Chapter 4: Inequalities in HIV

By Penny A. Cook
Centre for Public Health, Liverpool John Moores University

And

Suzy C. Hargreaves
Centre for Public Health, Liverpool John Moores University

How do we measure health inequalities? A multitude of colours; not just shades of red and black!

Karen Tocque
Director of Science and Strategy, North West Public Health Observatory, Centre for Public Health, Liverpool John Moores University

The fact that health inequalities exist, and indeed persist, is not open to dispute whatsoever. In this country, persisting inequalities are not even the issue, since it is well recognised that the gap between the wealthiest and the poorest areas of the country has been getting worse, not better, over the last 50 years. Despite this stark reality, the methods of illustrating and monitoring the gap are subject to long and detailed debates which can lead to a lot of confusion over what is really being measured and what actions can influence the trend.

For example, it has always baffled me as to why a national target to improve health inequalities would be expressed simply as reducing the gap '*starting with local authorities, by 2010 to reduce by at least 10 per cent the gap between the fifth of areas with the lowest life expectancy at birth and the population as a whole*'. Interpreted in isolation, this might then best be achieved by initiatives that prevent people living in the wealthiest communities from living long lives! But of course, no government would advocate this as a policy and the Status Report for England in 2005 very clearly re-iterated that the target for reducing the gap in inequalities sat alongside the objective to raise the relative health status of the worst off as well. Nevertheless, the progress reported showed that the gap continues to widen...

As with all health intelligence data, it is not sufficient to present just one indicator of change; there is a need for the absolute measure, the relative measure, and the gap for both to be presented alongside each other. Indeed, all these measures are extremely valuable, represented not just across a single gradient but also by many other ways of illustrating inequalities: as a trend over time; by deprivation; by ethnicity; across urban-rural categories; in behavioural groups; by income to name just some. Is it any wonder then that confusion sometimes arises? We are not, however, striving to create a single measure of inequalities; that would not be beneficial to the many. We are instead striving to analyse and interpret the vast wealth of information that we already collect from our population, in order to provide the greatest possible benefit and hopefully inform action that will reduce inequalities. To this end, a complex analysis of geographic, demographic, socio-economic, geodemographic, and potentially so many ..ic's (or other) measures provide the multi-coloured picture that we all need in relation to health status, trends and inequalities.

It is with this thought that I am very pleased to be able to support the production of a report looking at ten years of HIV and AIDS epidemiology in the North West. Without such valuable datasets and research programmes the complex and colourful but still alarming persistence of inequalities could not be illustrated; and without such complex and colourful illustrations we have no way of taking (or monitoring) action.

Introduction

The strong relationship between deprivation and ill-health in industrialised countries has been well documented since the publication of the 1980 Black report[1]. Although the findings in the Black report were not welcomed by the government of the time[2], more recent policy has attempted to address the health divide[3,4]. However, significant inequalities persist: for example, in the North West this is evident in several health conditions (see the recent report *Where Wealth Means Health*[5]).

The *National Strategy for Sexual Health and HIV* (2001)[6] recognised that inequalities exist in the provision of sexual health services, including HIV prevention services. Historically, inequalities in funding for HIV services have existed between regions across the UK, with each HIV positive resident in the North West being allocated less funding than their London counterpart[7] and being more likely to develop AIDS and die[8]. At an individual level, poverty is a major issue for some people with HIV, and this is especially the case for the rising numbers of asylum seekers with HIV. The Crusaid Fund, which supplies financial assistance for those in need, has noted that the number of individuals in extreme poverty (e.g. in need of food or shelter) has increased since the fund has been in operation, and that increasing proportions of those experiencing severe poverty are asylum seekers. Although most of Crusaid's applicants were from London (50%), the city that accounted for the next largest number of applications was Manchester (6%)[9].

Studies of inequalities in the health of HIV positive populations have tended to be carried out in other countries. Australian studies have investigated gay men and found that lower income groups were characterised by higher risk behaviour[10,11]. In addition, working class gay men were found to have poorer access to HIV prevention and risk-reduction messages as these interventions assumed a high level of education and did not necessarily reflect working class gay men's lives[11]. A study in Germany noted that gay men were often perceived as being from middle class backgrounds[12]. This has also been a commonly held stereotype in the UK[13]. However, a recent survey amongst gay men found that a third of the respondents had experienced problems in having enough money to live on in the previous year[14]. Further studies outside the UK have looked at the influence of socio-economic status upon an individual's experience of HIV treatment and care. A Canadian study investigated a group of HIV positive gay men and found a significant association between lower income and shorter survival after being infected with HIV[15]. An Italian study, which investigated the influence of socio-economic status (SES) on health service utilisation amongst patients with AIDS, found an association between lower SES and higher inpatient use and cost[16]. The study excluded asymptomatic and symptomatic HIV positive individuals, and both this and the Canadian study were carried out before the widespread use of antiretroviral therapy dramatically lowered AIDS death rates[17].

In the UK, groups of lower SES have been characterised by higher-risk sexual behaviour, and are therefore at greater risk of contracting HIV. A study on men who were part of the gay scene in the West Midlands found that social class and employment were related to the adoption of safer sex practices[18]. Another study looked at gay and UK African communities and found that a positive HIV diagnosis in either of these groups worsened the social exclusion already experienced, leading to feelings of low self-esteem. This, in turn, can lead to higher-risk sexual behaviour because worries are placed elsewhere and safer sex becomes a lower priority[19]. It is also acknowledged that HIV often impacts on people who already experience inequalities due to their sexual orientation, religion or lifestyle[20].

Another qualitative UK study looks specifically at working class gay men and the relationship between SES, masculinity, gay identity and HIV morbidity[21]. Interviews and focus groups showed that HIV morbidity was influenced by education, occupation and social stratification. Unemployment was also identified as a problem with the lack of money making socialising with other gay men difficult, leading to lack of self-esteem. If gay men from working class and poorer backgrounds are not necessarily socialising amongst gay men, it may be considered that access to health promotion materials and sexual health services could be limited. Having a gay identity during schooling had a negative impact on the men, in particular, homophobic bullying. This impact on schooling subsequently led to these men being unemployed or in low paid jobs. Weatherburn et al[13] acknowledged that gay men have, often stereotypically, been seen as middle-class since the gay community that emerged in the 1970s was seen as middle-class and intellectual. They also note that gay politics are represented by educated and articulate gay men who held jobs where being gay is not necessarily problematic. In 2003, a UK study found that 44% (the majority) of the gay men interviewed perceived their parents as working-class and nearly a third reported their own class as lower middle-class[22].

