

Chapter 6: HIV in Pregnancy

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The Global Challenge: prevention of HIV transmission from mother to child

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Nowhere is the beneficial impact of antiretroviral medication more emphatically made than in the successful prevention of vertical transmission of HIV. It is now 23 years since the first reported case of HIV in Manchester, and 21 years since the first child was born to an infected mother. With developments in knowledge, monitoring tests, and most importantly, antiretroviral drugs, the risk of transmission has gradually fallen to a level where the discovery of HIV in a woman is no longer deemed a bar to future pregnancy. The evidence-based information has been achieved through clinical trials which have shown step-wise improvements in results with various drug and dosing permutations of pre-natal, perinatal, and post-natal prophylaxis, with or without caesarean section. With this has been the identification of obstetric and neonatal practices which have increased the risk of vertical transmission, antiretroviral drugs that cause maternal toxicity, and the potential for drug-induced teratogenicity in the foetus.

In 2006, less than 10 percent of all mothers globally had access to adequate services to prevent mother-to-child transmission (MTCT). Without intervention, the rate of vertical transmission is 25-44% in developing countries and 13-25% in industrialised nations, a difference predominantly attributable to breast feeding. Whereas MTCT is now excessively rare in the indigenous populace in the west, it remains the cause of 90 percent of infections in children in resource poor nations. This is despite the knowledge that Zidovudine alone started at 16 weeks and continued in the neonate until six weeks after birth can reduce transmission by 70 percent and single dose Nevirapine given to mothers during labour and to the neonate in the first 72 hours may also reduce transmission by up to 44 percent. Using current Highly Active Antiretroviral Therapy (HAART) and starting from mid-second trimester, the risk of vertical transmission, if the viral load is undetectable at time of delivery, is probably less than one percent, irrespective of whether or not a caesarean section is performed.

Women are pivotal for the wellbeing of a family. In developed countries, the risk of death for HIV-infected and HIV-uninfected children is halved if the mother is alive. The means now exist to prevent MTCT in the majority of children through maternal screening and appropriate prophylaxis to mother and child. In Greater Manchester, approximately 50 pregnancies are now occurring annually in HIV-infected women and are being successfully managed through a multidisciplinary network. By far the majority of these are women from sub-Saharan Africa who are diagnosed antenatally through antibody screening. The last quarter of a century has seen unparalleled advances in HIV management with a previously inevitably fatal condition becoming a chronic illness with a near-normal life expectancy and with vertical transmission becoming a rarity. The challenge for the next 25 years is to deliver the infrastructure and the antiretrovirals to the areas of the world which are currently without, thereby preventing the next generation becoming infected with HIV at birth.

Introduction

HIV prevalence in women has increased substantially in the last ten years, with women now representing 31% of all HIV cases in the UK¹. In 1999, the Department of Health issued a health service circular to Health Authorities in order to ensure that all pregnant women were offered and recommended an HIV test as part of their antenatal care by 2000², with the intention that there would be a 90% national uptake of testing to identify 80% of HIV positive pregnant women by December 2002². Following these interventions substantial improvements were seen in the number of HIV diagnoses prior to delivery throughout England³, from an estimated 33% in 1997 to around 90% in 2004⁴.

National unlinked anonymous surveillance systems are also in place to estimate the prevalence of HIV in pregnancy. These surveys report on the number of positive antenatal HIV tests in the North West⁵ and throughout the whole of the United Kingdom⁶. In addition, the Survey of Prevalent HIV Infections Diagnosed (SOPHID) reports on the number of infants who contract HIV year to year via mother to child transmission¹. The Unlinked Anonymous HIV Prevalence Monitoring Programme in England and Wales reports the estimated HIV prevalence among pregnant women from its newborn infant dried blood spot metabolic screening programme. These data, together with data on all cases of births to HIV positive women reported to the National Study of HIV in Pregnancy and Childhood (NSHPC) provide estimates of HIV prevalence in pregnant women in England and Wales. Recent unlinked anonymous data estimated increases in HIV prevalence rates in pregnancy across England and Wales (with the exception of London which remained stable). However, the most dramatic increases were seen in the North West where one in 924 women giving birth in 2005 were infected with HIV, compared to one in 4,543 women in 2001⁷.

Diagnosing HIV during pregnancy provides the opportunity to implement an antiretroviral (ART) regimen to aid the prevention of mother to child transmission, or in cases where diagnosis takes place too late for ART prescribed maternally to affect the baby, ART can be administered to the baby directly after birth. It is currently estimated that, in total, 4% of infants born in the UK and exposed to maternal HIV are likely to become infected, this compares with roughly 20% in 1997⁴.

