

Intra-urban health differentials in London - urban health indicators and policy implications

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SUMMARY: *The paper describes health differentials between small areas within three boroughs (local government areas) in London - including the incidence of TB, asthma and respiratory diseases - and their associations with deprivation, unemployment and poor housing conditions. It also discusses the value of measuring such intra-urban health differentials for policy-making and illustrates how addressing social inequalities and economic disadvantages may be among the most effective interventions to improve health.*

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1. Phillips, D.R. (1993), "Urbanization and human health", *Parasitology* Vol.106, pages S93-S107.

2. The Healthy Cities initiative is the major exception although this

I. INTRODUCTION

FOR MANY YEARS, studies of urbanization have tended to be concerned with comparisons of urban-rural differentials⁽¹⁾ and have glossed over intra-urban differentials - particularly in the context of the North. Studies have also tended to focus on specifics such as housing, health, overcrowding, road accidents and basic services, trying to find specific links or trends rather than examining the whole urban system.⁽²⁾

There is an increasing interest in the development of urban health indicators which are defined by one commentator as "a characteristic of the environment that, when measured, quantifies the magnitude of stress, habitation characteristics, degree of exposure to the stress or degree of ecological response to the exposure."⁽³⁾ As well as its use as a contrast within and between cities in varying stages of evolution and development, the scrutiny of intra-urban differentials characterized by environment and health indicators has important policy implications for future planning and development.

This paper aims to look at intra-urban health differentials in London by examining an area in West London as a pilot study. In common with other large urban conurbation's in other parts of the world, London is a city of contrast with wide variations in health and the environment. This was documented as early as 1901 by Charles Booth. When he first described and mapped urban health differentials in London, he found distinct areas of

is focusing on initiating behavioural change; see Ashton, J. (editor) (1992), *Healthy Cities*, London.

3. Corvalan, C. (1993) "Methodology for linkage of routine health data and environmental monitoring data with special emphasis on air pollution" first report to the UN Environment Programme, 30 October.

4. Booth, C. (1902), *Labour and Life of the People*, London.

5. Townsend, P. and N. Davison (1992), "The Black report" in *Inequalities in Health*, Penguin.

6. "Yet it moves" (1994), *The Economist* No.332 (7877), pages 17-19.

7. Pratt, A.C. (1994) "Industry and employment in London" in J. Simmie (editor), *Planning London*, UCL Press.

8. Payne, J.N., J. Coy, S. Patterson and P.C. Miller (1994), "Is the use of hospital services a proxy for morbidity? A small area comparison of the prevalence of arthritis, depression, dyspepsia, obesity and respiratory disease with inpatient admission rates for these disorders in England", *Journal of Epidemiology and Community Health* No.48, pages 74-78; also Morris J.K., D.G. Cook and A.G. Shaper (1994), "Loss of employment and mortality", *British Medical Journal* No.308, pages 1135-59.

9. Pillimore P., A. Beattie and P. Townsend (1994), "Widening inequality of health in northern England, 1981-1991", *British Medical Journal* No.308, pages 1125-28.

10. World Bank (1991), *Urban Policy and Economic Development: An Agenda for the 1990s*, World Bank, Washington DC.

11. Channel Four Documentary (1994), *Sustainable London*.

poor health associated with areas of poverty.⁽⁴⁾ Official government agencies had been unwilling to make this link until the Black report⁽⁵⁾ in 1980, which drew together indicators showing that there are inequalities in health, brought it to government and public attention. This has developed further into a call for research proposals into "variations in health" by the Department of Health in 1996.