Little has been done to map HIV by deprivation in the UK in order to target resources effectively. This study aims to identify prevalence of HIV by North West deprivation quintile, which has not been done previously in the UK. Further aims are to build on previous research carried out on the North West HIV dataset[23], and to further analyse the relationship between deprivation and ill-health in HIV positive people. This chapter also presents another tool to express gradients in health inequalities and identify those at risk of HIV, using a geodemographic lifestyle classification system similar to that used by commercial companies to target their marketing activities. The

categories are strongly related to income deprivation, but in addition provide a range of detailed description information about the target groups (see *Where Wealth Means Health*[5] for further details). When these intelligence-based systems are used to target initiatives to modify health-related behaviours for a social good, the technique is known as social marketing[24]. The UK cross-government White Paper, *Choosing Health*[25], recommended that such social marketing techniques should be used in promoting health.

Methods

Data were extracted from the HIV treatment and care database. As part of the data collection protocol for the database, geographical area of residence is calculated from patients' full postcodes. Residential information is stored as lower super output area (LSOA), a relatively small area that is fixed geographically from census information, which can be used to create local authority and primary care trust datasets. The other advantage of LSOA data is that as index of multiple deprivation (IMD) and other social variables are available at this level. The geodemographic classification we have selected is P^2 People and Places (Beacon Dodsworth 2004-2005), which describes small areas in terms of both their relative deprivation and a range of other social factors, including the typical demography (whether the population is old or young, the ethnic make up, and the typical housing and employment). Definitions of the categories are given in appendix 1. As a classification system, P^2 People and Places categories appear to discriminate more effectively between key variables such as ethnic make up, age structure and employment than other geodemographic systems[23]. By using the LSOAs, it was possible to classify each HIV positive individual to a national deprivation quintile, a deprivation score, and a P^2 People and Places category (using data supplied by the North West Public Health Observatory). The national deprivation quintile was derived from ranking all the LSOAs in England and dividing them into five equally sized categories. One third of the North West LSOAs fall into the most deprived national quintile while only 12% fall into the least deprived quintile, demonstrating that the North West is a relatively deprived region (we would expect 20% to fall in each quintile if the North West had the same deprivation profile as England).

To estimate the age standardised population prevalence of HIV, three years' data on the total numbers of people accessing treatment were summed (2003-2005) in order to boost the sample size and gain more accurate estimates. In order to give an indication of incidence of new cases, only new cases for the most recent year (2005) were used. The age standardised population prevalence was calculated for each deprivation quintile and P^2 People and Places category. Additionally, for the P^2 People and Places analysis, the total number of cases infected through the two main infection routes, sex between men and sex between men and women, are presented separately.

For the most recent year (2005) an investigation between poverty and use of hospital services was carried out. The requirement of an overnight stay in hospital was used as an indicator of a more serious HIV-related health event. This was chosen instead of stage of HIV disease because hospitals record the highest stage ever rather than the current stage. However, stage of disease was retained in the multivariate analyses. Viral loads and CD4 counts were not used due to incompleteness of data (but see chapter 5 for analysis of those cases where CD4 counts and viral loads are available). Logistic regression was used to identify the relation between a stay of at least one night in hospital for any HIV-related treatment or care and deprivation, controlling for route of HIV infection, ethnicity, sex, age, and stage of disease. For these analyses, deprivation was recoded into three equally sized categories within the HIV positive population. This is because by far the majority of cases were in the two most deprived quintiles in the North West. Thus, the 'least deprived' deprivation category here is only affluent relative to the HIV positive population. Secondly, the relationship between outpatient clinic visits and deprivation score was investigated. The use of hospital outpatient appointments could be related to a number of issues, for example, state of health, accessibility of services and motivation to attend services for routine monitoring. For definitions of statistical and technical terms used, see the glossary at the end of this report.

Results

Prevalence of HIV by deprivation quintile

Figure 4.1 shows that there is a positive relationship between deprivation and HIV prevalence in the North West. While the most affluent areas in the North West had only 12 people with HIV per 100,000 population, this rose to 83 per 100,000 population for the most deprived areas. The prevalence increased particularly sharply between the second most and the most deprived quintile (more than doubling from 35 to 83 per 100,000). These rates are based on three years data, from 2003 to 2005.

Figure 4.2 shows a similar pattern for new cases for the year 2005, where the rate in the most deprived quartile, at 21 per 100,000 population is again more than double that of the next most deprived quartile. Prevalence was less than 2 per 100,000 in the least deprived quartile. Note that the 95% confidence intervals are larger for new cases on figure 4.2 than all cases shown in figure 4.1. This is because the new case estimates are based on small numbers for one year only. This is done in order to identify current trends, but leads to less certainty around the estimates.

Figure 4.1: HIV prevalence by national index of multiple deprivation quintile (NW residents, 2003-2005)
Bars are 95% confidence intervals