The number of births to HIV positive women is increasing each year in the UK and has more than tripled between 1997 and 2004⁴. With the increasing success of antiretroviral therapy during pregnancy there is likely to be increased pressure upon fertility and HIV services as more women choose to begin or add to their family. Audit data show that 16% of men and 4% of women attending UK HIV specialist clinics had enquired about fertility treatment and 30% of fertility treatment centres were planning to offer services to HIV positive males and 26% to HIV positive females⁸.

This chapter uses data relating to pregnancy in North West HIV positive women recorded on the North West's HIV treatment and care database, in order to provide a more detailed analysis of the regional picture. It compares data from HIV positive pregnant women in treatment to the whole of the North West HIV positive female population and explores any differences in terms of demographics, access to services and health status. It also compares North West HIV pregnancy rates to those of the rest of the North West population to observe the difference, if any, HIV may have on a woman's decision to begin or add to her family.

Methodology

In order to compare pregnancy rates between the HIV positive population and the general population, one full year (2005) of pregnancy data was extracted from the HIV treatment and care database. The earliest period reported pregnant on the database was used to calculate age at conception. These data were categorised to match the age groups used by the Office of National Statistics conception data and conception rates within the HIV positive population (calculated using the number of females presenting for treatment and care in 2005) were compared to the most recent North West general population conception rates (2004). Conception data by ethnicity are not collected by the Office of National Statistics (ONS). Therefore, to enable a comparison of pregnancy rates between HIV positive women and the general population by ethnicity, ONS aggregated conception data for females aged 15-44 were used alongside a ward-based area classification using data from 2002-2004. This is where wards with less than two thirds white population are classified to the predominant ethnic group. These data create crude conception rates for the North West by ethnicity, which were compared to the pregnancy rates for each ethnicity in the HIV positive population of the North West in 2005. For the purposes of this study those self-defined as of black Caribbean, Black African and black other are categorised as 'Black' and those self-defined as any other minority ethnic group are categorised as 'Other/Mixed'.

A dataset containing all HIV positive females accessing treatment and care in the North West of England was extracted from the HIV treatment and care database (30th June 2004 to 30th June 2006); (1,321 women in total). These dates were selected because this field was added to the data collection process in June 2004 (155 pregnant women). Basic demographics (sex, age, ethnicity, residency status) were extracted from the database, as were

level of care (total number of inpatient stays of one or more nights and outpatient episodes in the two year period), level of antiretroviral therapy (ART at last period recorded on the North West database, or level of ART during pregnant period/s recorded). Women recorded as not taking antiretroviral therapy were followed up with the reporting hospital where possible to ensure that it was not due to missing data. Several women first reported as pregnant in 2006 and were not on therapy. This may have been due to being in the earlier stages of pregnancy when data were collected. Other reasons for women not taking ART ranged from refusing to take it, to presenting too late to take it. CD4 count, viral load and stage of disease data were also extracted in order to assess the health status of patients. Once these data were extracted they were cross-matched with the new diagnosis database, first, to check that all pregnancy data were represented (as new diagnosis data also include information on pregnancy) and secondly, to extract information on those who were diagnosed during their pregnancy. Data were also extracted on the year of first presentation to the HIV Treatment and Care database as an additional marker of pregnancy initiating access to HIV care. Data were subject to univariate comparisons. Subsequently, predictors for inpatient stays were calculated and outpatient episodes were log transformed to improve normality and analysed for significant differences. Variations in CD4 and viral load were compared between pregnant and non-pregnant women. Further, the mean CD4 and viral load was calculated where it was available (60% of sample) and logistic regression was carried out to predict ill-health (CD4 count less than 200 cells and viral load over 10,000 copies/ml).

Results

Overall North West HIV positive women have a higher rate of conception than those in the general North West population, 94.3 per 1,000 HIV positive women aged 15-44 compared to 72.6 per 1,000 women aged 15-44 years. **Figure 6.1** shows that HIV positive women had higher rates of conception in all age groups apart from those in the 30-34 and 40-44 ages. **Figure 6.2** shows higher rates of conception in HIV positive women across all ethnic groups compared to those of the general population. Further, white and other/mixed/unknown categories in the HIV positive population show an additional 44 conceptions per 1,000 than the general population whereas HIV positive black women had an additional 57 conceptions per 1,000 population.

Records from 1,321 females were extracted from the HIV treatment and care database of women presenting for treatment during the period July 2004 to June 2006. From these data 155 women were reported as pregnant in one or more six monthly reporting period during this two-year period.

