increased significantly as the proportion of such minorities in the local population fell. The incidence rate ratio varied in a dose-response fashion from 2.38 (95% confidence interval 1.49 to 3.79) in the third of wards where non-white ethnic minorities formed the largest proportion (28-57%) of the local population to 4.4 (2.49 to 7.75) in the third of wards where they formed the smallest proportion (8-22%).

**Conclusion** The incidence of schizophrenia in non-white ethnic minorities in London is greater when they comprise a smaller proportion of the local population.

## Introduction

An increased incidence of schizophrenia has been consistently reported in people of African-Caribbean and African origin who are resident in the United Kingdom<sup>1-3</sup> and less consistently so in those of south Asian origin.<sup>4-5</sup> As the excess cannot be explained by any known biological risk factor, investigation has turned to the possible role of social environment.<sup>6-10</sup>

Research in the United States has shown an association between the proportion of an ethnic minority living in a particular area and their rates of admission for mental illness,<sup>11</sup> but a national study in the United Kingdom could not replicate these findings.<sup>12</sup> Clarification of this issue is important not only because of what it may tell us about the aetiology of schizophrenia but also because ethnic minority groups are gradually dispersing throughout the United Kingdom.

We investigated whether the proportion of ethnic minorities in a given area was associated with their incidence rate of schizophrenia at an electoral ward level.

## Methods

### Identification of participants

We collected clinical and demographic information on all people from a defined area of south London who presented with psychosis during 1988-97. We identified cases from hospital computer records by generating a list of all people admitted with any possible psychotic illness as defined by ICD-9 (international classification of diseases and related health problems, ninth revision) and ICD-10 (tenth revision). We also examined case notes of all patients from the area who had psychiatric hospital records to identify people who made contact with services but were not admitted to hospital.

We checked case records to ensure the individuals had not previously had contact with psychiatric services and rated them using the operational checklist for psychotic disorders.<sup>13-15</sup>

### Ethnic and sociodemographic status

We classified ethnicity on the basis of that recorded by the patients themselves. We also used the patient's and his or her parents' place of birth, and any description of colour to determine ethnicity for those patients who did not have statements of self assigned ethnicity.<sup>16</sup> We were able to split the population into only two groups: a white group (self assigned ethnicity white) and non-white group (all other self assigned ethnicities). The non-white population was about 40% Caribbean, 30% African, and 10% other. Incident cases were assigned to either white or non-white groups.

The area (about 120 000 people) was divided into electoral wards of about 10 000 people, which had different socioeconomic characteristics. We used the address at presentation to the services to identify wards for all incident cases. We estimated population data using the 1991 census<sup>17</sup> and London Research Centre projections.<sup>18</sup> Socioeconomic status at ward (neighbourhood) level was based on a composite deprivation score,<sup>19</sup> which includes unemployment, overcrowding, child poverty, lack of amenities, low earnings, no car, and low level of education (but not ethnic group).

### Analysis

We carried out indirect standardisation with the Research Diagnostic Criteria rates of schizophrenia for the total 10 year population as the standard and applied them to each ward, stratifying for age, sex, and ethnic minority. We also carried out multilevel Poisson regression analysis to calculate incidence rate ratios for schizophrenia for individual and ward variables and to test for interaction between non-white ethnic minority status at the individual level and proportion of non-white ethnic minority at the neighbourhood level. We adjusted associations between schizophrenia and individual level non-white ethnic minority status and ward level proportion of non-white ethnic minority for age, sex, and ward level of deprivation.

## Results

For the period 1988-97 we identified 126 (57%) men and 96 (43%) women as first onset cases. The mean age was 35 years (SD 18), and 126 (57%) were non-white. Of the white patients, 10 were born in the Republic of Ireland and five were born outside the United Kingdom or Republic of Ireland.

Wards differed with respect to incidence of schizophrenia ( $\chi^2=3.9$ ,  $df=1$ ,  $P<0.05$ ): the incidence, adjusted for individual level age, sex, and non-white ethnic group, varied from 12 to 38 per 100 000 person years. Table 1 shows the effects of explanatory variables on incidence rate ratios at individual and neighbourhood level.