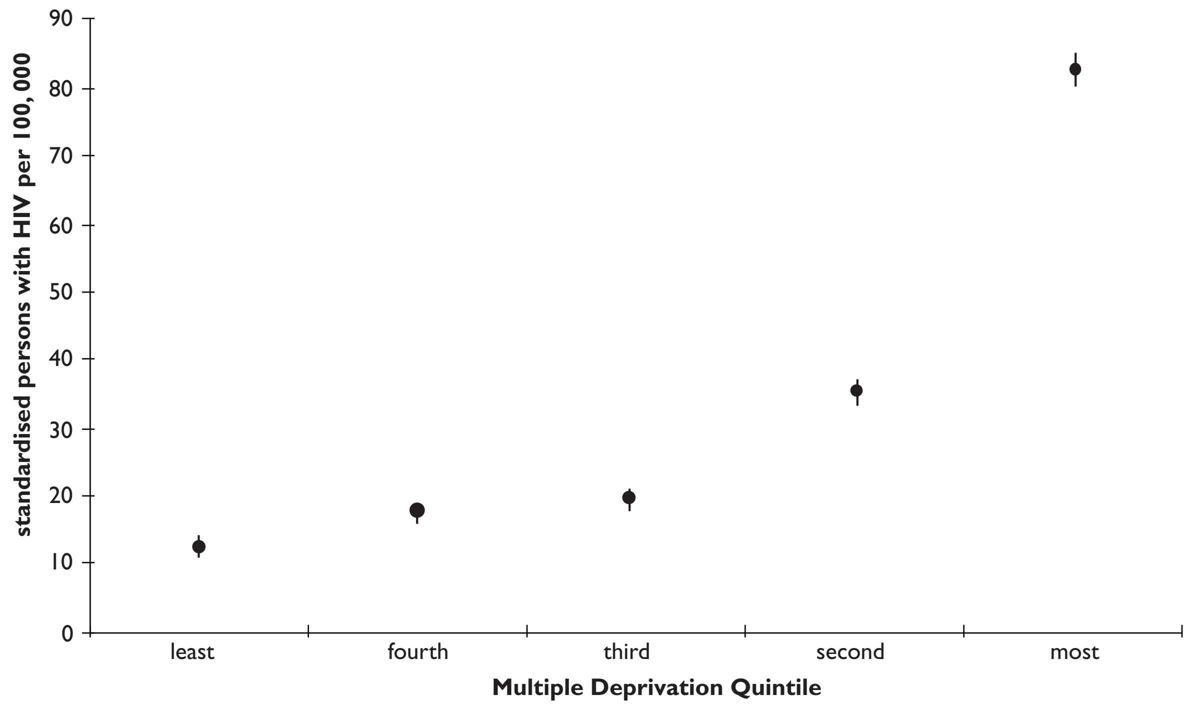
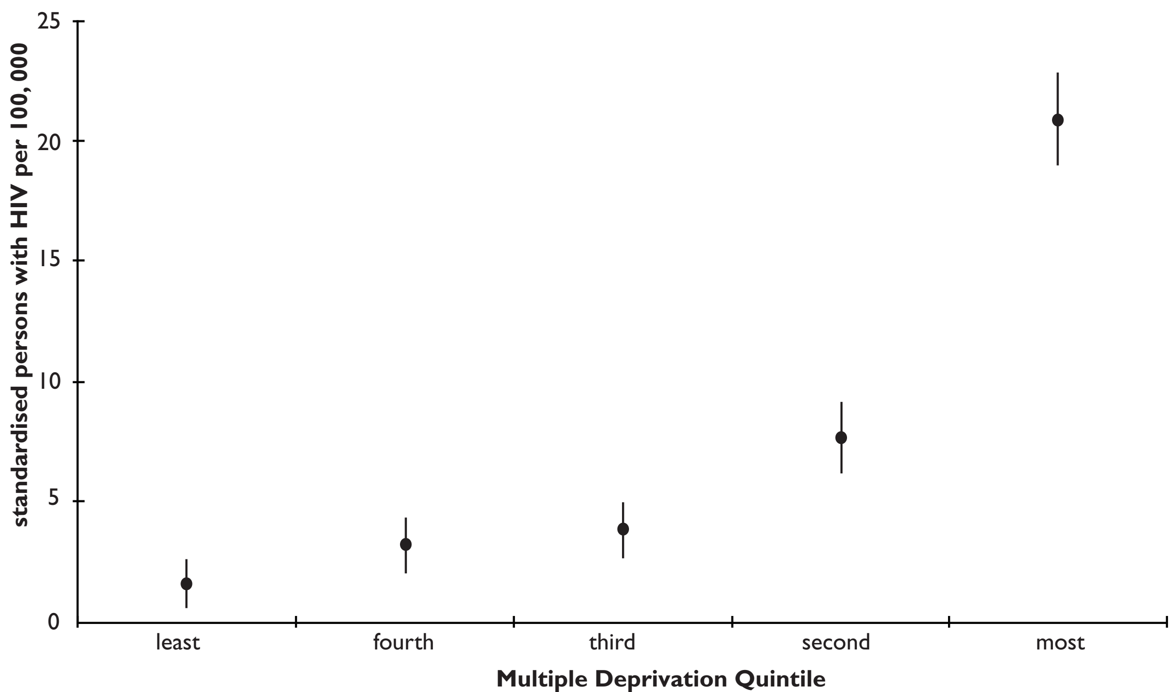


Figure 4.2: Prevalence of new cases of HIV by national index of multiple deprivation quintile (NW residents, 2005)
Bars are 95% confidence intervals



HIV prevalence by P^2 People and Places categories

Figure 4.3 shows the prevalence of HIV calculated within P^2 People and Places categories, and the general trend towards increasing prevalence with increasing deprivation associated with the categories (deprivation increases from left to right along figure 4.3). However, there is higher than expected prevalence in qualified metropolitans and new starters, and lower than expected prevalence in disadvantaged households, urban producers and weathered communities. **Figure 4.4** shows that for new cases the pattern is similar, except there is not a noticeable peak for qualified metropolitans. As for the deprivation calculations, new case prevalence is calculated using one year's data only and therefore is less certainty around the estimates.

Figure 4.3: HIV prevalence by P^2 People and Places categorisation (NW residents, 2003-2005).
For definitions of categories see appendix 1. Bars are 95% confidence intervals