II. LONDON IN THE WORLD CONTEXT

LONDON IS A long established urban metropolis and the capital city of the United Kingdom. It has nearly 7 million inhabitants. The principle economic base is dependent on the financial markets, service industry and light manufacturing. The dockyards of East London and industry around the capital were once large employers of semi-skilled and skilled labour which began to disappear after the Second World War; 55 per cent of these jobs disappeared between 1969 and 1988. London now has the highest level of unemployment in mainland Britain, with 500,000 jobs vanishing since the mid-1980's.⁽⁶⁾ The consequences of this changing pattern of employment and industry are the increase in localized unemployment and the increased use of transport to move to new jobs; and at a more micro level a breakdown of social networks and ethnic polarization as people have to move away to find work.⁽⁷⁾ This is significant in the context of intra-urban variations in health as unemployment has been shown to have a significant detrimental effect on men's health for cardiovascular disease and cancer⁽⁸⁾ and this effect is increasing over time.⁽⁹⁾

The World Bank's Urban Development Report⁽¹⁰⁾ emphasizes protection of the urban environment and the sustainability of it and the surrounding area. It also stresses the importance of an urban infrastructure based on a centralized authority. As a large city, London cannot meet its own energy needs in either food or fuel and relies heavily on transport of its needs from the surrounding area and from overseas. There have been questions raised about the sustainability of this lifestyle.⁽¹¹⁾ Since the disbanding of the General London Council (GLC) by the central conservative government in the 1980's, there has also been no central authority for London. This makes taking decisions about London-wide services for transport, health care and benefits difficult, and action on air pollution fragmented.

The physical structure of London has developed in an *ad hoc* way over hundreds of years; there is now an awareness that there needs to be some form of planning integration to alleviate problems such as traffic congestion, public transport planning and air pollution.

There is an increasing dependence on the car as a mode of transport with the increasing availability and affordability of cars and the disintegration and cost of public transport. The use of cars in an urban setting creates pollution, congestion and requires even larger quantities of energy bought in to sustain it. The large supermarket chains are moving out to the suburbs

12. Wolff, S.P. and C.J. Gillham (1991), "Public health vs. public policy? An appraisal of British urban transport policy", *Public Health* No.105(3), pages 217-228.

13. McLaren, D. (1992), "London as an ecosystem" in A. Thornley (editor) (1992), *The Crisis of London*, Routledge.

14. Hospital episode statistics are routinely collected data available on all admissions to hospital. They give, among other information, details of the individual admitted, where they were admitted and the diagnoses made.

15. See reference 1.

16. Global influences while potentially important will not be further discussed here. They include the contribution of London to global warming, depletion of the ozone layer and transglobal pollution (e.g emissions crossing international boundaries).

17. Friends of the Earth (1992), *Roads around London*.

and industrial estates, and are increasingly inaccessible to those without cars thus adding to deprivation in inner areas,⁽¹²⁾ the devouring of green space and a lack of inner-city renewal.⁽¹³⁾ There is also a growing sense of social isolation as communities fragment.

III. CASE STUDY AND METHODS

AS A PRELIMINARY study into intra-urban health differentials in London, the boroughs of Ealing, Hammersmith and Hounslow were used as a pilot study. They have a combined population of over 600,000 and represent a mix of ethnic and material backgrounds similar to that of London as a whole. Databases for the initial study include mortality and hospital episode statistics⁽¹⁴⁾ and 1991 census data which are all readily available.

In considering the relationship between urbanization and health, the issues affecting the urban environment can be considered under a number of interrelated headings: physical factors, social and cultural factors, economic factors, psycho-social factors, hazards and global influences.⁽¹⁵⁾ Using mortality rates to ascertain an appropriate measure of health can be a crude measure as they describe only the end of life and not the pattern of ill-health over time. This study also examined physical and psychological morbidity as measured by the use of hospital episode statistics. The use of these statistics carries its own problems as they rely on hospital admissions which vary in space and time and have socio-economic variations; but it is a measure that has comprehensive data collection that is postcoded (a postcode includes up to about 14 households and can be aggregated up to provide a useful geographical area for measurement and comparison). The advantage of attempting to study intra-urban differentials in London is that much information is available at postcode level or above, much at ward level - an administrative area of approximately 10,000 individuals. This means a comprehensive and accurate database of health and environmental data can be created which can be combined by the use of Geographical Information Systems (GIS).