There was a significant negative interaction between individual level non-white ethnic minority status and the proportion of non-white ethnic minorities at neighbourhood level. Thus the analysis, stratified by thirds of proportion of non-white ethnic minorities, revealed that as the proportion in a given population decreased, the rate of schizophrenia in non-white ethnic minorities increased (table 2). Indeed, there was a "dose-response" relation with increasing incidence in non-white ethnic minorities as the proportion of such minorities in an area fell.

## Discussion

Our results are consistent with those from studies in the United States that have found an inverse correlation between an individual's risk of mental illness and the relative proportion of their ethnic group living in an area.<sup>11 20 21</sup> Cochrane and Bal calculated first and total admission rates for schizophrenia for the whole of England in 1981 for 15 different ethnic groups on the basis of place of birth.<sup>12</sup> Their analysis between and within groups did not find that rates increased as the relative size of the ethnic group decreased, with the exception that there was a strong significant negative correlation ( $-0.86$ ,  $P<0.01$ ) between admission rates for schizophrenia and relative size of the population born in the Republic of Ireland.

Unlike other studies, we used incidence data rather than data on hospital admission. Moreover, we were able to look at smaller areas that have less variance in coverage and access to services and used appropriate multilevel statistical techniques.

### Interpretation

We believe that selection bias or confounding by economic deprivation is unlikely in our study. To invalidate our results any confounder, such as drug misuse or presence of a particularly high risk group, would have to act differentially across neighbourhoods, exerting maximum effect in neighbourhoods with a low proportion of non-white ethnic minorities, less effect on those with medium proportion, and least effect on those with a high proportion.

### Mechanism

Our findings point towards there being a social risk factor for the increased rate of schizophrenia reported in non-white ethnic minorities in the United Kingdom. A possible mechanism is increased exposure to, and/or reduced protection against, stress and life events. Specific stresses for people in ethnic minority

**Table 1** Influence of explanatory variables on unadjusted and adjusted incidence rate ratios

Variable	Unadjusted ratio (95% CI)	P value	Adjusted ratio (95% CI)	P value
<b>Individual level</b>				
Age (years)	0.77 (0.71 to 0.84)	<0.001	0.82 (0.76 to 0.9)	0.00
Sex	0.66 (0.5 to 0.86)	<0.001	0.66 (0.51 to 0.86)	0.00
Non-white ethnic minority	3.75 (2.87 to 4.9)	<0.001	3.28 (2.49 to 4.34)	0.00
<b>Neighbourhood level equivalent of individual level</b>				
Proportion of non-white ethnic minorities	1.12 (0.91 to 1.34)	0.27	0.83 (0.63 to 1.1)	0.2
<b>Neighbourhood level</b>				
Deprivation	1.06 (1.01 to 1.11)	0.01	1.05 (0.98 to 1.13)	0.16

**Table 2** Change in incidence and incidence rate ratios for research diagnostic criteria for schizophrenia according to operational checklist for psychotic disorders with proportion of ethnic minority

Proportion of non-white ethnic minorities	Incidence per 100 000	Unadjusted ratio (95% CI)	Adjusted ratio* (95% CI)
Lowest third (8-22.8%)	52.6	5.15 (2.96 to 8.96)*	4.4 (2.49 to 7.75)†
Middle third (23-28.1%)	59.0	3.89 (2.58 to 5.89)*	3.63 (2.38 to 5.54)†
Highest third (28.2-57%)	36.9	2.32 (1.48 to 3.63)*	2.38 (1.49 to 3.79)†

\*Adjusted for age (years), sex, and ward deprivation z score. † $P<0.001$ .