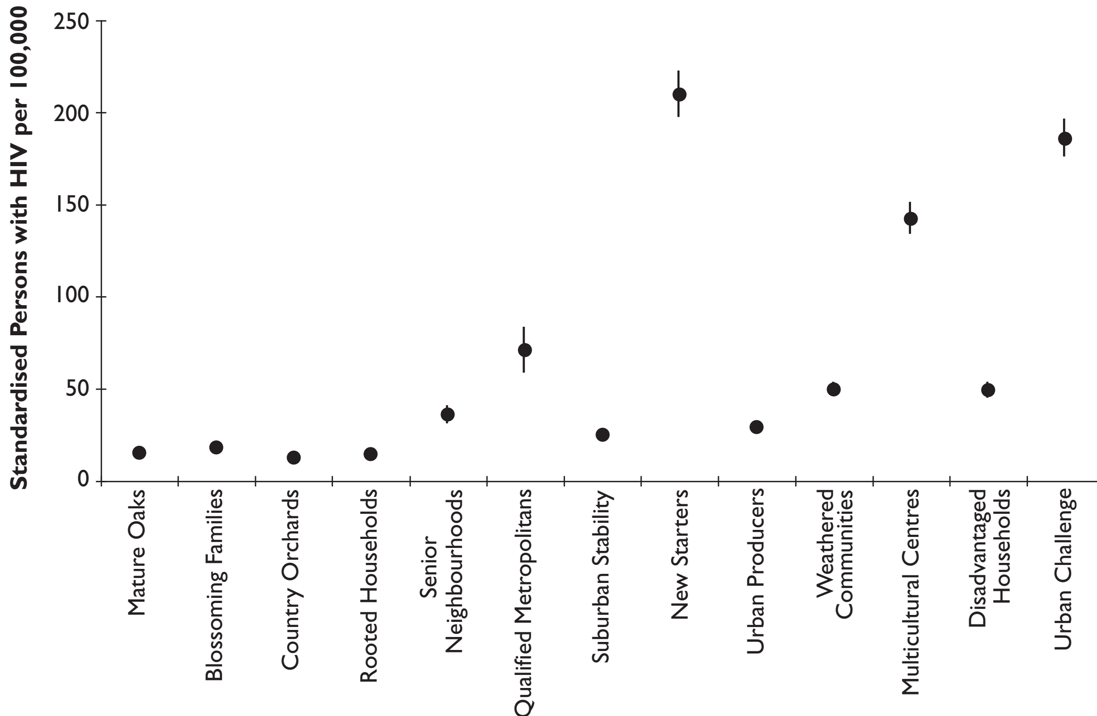


Figure 4.4: Prevalence of new HIV cases by P^2 People and Places categorisation (NW residents, 2005).
For definitions of categories see appendix 1. Bars are 95% confidence intervals

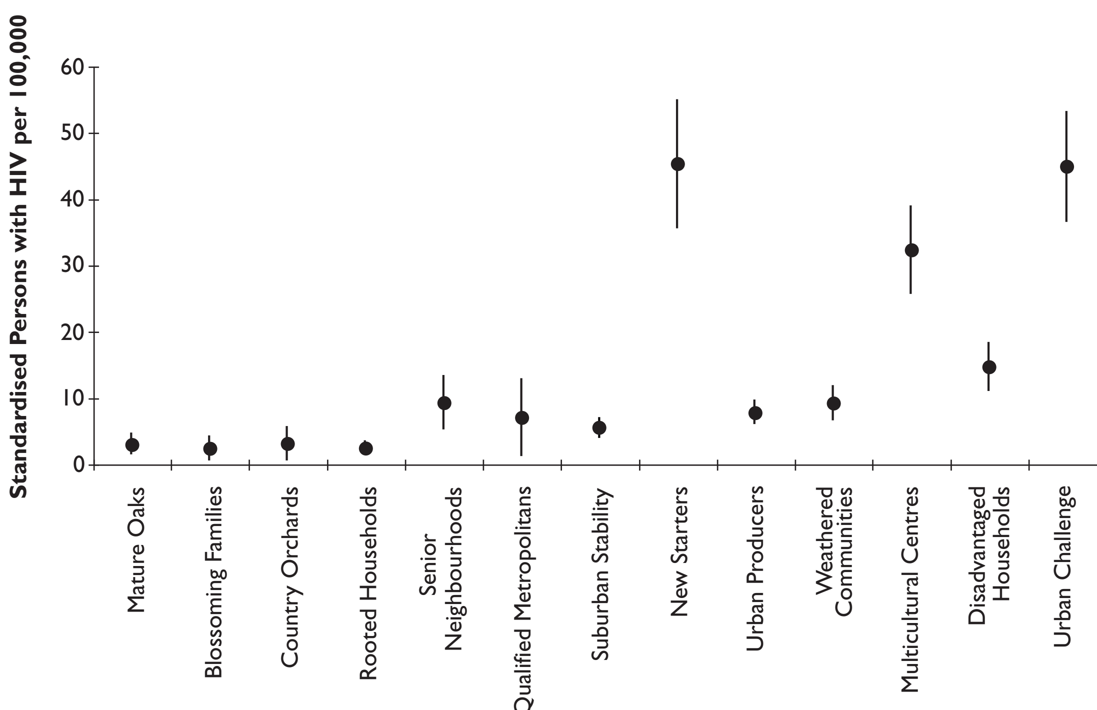
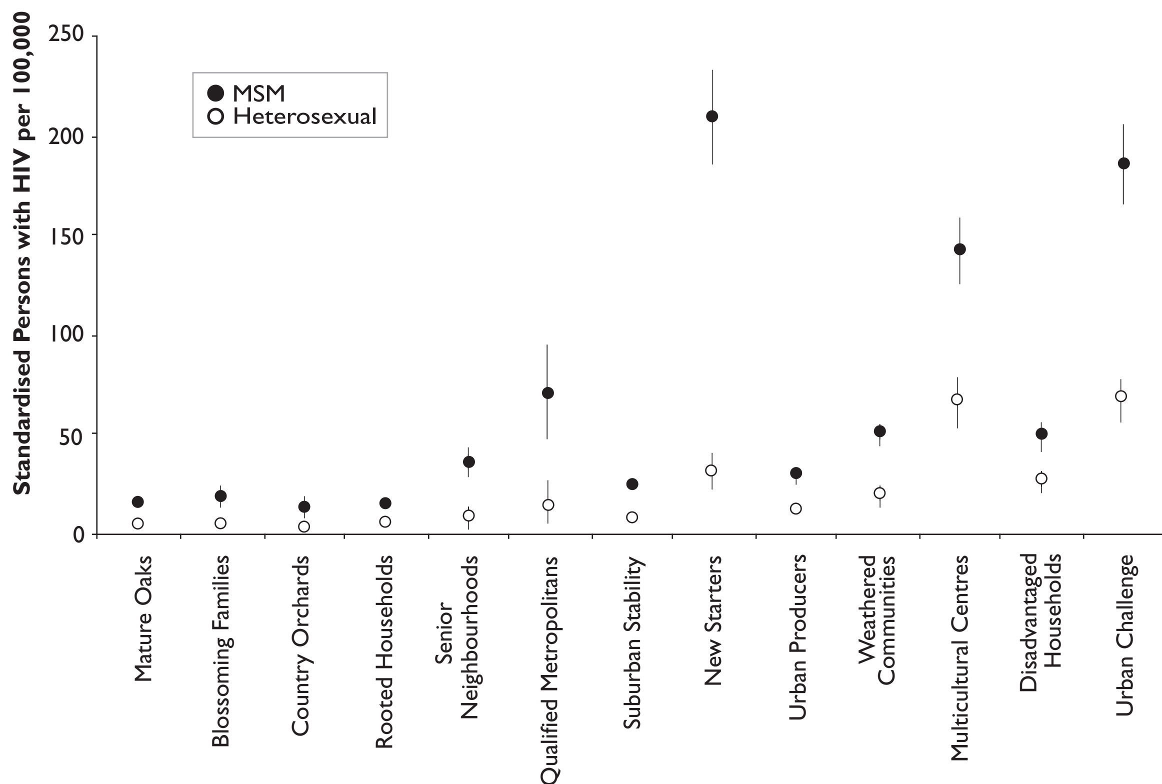