IV. PHYSICAL ENVIRONMENTAL RISKS

PHYSICAL FACTORS AFFECTING the urban environment in London include industrial and residential pollution, road transport (pollution and accidents), water quality and the occupational environment. Within the urban environment there are also hazards, both acute and chronic, caused by exposure to industrial plants, toxic and caustic chemicals, industrial manufacturing and occupational hazards.⁽¹⁶⁾ There are databases of some of these hazards available from various sources for London that could be added into the model of the environment.

Outdoor air pollution is an issue high on the popular political agenda.⁽¹⁷⁾ It is perceived that an increase in air pollution, particularly from road traffic, has led to an increase in the preva-

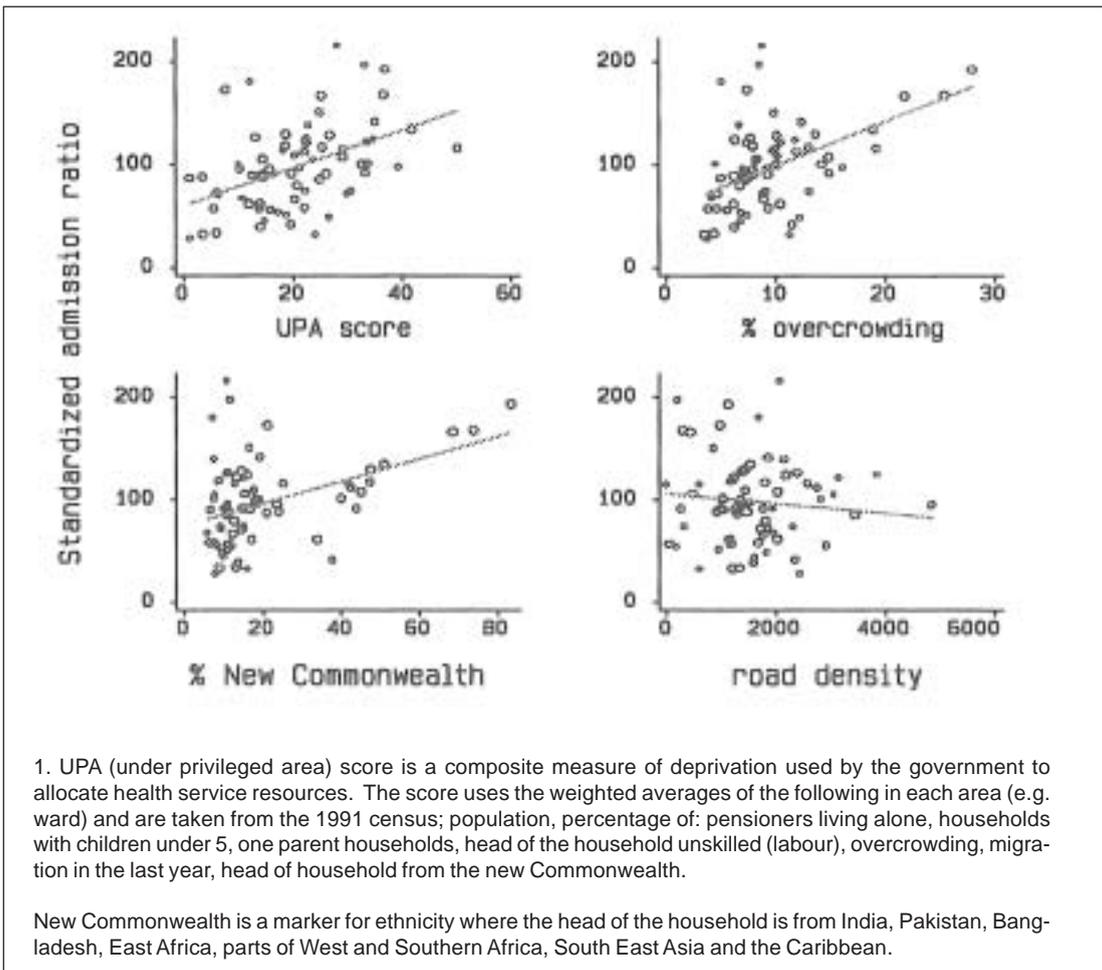
18. Schwartz, J. (1994), "What are people dying of on high pollution days?", *Environmental Research* No.64(1), pages 26-35.