Table 6.1 shows that although more non-UK nationals reported a pregnancy in the two-year period examined, this number is not significantly different from those reported by UK nationals. Furthermore, as would be expected, pregnant women are significantly younger compared to their non-pregnant counterparts. However, within the pregnant population, although not significant, it is interesting to note that women of all ethnicities present in equal proportions as pregnant within the 26-39 age group, a greater proportion of white women present as pregnant age 25 and below than other ethnicities (36% compared to 25% for black women and 20% for other/mixed/NK) (not shown). HIV positive pregnant women also differ significantly in stage of HIV disease (are more likely to be asymptomatic) and are significantly more likely to be taking quadruple or more therapy. **Table 6.1** also shows that pregnant women are significantly more likely to have at least one episode of inpatient care (chi square 4.66, $P=0.024$). The mean number of outpatient visits during the period was 11 and pregnant women were more likely to have outpatient visits than non-pregnant women ($F=4.729$, $P=0.030$) with pregnant women averaging nine outpatient visits (95% CI, 8.105-10.564) compared to eight for non-pregnant women (95% CI, 7.558-8.318) (not shown). For 72% of the sample, pregnancy coincided with their first access to HIV services. **Table 6.2** shows the most common drug combinations in pregnancy where data on the actual drugs were available. Four women took Zidovudine monotherapy (4% of those with known drug combinations). Zidovudine featured in all the common combinations and a nucleoside analogue combination of Zidovudine and Lamivudine was seen in the top five most common combinations.

Table 6.3 shows that pregnancy was more likely for women aged 25 years and under, those first seen mid-2004 to mid-2006, on antiretroviral therapy, and at an asymptomatic stage of disease. **Table 6.4** shows that an inpatient stay of one or more nights is significantly associated with pregnancy (OR, 2.429, 95% CI 1.479-3.988, $P<0.001$) even after controlling for other variables. Overall a stay in hospital is characterised by a woman reporting for treatment and care mid-2004 to mid-2006, being pregnant, being symptomatic or having AIDS and having a mean CD4 of less than 200 cells/mm³ and a viral load greater than 10,000 copies/ml.

Table 6.5 shows that non-pregnant women are more likely to have variable CD4 counts. Variation in CD4 count is also characterised by a patient being of other, mixed or unknown ethnicity, taking antiretroviral therapy, being first seen prior to mid-2004, and having a viral load variance of more than 1,000 copies/ml. However, pregnancy was not related to a mean CD4 count less than 200 (predicting ill-health). A mean CD4 count of less than 200 cells/mm³ is characterised by being on antiretroviral therapy, being symptomatic, having had an AIDS defining illness, having died or having an unknown stage of disease, being seen for treatment and care mid-2004 to mid-2006 and having a mean viral load greater than 10,000 copies/ml. **Table 6.6** shows that pregnancy is not related to viral load variation, nor to a viral load of >10,000 copies/ml. variation in viral load is characterised by a patient not being on antiretroviral therapy and having a CD4 variance of 100 cells/mm³ or more. Whereas a mean viral load greater than

10,000 copies/ml is characterised by not being on antiretroviral therapy, having one or more inpatient stays, first being seen for treatment and care mid-2004 to mid-2006 and having a CD4 of 200 cells/mm³ or less (table 6.6).

To conclude, there is a higher rate of conception among HIV positive women compared to the general North West population. Furthermore, black HIV positive women had the highest conception rate overall. Non-pregnant HIV positive women are more likely to experience a variance in CD4 count but not viral load. Pregnancy is not related to viral load or CD4 variance, nor is it related to having a viral load greater than 10,000 copies/ml or a CD4 less than 200 cells/cm³. Therefore, pregnancy is not a predictor for ill-health (defined as CD4 <200 cells/mm³ or viral load >10,000 copies/ml).

Figure 6.1: Conception rates of HIV positive women compared to the general female population in the North West by age group