Figure 4.5 shows the prevalence of HIV acquired via two main infection routes, sex between men and sex between men and women, by P[2] People and Places category. The figure shows the overall higher population prevalence of HIV acquired via sex between men, and particularly high prevalence among new starters and higher than expected (from deprivation) prevalence in qualified metropolitans. Heterosexually acquired prevalence tracked these patterns, but with a less marked peak in qualified metropolitans. Heterosexually acquired HIV was more prevalent in multicultural centres and urban challenge areas, with a smaller peak among new starters. Note that the men who have sex with men (MSM) figures refer to population prevalence of MSM-acquired HIV, not the prevalence in MSM. This is because there are no estimates of the baseline numbers of MSM even at PCT level, let alone the lower geographical level (LSOA) that would be needed for this analysis.

Figure 4.5: Prevalence of sexually acquired HIV prevalence by P[2] People and Places categorisation and infection route (NW residents, 2003-2005)

For definitions of categories see appendix 1. Bars are 95% confidence intervals



Use of hospital services and deprivation

Table 4.1 shows that several demographic factors were related to deprivation: HIV positive individuals infected by sex between men, injecting drug use (IDU) or blood/tissue were much more likely to reside in the relatively affluent third of the dataset. However, for MSM, the magnitude of this effect was slight, with 36% residing in the least deprived area, 33% in the average category and 31% in the most deprived. The reverse pattern was true for heterosexually infected individuals, with 40% living in the poorest third. In line with the relationship between infection route and deprivation, males were more likely to reside in the more affluent areas. Those categorised as belonging to a black or minority ethnic group (BME), and those classified as non-UK nationals were more likely to live in the poorest areas. Those in more deprived areas were more likely to be younger. There was no relationship between stage of disease and deprivation.

Table 4.1: Relationships between deprivation and demographic variables, infection route and stage of disease (all North West residents seen for care, 2005)

	Least deprived+	Average*	Most Deprived#	Total	Chi Square	df	P
Route					**76.2**	**10**	**<0.001**
MSM	691 (36.3%)	631 (33.1%)	584 (30.6%)	1906			
Injecting drug use	33 (40.7%)	35 (43.2%)	13 (16.0%)	81			
Heterosexual	345 (27.4%)	411 (32.7%)	501 (39.9%)	1257			
Blood/tissue	34 (63.0%)	16 (29.6%)	4 (7.4%)	54			
Mother to child	20 (32.3%)	21 (33.9%)	21 (33.9%)	62			
Other/Unknown	22 (30.6%)	29 (40.3%)	21 (29.2%)	72			
Sex					**42.0**	**2**	**<0.001**
Male	920 (35.9%)	861 (33.6%)	785 (30.6%)	2566			
Female	225 (26.0%)	282 (32.6%)	359 (41.5%)	866			
Ethnicity					**167.9**	**2**	**<0.001**
White	930 (40.0%)	752 (32.4%)	642 (27.6%)	2324			
BME	215 (19.4%)	391 (35.3%)	502 (45.3%)	1108			
Residency					**166.3**	**4**	**<0.001**
UK	999 (38.1%)	876 (33.4%)	746 (28.5%)	2621			
Non UK	86 (14.6%)	201 (34.0%)	304 (51.4%)	591			
Unknown	60 (27.3%)	66 (30.0%)	94 (42.7%)	220			
Stage of disease					**10.3**	**8**	**0.242**
Asymptomatic	476 (31.2%)	524 (34.3%)	528 (34.6%)	1528			
Symptomatic	375 (35.4%)	343 (32.4%)	341 (32.2%)	1059			
AIDS	267 (35.6%)	243 (32.4%)	240 (32%)	750			
Death	12 (33.3%)	14 (38.9%)	10 (27.8%)	36			
Unknown	15 (25.4%)	19 (32.2%)	25 (42.4%)	59			
Age					**75.3**	**8**	**<0.001**
Under 20	24 (31.2%)	28 (36.4%)	25 (32.5%)	77			
20-29	122 (22.7%)	218 (40.6%)	197 (36.7%)	537			
30-39	415 (31.1%)	444 (33.3%)	476 (35.7%)	1335			
40-49	370 (36.0%)	326 (31.7%)	332 (32.3%)	1028			
50+	214 (47.0%)	127 (27.9%)	114 (25.1%)	455			
Total	**1145 (33.4%)**	**1143 (33.3%)**	**1144 (33.3%)**	**3432**			

+Index of Multiple Deprivation (IMD) score less than 32.5
*IMD between 32.5 and 57
#IMD greater than 57

Table 4.2 shows that when the relationships between ill-health (defined as the requirement of admission to hospital) and the other factors are considered separately (in univariate analysis), route, ethnicity and stage of disease are all predictors of requiring a hospital stay, while deprivation is not. However, when all the variables are considered together (in multivariate analysis), route, ethnicity and stage of disease remain significant, and deprivation is also significant, with those in the most deprived areas being more likely to stay in hospital (adj OR=1.5, 95%CI 1.083, 1.955, P=0.013). Although all else being equal, individuals from BME groups are much less likely to stay over night in hospital (adj OR=0.598, 95%CI 0.417, 0.857, P=0.005), children infected from their mothers, IDU and heterosexuals are more likely to require a stay in hospital than MSM.