19. Jarvis, D., S. Chinn, C. Luczynska and P. Burney (1996), "Association of respiratory symptoms and lung function in young adults with use of domestic gas appliances", *The Lancet* No.347, pages 426-31.

20. Hyndman, S.J. (1990), "Dampness and Bangladeshi housing in London", *Social Science and Medicine* No.30(1), pages 131-141.

lence of asthma (this has yet to be proven, see Figure 1). The relative importance of exposure must be considered, whether it has a chronic long-term effect or the occasional high day such as happened in the summer of 1994, leading to an increase in hospital admissions and deaths.⁽¹⁸⁾ It is difficult to calculate exposure levels for outdoor air pollution as only limited amounts of an individual's time are spent outside. Any calculations are also affected by indoor air pollution particularly from the use of gas for cooking, which appears to particularly affect women,⁽¹⁹⁾ and environmental tobacco smoke. Indoor air pollution can cause acute respiratory infections in children and chronic lung disease in adults. These can be exacerbated by poorly ventilated housing (cold, damp,⁽²⁰⁾ mould) and overcrowding. The study found an association between asthma and respiratory disease, and living in rented accommodation and unemployment.

Figure 1: Hospital Admissions for Asthma and a Number of Significantly Correlated Environmental Factors.⁽¹⁾



21. Roberts I., R. Norton, B. Taua (1996), "Child pedestrian injury rates: The importance of 'exposure to risk' relating to socio-economic and ethnic differences, in Auckland New Zealand", *Journal of Epidemiology and Community Health* No. 50(2), pages 162-5

22. Sparks, G., M.A. Craven and C. Worth (1996), "Understanding differences between high and low childhood accident rate areas: the importance of qualitative data", *Journal of Public Health* No.16(4), pages 439-446.

23. See reference 1.

24. Smith, C.A., C.J. Smith, R.A. Kearns and M.W. Abbott (1993), "Housing stressors, social support and psychological distress", *Social Science and Medicine* No.37(5), pages 603-612.

25. Clegg E.J. and J.P. Garlick (1980), *Disease and Urbanisation*, Taylor and Francis, London.

26. See reference 25.

27. Whitehead, M. (1992), "The health divide" in *Inequalities in Health*, Penguin.

28. Bebbington, P.E., J. Hurry and C. Tennant (1991), "The Camberwell community survey: a summary of results", *Social Psychiatry and Psychiatric Epidemiology* No.26, pages 195-201.

29. Cappon, D. (1985), "Criteria for healthy urban environments", *Canadian Journal of Public Health* No.82, pages 249-258.

Road transport also contributes to accidents and to noise pollution which is an area under increasing scrutiny. There is research to suggest that childhood accidents associated with road traffic have a socio-economic bias towards more deprived groups;⁽²¹⁾ this is also the case for accidents in general.⁽²²⁾

V. HEALTH OUTCOMES AND THE ENVIRONMENT

STRESS WITHIN THE urban environment can mean an increase in depression, suicide, substance abuse, etc.⁽²³⁾ The factors contributing to this stress are varied, for instance accommodation in sub-standard or poor housing has been found to cause psychological stress.⁽²⁴⁾ The factors related to stress are not necessarily associated with the urban environment exclusively, for instance living on income support or in damp housing, but in the urban setting are exacerbated by other social and physical conditions. The stress caused by overcrowding and migration (between or within countries)⁽²⁵⁾ has also been linked to infant mortality.