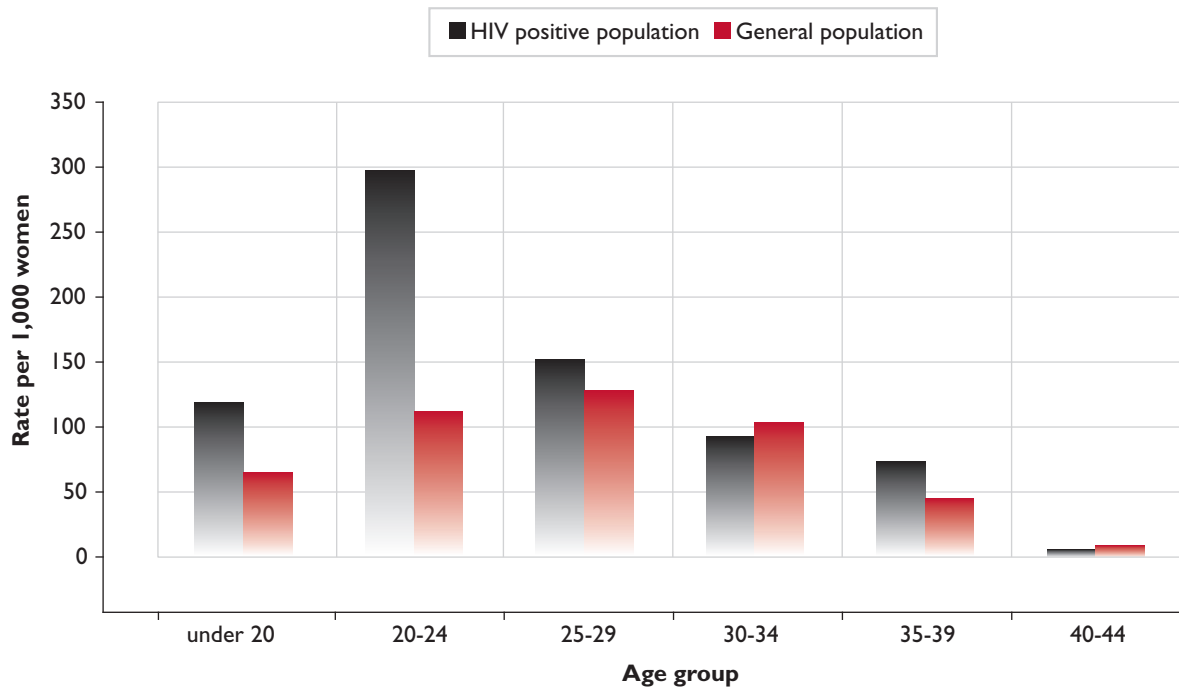


Figure 6.2: Conception rates of HIV positive women compared to the general female population in the North West by ethnicity

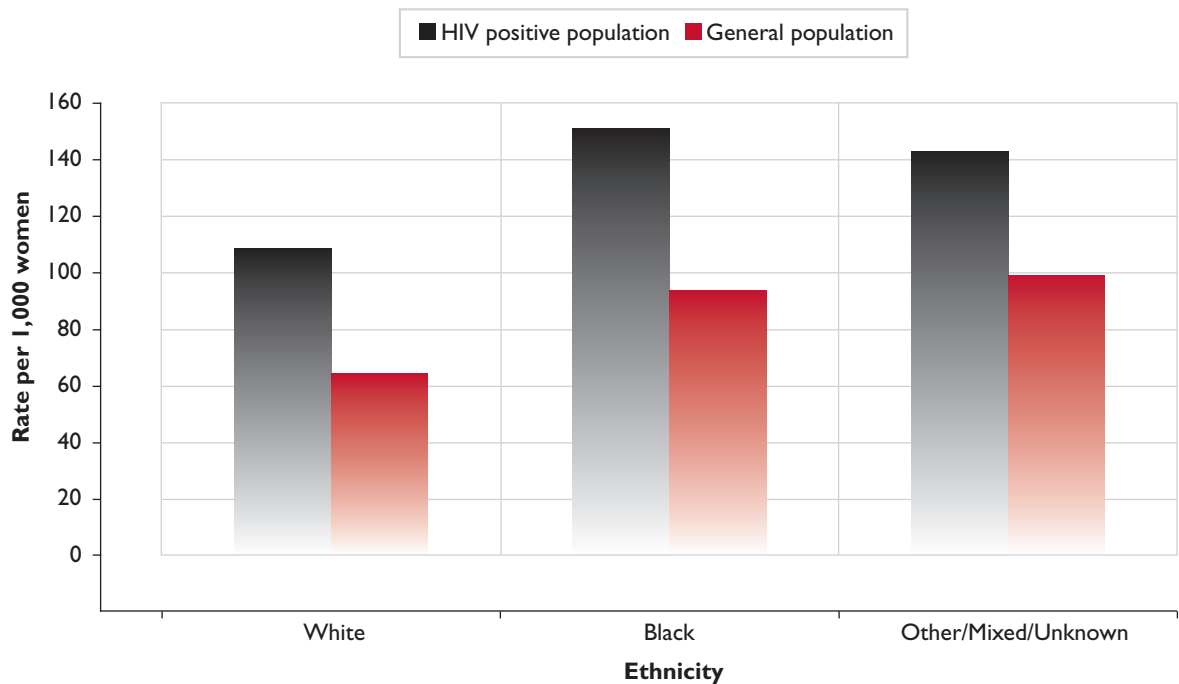


Table 6.1: Residency, age group, inpatient care, ethnicity, stage of disease, level of antiretroviral therapy and period first seen by pregnancy status