### What is already known on this topic

An increased incidence of schizophrenia has been reported in several ethnic minorities in the United Kingdom

Biological risk factors do not seem to explain this

Reports from the United States have shown an association between the proportion of an ethnic minority living in an area and their admission rates for mental illness in general

### What this study adds

The lower the proportion of non-white ethnic minorities in a local area the higher the incidence of schizophrenia in those minorities

groups could be overt discrimination, institutionalised racism, and perceived alienation, isolation, and anomie.<sup>22</sup> The more isolated a member of an ethnic minority, the more likely he or she may be to encounter such stresses.<sup>23</sup> People from ethnic minorities may be more likely to be singled out or be more vulnerable when they are in a small minority. Reduced protection from the effects of such stresses could be due to decreased social networks or social buffers in small or dispersed ethnic minority populations.

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## Prescriptions for antiulcer drugs in Australia: volume, trends, and costs

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H<sub>2</sub> receptor antagonists and proton pump inhibitors have markedly changed the management of peptic ulcer and gastro-oesophageal reflux disease; they have also changed the profile of national drug budgets. Antiulcer drugs have retained the leading position in drug sales worldwide: sales of antiulcer drugs were valued at \$US12.9 billion (£8.6bn) in 1998 and were increasing at 3% a year.<sup>1</sup>

Since 1992 the Australian government's pharmaceutical benefits scheme has required prescribers of proton pump inhibitors to certify the presence of peptic ulcer disease or ulcerating oesophagitis (confirmed by endoscopy, radiography, or surgery) and refractory to treatment with other drugs, scleroderma oesophagus, or Zollinger-Ellison syndrome. The aim of this study was to assess how these restrictions have affected prescribing of antiulcer drugs.

### Participants, methods, and results

We analysed data from the pharmaceutical benefits scheme on the number of prescriptions for H<sub>2</sub> receptor antagonists, proton pump inhibitors, and cytoprotectant agents for the financial years 1992-3 to 1996-7 and 1999. Data on misoprostol and treatments to eradicate *Helicobacter pylori* were available only for 1999.

In 1999 antiulcer drugs made up 6.1% of all prescriptions dispensed. They were the second most costly group of drugs to the government, consuming 11.1% of the total pharmaceutical benefits scheme budget (table). Ranitidine, famotidine, nizatidine, omeprazole, and lansoprazole were all among the 100 drugs most often prescribed, and, with pantoprazole, were among the 100 most costly drugs to the government. Ranitidine was the third most commonly prescribed, and omeprazole was the second most

costly. The total number of prescriptions for proton pump inhibitors was only half (51%) that for the H<sub>2</sub> receptor antagonists, but proton pump inhibitors were 2.4 times more costly. *H pylori* eradication treatments made up only 1.3% of all prescriptions for antiulcer drugs.

Between 1992-3 and 1999 total prescriptions for H<sub>2</sub> receptor antagonists, proton pump inhibitors, and cytoprotectant agents increased by 109%—increases of 51% for H<sub>2</sub> receptor antagonists and 1228% for proton pump inhibitors and a decrease of 84% for cytoprotectants. Prescriptions for proton pump inhibitors increased by 40% between 1995-6 and 1996-7 and by 43% between 1996-7 and 1999. Prescriptions for H<sub>2</sub> receptor antagonists increased by 3% between 1995-6 and 1996-7 and decreased by 4% between 1996-7 and 1999. Proton pump inhibitors have continued to make up an increasing proportion of total antiulcer drugs prescribed (13% in 1994-5, 20% in 1995-6, 25% in 1996-7, and 34% in 1999).

### Comment

The proportion of proton pump inhibitors prescribed relative to H<sub>2</sub> receptor antagonists is at odds with the guidelines for the Australian pharmaceutical benefits scheme and with data on the epidemiology of refractory oesophagitis. Despite restrictions, proton pump inhibitors accounted for 34% of prescriptions for antiulcer drugs and for 51% of government expenditure on antiulcer drugs in 1999. Around 7-8% of consultations with general practitioners are for gastrointestinal problems, and this proportion did not change between 1992 and 1999.<sup>2</sup> Australians seem to consult at higher rates for gastrointestinal symptoms than do other nationalities.<sup>3</sup> The continued rise in the