When the morbidity of mental illness was considered (as an indicator of stress) in this study and elsewhere, psychiatric disorders were correlated with overcrowding⁽²⁶⁾ ($r=0.27$, $p<0.05$). This could be as a result of inter-correlation between environmental factors, for example overcrowding is associated with economic poverty and a lack of education. The study also found that living in an area of high unemployment or with one parent families was associated with hospital admissions for mental illness ($r=0.52$, $r=0.49$ $p<0.05$). When considering if there is any causal pathway in the association with unemployment, it is unclear whether it is being unemployed that leads to neurosis or vice versa.⁽²⁷⁾ The association with one parent families has been found elsewhere⁽²⁸⁾ and is likely to be associated with the stress of poverty. As the present government has placed emphasis on care in the community, thus reducing the number of hospital admissions, the number of admissions found in this study could be the tip of the iceberg and a more accurate estimation of neurosis could be gained by using GP, specialist and hospital outpatient referrals combined with social welfare records. The other point to note is the comparatively high number of uncoded admissions. It is not possible to ascertain why this occurred in this study but it could be associated with homelessness or living in temporary accommodation.

The stress and pressure of urban living has led one commentator to state that "...the unprecedented concentration of people in one place places them at risk of modern plagues or Chernobyl-like disasters"⁽²⁹⁾ although in the North this is also linked to a long life expectancy and an efficient infrastructure for health service provision. The modern plague has been characterized as AIDS or (the "old plague") tuberculosis (TB). TB is associated in this study and others with a number of interrelated factors showing the complexity of understanding links between health and environment. Mortality and hospital ad-

30. Spence, D.P.S., J. Hotchkis, C.S.D. Williams and P.D.O. Davies (1993), "Tuberculosis and poverty" in *British Medical Journal*/No.307, pages 759-761.

31. Kumar, D., K.M. Citron, J. Leese and J.M. Watson (1995), "Tuberculosis among the homeless at a temporary shelter in London: report of a chest x-ray screening programme", *Journal of Epidemiology and Community Health* No.49, pages 629-33.

32. Mangtani, P., D.J. Jolley, J.M. Watson and L.C. Rodrigues (1995), "Socio-economic deprivation and notification rates for tuberculosis in London during 1982-1991", *British Medical Journal* No.310(6985), pages 963-966.

33. Strachan, D.P., K.J. Powell, A. Thaker, F.J.C. Millard and J.D. Maxwell (1955), "Vegetarian diet as a risk factor for tuberculosis in immigrant south London Asians", *Thorax* No.50(2), pages 175-180.

34. Carstairs, V. and J.K. Morris (1989), "Deprivation and mortality: an alternative to social class", *Community Medicine* No.11, pages 210-219.

35. See reference 27.

missions for tuberculosis are correlated with ethnicity and with deprivation indices⁽³⁰⁾ ($r=0.48$, $r=0.55$, $p<0.05$). TB is also correlated with overcrowding ($r=0.55$, $p<0.05$) as might be expected as it is spread by airborne particles. As tuberculosis is a notifiable disease, prevalence data could be used to confirm the validity of admissions data although it is current practice for all new TB patients to spend time in hospital receiving chemotherapy. Tuberculosis in London is also 150 times more likely to be found among the homeless population⁽³¹⁾ which falls through the net of regular statistics collection for the census or hospital admissions by not having fixed addresses. It is also associated with a vegetarian diet⁽³²⁾ in south Asian Hindus, thought to be the result of a deficiency of vitamin D to fight infection.⁽³³⁾

Asthma and respiratory diseases were significantly associated with a number of different environmental factors. Hospital admissions for asthma are shown in Figures 1 and 2. Other significant associations include unemployment ($r=.50$, $p<0.05$)(Figure 3) and lower social class ($r=.51$, $p<0.05$). As previously mentioned, there is an increasing public concern in London, and elsewhere, that road traffic is linked to asthma; the study showed a negative relation with road density - seen as a proxy for road traffic and asthma admissions.

Figures 1 and 2 show how hospital admissions vary over the 68 wards of Ealing, Hammersmith and Hounslow. Asthma admissions are higher where a greater proportion of the population are deprived and where there is more overcrowding and a higher number of new Commonwealth households. There are lower levels of asthma admissions in areas with high road densities (road density is a proxy for road traffic and transport pollution).