Table 4.3 assists in the interpretation of why those from deprived areas are more likely to be admitted to hospital whereas BME groups are less likely; an apparently contradictory result given that BME groups are more likely to reside in deprived areas. The table provides a breakdown of ethnicity, infection route, and deprivation. Although few in number, men from BME groups who have sex with men have very low rates of hospital inpatient attendance (5% or less regardless of deprivation category and stage of disease). However, white heterosexuals who had AIDS or died, and who had lived in more deprived areas, have the highest rates of attendance (47%).

Table 4.2: Univariate and multivariate relationships* between admission to hospital and demographics, infection route and stage of disease (all North West residents seen for care, 2005)

	n	Hospital stay	Chi Square	P	df	Adj OR (95%CI)	P
Route			**20.6**	**0.001**	**5**		**0.001**
MSM	1906	192 (10.1%)				Reference category	
Injecting drug use	81	20 (24.7%)				2.76 (1.57-4.85)	<0.001
Heterosexual	1257	127 (10.1%)				1.42 (1.01-1.99)	0.042
Blood/tissue	54	6 (11.1%)				1.03 (0.43-2.49)	0.942
Mother to child	62	10 (16.1%)				2.86 (1.33-6.14)	0.007
Other/Unknown	72	10 (13.9%)				2.03 (0.99-4.17)	0.053
Stage of disease			**310.0**	**<0.001**	**4**		**<0.001**
Asymptomatic	1528	81 (5.3%)				Reference category	
Symptomatic	1059	105 (9.9%)				1.92 (1.41-2.60)	<0.001
AIDS	750	146 (19.5%)				4.26 (3.19-5.69)	<0.001
Death	36	30 (83.3%)				90.8 (36.6-226)	<0.001
Unknown	59	3 (5.1%)				0.94 (0.29-3.07)	0.916
Deprivation+			**2.7**	**0.255**	**2**		**0.027**
Least deprived	1145	108 (9.4%)				Reference category	
Average	1143	131 (11.5%)				1.39 (1.04-1.85)	0.026
Most deprived	1144	126 (11.0%)				1.46 (1.08-1.96)	0.013
Ethnicity			**4.5**	**0.035**	**1**		**0.005**
White	2324	265 (11.4%)				Reference category	
BME	1108	100 (9.0%)				0.60 (0.42-0.86)	
Non significant							
Age			**5.2**	**0.265**			
Under 20	77	11 (14.3%)					
20-29	537	57 (10.6%)					
30-39	1335	128 (9.6%)					
40-49	1028	110 (10.7%)					
50+	455	59 (13.0%)					
Residency			**2.6**	**0.279**			
UK	2621	291 (11.1%)					
Non UK	591	54 (9.1%)					
Unknown	220	20 (9.1%)					
Sex			**0.1**	**0.809**			
Male	2566	271 (10.6%)					
Female	866	94 (10.9%)					

*Univariate chi square tests and multivariate backwards logistic regression, n=3432

+Least deprived: Index of Multiple Deprivation score less than 32.5; average: score between 32.5 and 57; most deprived: score greater than 57

Table 4.3: Percentage of individuals requiring a hospital stay by route, severity of HIV disease, ethnicity and deprivation+, 2005

Ethnicity	Route	Stage	Least deprived % admitted to hospital	Least deprived n#	Average % admitted to hospital	Average n#	Most deprived % admitted to hospital	Most deprived n#	Table Total % admitted to hospital	Table Total n#
White	MSM	Symptomatic or asymptomatic	5	(520)	8	(471)	10	(436)	8	(1427)
		AIDS or Death	21	(151)	22	(125)	19	(122)	21	(398)
	Heterosexual	Symptomatic or asymptomatic	8	(125)	9	(68)	9	(43)	8	(236)
		AIDS or Death	17	(48)	22	(27)	47	(17)	24	(92)
	Other/Unknown	Symptomatic or asymptomatic	11	(57)	14	(42)	16	(19)	13	(118)
		AIDS or Death	24	(29)	42	(19)	40	(5)	32	(53)
	White total		**10**	**(930)**	**12**	**(752)**	**13**	**(642)**	**11**	**(2324)**
Non White	MSM	Symptomatic or asymptomatic	0	(18)	0	(27)	5	(22)	1	(67)
		AIDS or Death	0	(2)	0	(8)	0	(4)	0	(14)
	Heterosexual	Symptomatic or asymptomatic	5	(128)	6	(247)	3	(344)	5	(719)
		AIDS or Death	23	(44)	25	(69)	25	(97)	24	(210)
	Other/Unknown	Symptomatic or asymptomatic	0	(18)	19	(31)	13	(30)	13	(79)
		AIDS or Death	40	(5)	11	(9)	20	(5)	21	(19)
	BME total		**9**	**(215)**	**10**	**(391)**	**8**	**(502)**	**9**	**(1108)**
	Total		**9**	**(1145)**	**11**	**(1143)**	**11**	**(1144)**	**11**	**(3432)**

+ Least deprived: Index of Multiple Deprivation score less than 32.5; average: score between 32.5 and 57; most deprived: score greater than 57
# n=total number in each category

Table 4.4 shows access to outpatient clinics compared between demographic variables, infection routes and stages of disease. There was a highly significant overall difference in outpatient attendance between those infected by different routes (P<0.001). However, only five percent of the variation in outpatient visits was explained by the model, and inspection of the means shows relatively small actual differences, with children infected from their mothers and MSM using services more than heterosexuals. Those of unknown infection route used the services the least. It is likely that their unknown infection route was in part because clinicians had less contact with these individuals. Stage of disease was also highly related to outpatient use overall (P<0.001). Table 4.4 shows, after accounting for other variables, increasing numbers of days per year with advancing stage of disease, from 5.5 days for asymptomatic individuals, to 6.7 days for symptomatic individuals and 7.4 days for those with AIDS. However, those who died used outpatient services less (3.0 days per year) and instead were much more likely to stay in hospital (see table 4.2). Outpatient clinic visit rate was significantly different between those of different residency status (P=0.003), with UK nationals having the most outpatient visits on average (table 4.4). Use of outpatient services did not differ significantly between the deprivation categories (P=0.087, table 4.4), although there was a tendency for those in the most affluent areas to use outpatient services less (table 4.4). It is important to note that despite the highly statistically significant differences between groups, in practical terms the analysis only explains 5 percent of the variation in outpatient visits.