The most significant indicators for an increase in ill-health or mortality from heart disease, respiratory disease, asthma and tuberculosis were unemployment, being in low social class and living in overcrowded conditions. Other studies have reported a link with living in rented accommodation and not owning a car although these were less important in London. There is a transient professional population in the city and renting is not necessarily associated with low income in London; also there exists a large public transport infrastructure. This emphasizes the need for indicators specific to the needs of an area as living in rented accommodation and not owning a car are part of the composite indicators commonly used in the UK⁽³⁴⁾ to inform policy and resource allocation.

VI. CONCLUSIONS IN MEASURING INTRA-URBAN HEALTH DIFFERENTIALS

THE USE OF geographical analysis of deprivation to assist in the creation of suitable urban health indicators provides a move beyond the epidemiologists' quest for what causes individual diseases. Focusing solely on individual behavioural change, housing or unemployment misses the mark⁽³⁵⁾ in achieving long-

Figure 2: Hospital Admissions for Asthma in Ealing, Hammersmith and Hounslow (standardized admission ratios)

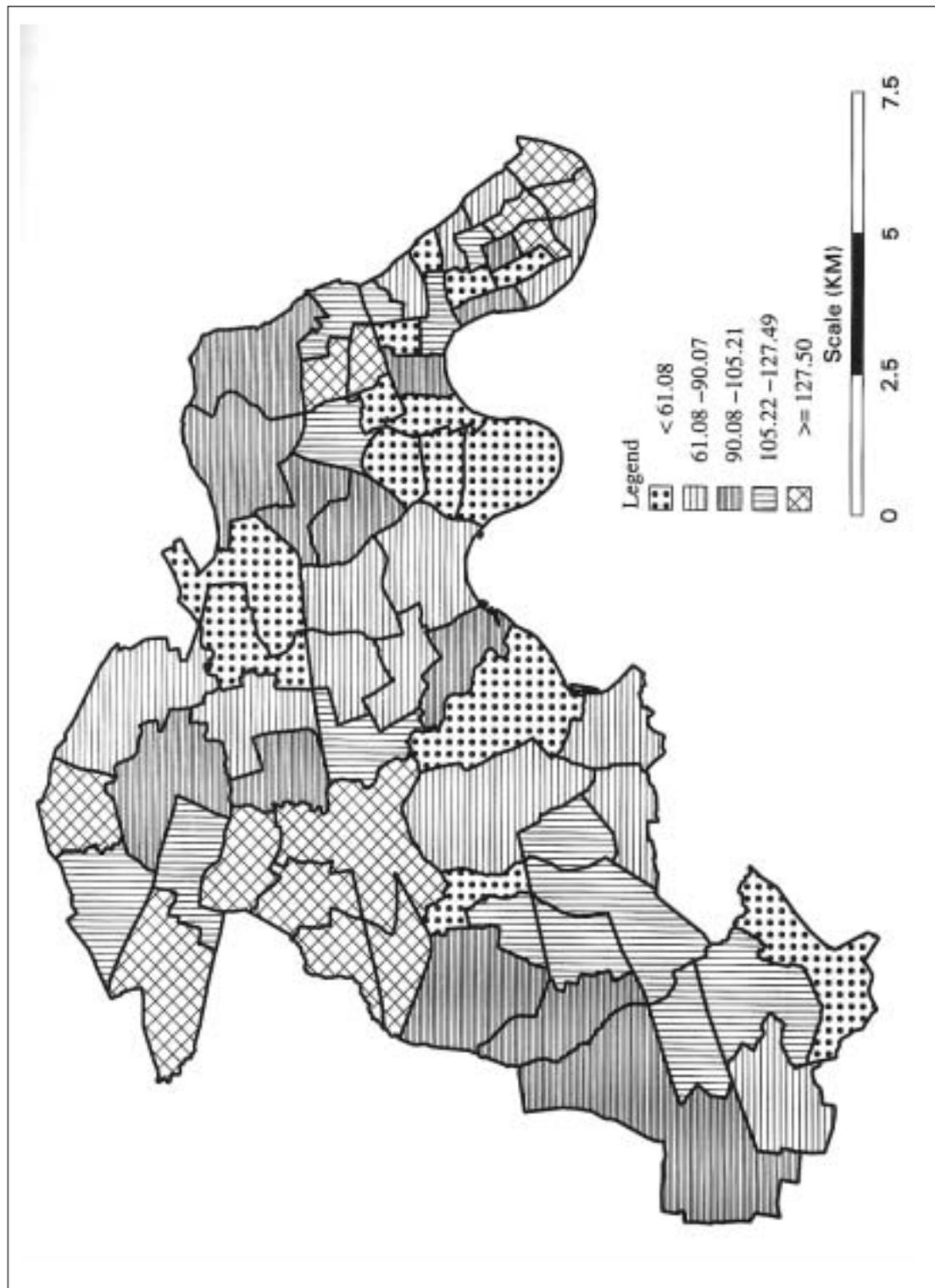
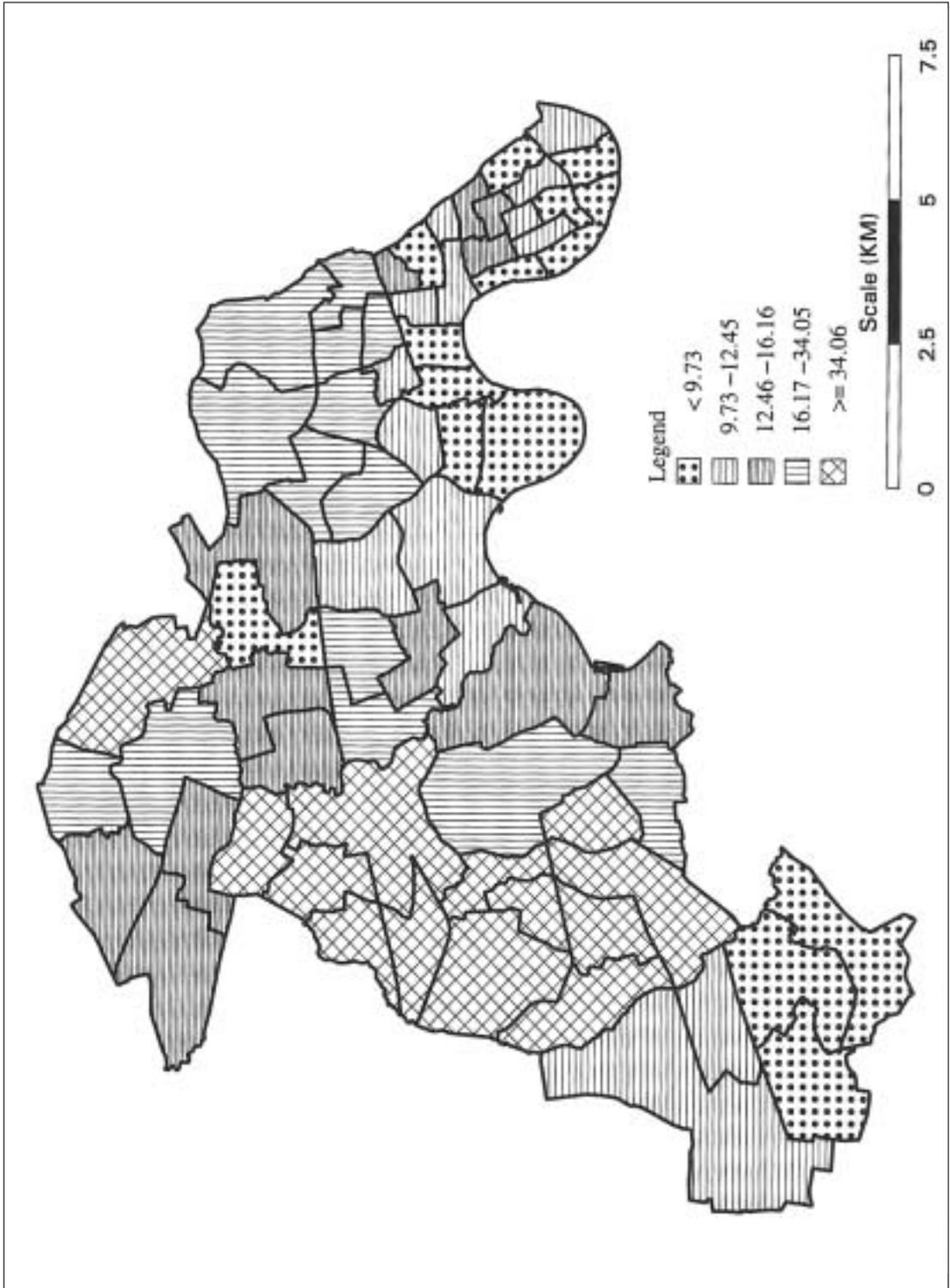


Figure 3: Distribution of New Commonwealth Households in Ealing, Hammersmith and Hounslow from the 1991 Census (expressed as a percentage of total heads of household)



36. Wilkinson, R.G. (1994), "Divided we fall", *British Medical Journal* No.308, pages 1113-1114.

term results or an understanding of the complexity of the problem. The UK government's attempt to divorce health from deprivation has been largely ineffective⁽³⁶⁾ and the insistence by ministers that there is no poverty in this country misguided. Whilst in the context of poverty in many other areas of the world this is essentially true, it is in the context of London and the UK as a whole, as a supposedly developed country, that this is significant.

To complete a comprehensive study of intra-urban health differentials in London and to create an appropriate indicator, other information could be included. This would include physical factors such as air pollution levels in London combined with climate and road transport use, etc., to try and establish morbidity due to high pollution and low pollution levels and then relate this to transport policy (this research is already underway for the London area). Social welfare information on housing benefit recipients may be a better measure of housing type and quality than simply having a rented house, particularly in London where many people come to work for a short time in their lives without settling. Police records for crime, seen by some as a measure of urban decay, could be included and there is information available on accidents. All of these measure the urban environment in a slightly different way; most of the information mentioned is routinely available and the key is to find measures that are robust and appropriate to London. Then comparisons can be made between London and other cities and the influence of the urban environment on health can be extended to the North as well as the South.

VII. POLICY EXAMPLES

THE RECENT EMPHASIS on nutrition is an example of the inappropriateness of trying to achieve behavioural changes in isolation. People living in bed-sitter accommodation have poor or non-existent facilities for the preparation and storage of food-stuffs. When money is in short supply, the children are bought food to eat that will not go to waste, there is little chance to experiment with new foods or a healthy diet. In a recent study in London, half the mothers in the study - on or near income support levels - went without food so that the children could eat.⁽³⁷⁾ Added to this, the trend toward siting large supermarkets in out of town or suburban areas makes inner-city food purchasing more difficult and more expensive. Those hit hardest by this practice are likely to be one or more of the following: be poor, have no car, have small children, be ill or elderly. All of these are groups at high risk from certain diseases and require a balanced diet.

Reducing social inequalities and economic disadvantages, and providing educational opportunities appear to be linked with alleviating ill-health in ischaemic heart disease, neurosis, tuberculosis and respiratory diseases. In the 1990's, emphasis is placed on the cost-effectiveness of public health, there are limited budgets available and priorities have to be considered. The

37. Kempson, Bryson and Rowlingson (1994), *Hard Times?*, Policy Studies Institute.

“poor” have the smallest voice in this policy arena and the most environmental factors influencing them, including damp housing, overcrowding and unemployment. Part of the key to tackling this is to address the lack of intersectoral cooperation between health, education and local authority departments. Could the most efficient use of limited budgets available in these areas be to look to long-term solutions such as the cost effectiveness of reducing pollution levels and improving housing, and reducing unemployment to decrease the burden on health and social services in the future.