Table 4.4: Adjusted mean number of outpatient days* by infection route, stage of disease and deprivation, and analysis of variance to identify differences

Variable	n	Mean (95% CI)		ANOVA		
				df	F	P
Route				**5**	**5.7**	**<0.001**
MSM	1906	6.7	(6.5-6.9)			
Injecting drug use	81	5.8	(4.8-6.9)			
Heterosexual	1257	5.7	(5.5-5.9)			
Blood/tissue	54	6.6	(5.4-7.9)			
Mother to child	62	6.9	(5.8-8.1)			
Other/Unknown	72	5.1	(4.4-5.9)			
Stage				**4**	**32.8**	**<0.001**
Asymptomatic	1528	5.5	(5.3-5.7)			
Symptomatic	1059	6.7	(6.5-7.0)			
AIDS	750	7.4	(7.0-7.8)			
Death	36	3.0	(1.8-4.2)			
Unknown	59	6.7	(5.2-8.4)			
Residency				**2**	**5.9**	**0.003**
UK	2621	6.5	(6.3-6.6)			
Non UK	591	5.9	(5.6-6.2)			
Unknown	220	5.1	(4.6-5.6)			
Deprivation+				**2**	**2.4**	**0.087**
Least deprived	1145	6.5	(6.3-6.6)			
Average	1143	5.9	(5.6-6.2)			
Most deprived	1144	5.1	(4.6-5.6)			
Total	**3432**	**6.3**	**(6.1-6.4)**	**13**	**15.1**	**<0.001**

*Analysis carried out on square root transformed data (to improve normality). Means are back-transformed for presentation. P values take into account relationships with the other variables using the general linear modelling procedure in SPSS. Non-significant factors were: sex, age groups, ethnicity. Overall model: R^2=0.054 (Adjusted R^2=0.051)
+Least deprived: Index of Multiple Deprivation score less than 32.5; average: score between 32.5 and 57; most deprived: score greater than 57

Discussion

Population analyses by deprivation and P^2 People and Places

In common with many other diseases and conditions, HIV prevalence is strongly determined by poverty. In the most deprived quintile of the North West, the prevalence of HIV is 6.6 times higher than in the least deprived quintile, while the prevalence of new cases is 13.3 times higher than that in the most affluent areas (figures 4.1 and 4.2). Other conditions with a similarly strong link to poverty (i.e. with a more than three-fold difference between the prevalence in the least to the most deprived quintile) examined in *Where wealth means health*[5] are incidence of self-harm (3.4 times higher in the most deprived quintile), violence (4.9), chronic obstructive pulmonary disease (4.0), alcohol related conditions (4.8) and births to lone mothers (6.4)[5]. However, these findings suggest HIV is the health condition with the strongest relationship with deprivation yet studied in the North West.

The breakdown of HIV prevalence by geodemographic groups, although related to deprivation, provides more descriptive information about the characteristics of populations associated with higher prevalence of HIV. The locality classification system used here, P^2 People and Places, shows that the highest prevalence, 210 per 100,000, was found in 'new starters', and the prevalence here was higher than expected from deprivation category alone (figure 4.3). The 'new starters' category is described as being young adults including students and young working adults who live in rented accommodation, are less likely to have a car, read broadsheet newspapers and are interested in politics. They are characterised by doing their grocery shopping cheaply (e.g. in Aldi supermarkets), and are likely to smoke. From previous work on health profiles in *Where Wealth Means Health*[5], this group is also known to stand out in other health respects: they suffer excess mortality attributable to alcohol and have a high prevalence of alcohol related conditions, and have a high prevalence of mental health disorders. There was also relatively high prevalence of HIV among 'qualified metropolitans'. This group is described as mainly single highly qualified adults in cities, who rent their homes and do not own cars. They have degrees and well paid jobs, are highly mobile, read broadsheets and shop at Sainsbury's. Relative to their position on the deprivation scale they were less likely to suffer from many of other adverse health conditions in the *Where Health Means Wealth* report[5], suggesting that the high prevalence of HIV is anomalous.

For two other groups, the higher levels of deprivation can explain the high HIV prevalence: multicultural centres and urban challenge areas. Both groups tend to live in housing association or council housing, read tabloid

newspapers and smoke. Multicultural centres, as the name suggests, contain a broad ethnic mix of families. Urban challenge areas contain people with relatively low qualifications, with high levels of unemployment. Those who are employed tend to be in routine/semi routine occupations. Urban challenge areas also have a high prevalence of alcohol related mortality and morbidity[5]. The group that had a lower prevalence than would be predicted from their level of poverty is 'disadvantaged households'. These are characterised by being young adults with children living in council / housing association flats with no central heating, and without a car.

Over the years, the profile of new cases of HIV has changed (see chapter 2), and therefore we would expect the pattern of rates of new cases by P^2 People and Places categories to differ from that of all cases (figures 4.3 and 4.4). The most notable difference is the lower peak among qualified metropolitans. 'New starters', 'multicultural centres' and 'urban challenge' all show high rates of new cases, and these are the areas where targeted HIV prevention may be most effective.

When the prevalence of sexually acquired cases of HIV was split by heterosexual and MSM and plotted by P^2 People and Places category, some interesting patterns emerged. The highest prevalence of MSM acquired HIV was among 'new starters' (young adults and students, interested in politics and who read broadsheets). Perhaps surprisingly, the prevalence of HIV acquired through sex between men was much higher than that of heterosexually acquired HIV in 'multicultural centres', despite there being relatively few non-white MSM. This demonstrates that prevention activities targeted at all sexualities are required within areas classified as 'multicultural'.

Use of hospital services

There were so few HIV positive people living in the most affluent areas, that for the analysis to predict requirement of a stay in hospital (a measure of the severity of a person's condition in a particular year) it was necessary to categorise deprivation so that it was coded relative to that of the HIV positive population. Several factors were strongly linked to deprivation, such as infection route, ethnicity and residency status, making the relationship between deprivation and ill-health difficult to interpret. Data over the years (see chapter 2) show MSM with HIV to be more likely to be white, while those with heterosexually acquired HIV are more likely to be from BME communities. Non UK nationals were also more likely to be infected through heterosexual sex. Deprivation showed the expected relationship with ethnicity, with individuals from BME communities being more likely to live in the most deprived areas. Although gay men with HIV were more likely than heterosexuals to live in the least deprived areas, it is important to note that 'least deprived' in this sense is relative to the HIV positive population, the majority of which lives in the most deprived areas of the North West. Since these men do not conform to the stereotypical view of gay men as being relatively affluent, and may not socialise in the areas typically targeted by health promotion efforts, more should be done to intervene in schools, families and the workplace[21].

Despite the complex relationships between sexuality, ethnicity and poverty, when all the other factors were held constant, those in the most deprived areas were more likely to require a hospital stay of at least one night (the definition used here for a significant adverse health event). This relationship was also observed in datasets from earlier years (in 1999[26]; and in 2002[23]). Those from BME communities were the least likely to require a hospital stay, a finding that apparently contradicts the fact that BME groups are also more likely to live in the poorest areas. However, an underlying pattern among the least common subgroups in the dataset appeared to cause this effect: there were very low rates of hospital stays among the relatively few MSM from BME groups, and high rates of hospital stays among white heterosexuals from the most deprived areas (table 4.3). Both these groups (non white MSM and white heterosexuals) are relatively few in number in the North West; yet appear to be quite distinct in their pattern of service use. These relationships need to be investigated further in order to fully determine the implications for access to, and need of, services.

There are a number of ways in which extreme poverty can directly affect HIV disease. The very poorest people with HIV often reside in damp accommodation with inadequate heating, which increase ill-health through respiratory infections and can exacerbate TB (which is commonly associated with HIV). Individuals living in poverty are more likely to live in shared housing, where the lack of privacy causes some individuals to jeopardise their health in order to conceal their HIV status[10]. Lack of adequate nutrition would also have a negative impact on an HIV positive person's health status.

Conclusions

This chapter presents the stark difference in prevalence of HIV between the most wealthy and least wealthy areas of the North West, and shows a steeper gradient than any health condition yet investigated[5]. Specific population groups were identified with particularly high levels of HIV: multicultural centres, new starters, and qualified metropolitans. Of these, 'qualified metropolitans' appear to be less at risk of new HIV infections. When the HIV positive population were divided into three equally sized categories on the basis of their poverty, the poorest third (representing very materially disadvantaged people) were the most likely to be admitted to hospital, suggesting an adverse health event. The findings presented here confirm and add further detail to the relationships between HIV-related ill-health and poverty reported previously[23]. These findings suggest that health networks in the most deprived areas not only provide HIV services to a greater number of people, but also provide a disproportionately high rate of inpatient care.

References

[1] Townsend P, Davidson N. Inequalities in health: the Black report. Harmondsworth: Penguin, 1982.
[2] Smith GD, Bartley M, Blane D. The Black report on socioeconomic inequalities in health 10 years on. BMJ 1990; 301(3748):373-377.
[3] Acheson D. Independent Inquiry into Inequalities in Health. The Stationary Office, 1998.
[4] Department of Health. Our Healthier Nation. The Stationary Office, 1998.
[5] Wood J, Hennell T, Jones A, Hooper J, Tocque K, Bellis MA. Where Wealth Means Health. North West Public Health Observatory, 2006.
[6] Department of Health. The national strategy for sexual health and HIV. Crown Copyright 2001
[7] Cosgrove P, Lyons M, Bellis MA. Economics of HIV and AIDS in the North West of England. Liverpool John Moores University, 2001.
[8] Bellis MA, McVeigh J, Thomson R, Syed Q. The National Lottery. Health Service Journal 1999; 17:22-23.
[9] Crusaid and National AIDS Trust. Poverty and HIV: Findings from the Crusaid Hardship Fund 2006.
[10] Connell RW, Dowsett GW, Rodden P, Davis MD. Social class, gay men and AIDS prevention. Australian Journal of Public Health 1991; 15:178-189.
[11] Dowsett GW, Davis MD, Connell RW. Working class homosexuality and HIV/AIDS prevention: Some recent research from Sydney Australia. Psychology and Health 1992; 6:313-324.
[12] Bochow M. Socioeconomic status and HIV prevalence among gay men in Germany. Conference on AIDS in Europe: New Challenges for Social and Behavioural Sciences 1998:92-102.
[13] Weatherburn P, Davies PD, Hickson F, Hartley M. A Class Apart: The Social Stratification of HIV Infection Amongst Homosexually Active Men. Sigma Research 1999.
[14] Weatherburn P, Anderson W, Reid D, Henderson L. What do you need? Findings from a national survey of people living with HIV. Sigma Research 2002.
[15] Hogg RS, Strathdee SA, Craib KJP, O'Shaughnessy MV, Montaner JSG, Schechter MT. Lower socioeconomic status and shorter survival following HIV infection. Lancet 1994; 344:1120-1124.
[16] Tramarin A, Campostrini S, Tolley K, De Lalla F. The Influence of socioeconomic status on health service utilisation by patients with AIDS in North Italy. Social Science and Medicine 1997; 45(6):859-866.
[17] Weller I, Williams I. ABC of AIDS: Antiretroviral drugs. British Medical Journal 2001; 322:1410-1412.
[18] Hope VD, MacArthur C. Safer sex and social class: Findings from the study of men using the "gay scene" in the West Midlands Region of the United Kingdom. AIDS Care 1998; 10:81-88.
[19] Atrill R, Kinniburgh J, Power L. Social exclusion and HIV: A report. Terence Higgins Trust Policy Campaigns and Research Division, Terence Higgins Trust 2001.
[20] MedFASH. Recommended standards for NHS HIV services. Medical Foundation for AIDS and Sexual Health 2003.
[21] Keogh P, Dodds C, Henderson L. Working class gay men: redefining community, restoring identity. Sigma Research 2004.
[22] Hickson F, Weatherburn P, Reid D, Stephens M. Out and About: Findings from the United Kingdom Gay Men's Sex Survey 2002. Sigma Research 2003.
[23] Cook PA, Hargreaves SC, Tocque K, Bellis MA. Relationships between the use of hospital services and place of residence deprivation score among HIV positive individuals in the North West of England. Communicable Disease and Public Health 2004; 7:319-321.
[24] Dedman D, Jones A, Tocque K, Bellis MA. Population targeting: tools for social marketing, North West Public Health Observatory Synthesis Bulletin, Issue 6, December 2006.
[25] Department of Health. Choosing Health. Crown Copyright 2004.
[26] Hargreaves SC. Epidemiology of HIV in the North West of England 1999-2002. MPhil Thesis. Liverpool John Moores University, 2006.