	Not Pregnant	Pregnant	Total	Chi Square	df	P
Residency				4.152	2	0.125
UK	520 (44.6%)	58 (37.4%)	578 (43.8%)			
Non UK	517 (44.3%)	73 (47.1%)	590 (44.7%)			
Unknown	129 (11.1%)	24 (15.5%)	153 (11.6%)			
Age Group				64.483	2	<0.001
0-25	152 (13%)	41 (26.5%)	193 (14.6%)			
26-39	665 (57.1%)	112 (72.3%)	777 (58.8%)			
40+	349 (30%)	2 (1.3%)	351 (26.6%)			
Inpatient Care				4.66	1	0.024
None	986 (84.6%)	120 (77.4%)	1106 (83.7%)			
One or more	180 (15.4%)	35 (22.6%)	215 (16.3%)			
Ethnicity				6.319	2	0.097
White	277 (23.8%)	25 (16.1%)	302 (22.9%)			
Black	812 (69.6%)	120 (77.4%)	932 (70.6%)			
Other/Mixed/Unknown	77 (6.6%)	10 (6.5%)	87 (6.6%)			
Stage of Disease				33.514	2	<0.001
Asymptomatic	602 (51.6%)	118 (76.1%)	720 (54.5%)			
Symptomatic	295 (25.3%)	22 (14.2%)	317 (24%)			
AIDS/Death/Unknown	269 (23.1%)	15 (9.7%)	284 (21.5%)			
Level of Antiretroviral therapy				74.775	2	<0.001
No therapy	416 (35.7%)	24 (15.5%)	440 (33.3%)			
Triple or less	552 (47.3%)	60 (38.7%)	612 (46.3%)			
Quadruple or more	198 (17%)	71 (45.8%)	269 (20.4%)			
First seen in period mid 2004- mid 2006				47.482	1	<0.001
Seen prior to mid-2004	666 (57.1%)	43 (27.7%)	709 (53.7%)			
Seen mid-2004 to mid-2006	500 (42.9%)	112 (72.3%)	612 (46.3%)			
Total (100%)	1166	155	1321			

Table 6.2: Most common Antiretroviral therapy combinations in pregnant women

Nucleoside Analogues	Protease Inhibitors	Other ART	Frequency (97 in total)
Zidovudine, Lamivudine	Saquinivir, Ritonavir		26
Zidovudine, Lamivudine	Ritonavir, Lopinavir		18
Zidovudine, Lamivudine	Nelfinavir		10
Zidovudine, Lamivudine		Nevirapine	9
Zidovudine, Lamivudine	Saquinivir		4
Zidovudine			4

Table 6.3: Logistic regression to predict pregnancy

	n	Adj OR 95.0% C.I. (-/+)	df	P
Residency			2	0.570
UK	578	Reference category		
Non-UK	590	0.947 (0.577-1.557)		0.831
Unknown	153	1.299 (0.686-2.457)		0.422
Age group			2	<0.001
0-25	193	Reference category		
26-39	777	0.772 (0.487-1.225)		0.273
40+	351	0.024 (0.006-0.104)		<0.001
Ethnicity			2	0.646
White	302	Reference category		
Black	932	0.905 (0.493-1.663)		0.748
Other/Mixed/Unknown	87	0.658 (0.271-1.594)		0.354
First seen			1	<0.001
First seen prior to mid-2004	709	Reference category		
First seen mid-04 to mid-06	612	3.388 (2.203-5.209)		
Antiretroviral therapy			2	<0.001
No therapy	440	Reference category		
Triple or less	612	5.237 (3.053-8.983)		<0.001
Quadruple or more	269	15.060 (8.650-26.221)		<0.001
Stage of Disease			2	<0.001
Asymptomatic	720	Reference category		
Symptomatic	317	0.388 (0.227-0.661)		0.001
AIDS/Death/Unknown	284	0.286 (0.156-0.524)		<0.001

Table 6.4: Logistic regression to predict one or more inpatient stays in women

	n	Adj OR 95.0% C.I. (-/+)	df	P
Residency			2	0.160
UK	578	Reference category		
Non-UK	590	0.707 (0.464-1.077)		0.106
Unknown	153	0.617 (0.346-1.101)		0.102
Age group			2	0.411
0-25	193	Reference category		
26-39	777	0.734 (0.458-1.176)		0.198
40+	351	0.724 (0.422-1.242)		0.241
Ethnicity			2	0.979
White	302	Reference category		
Black	932	0.990 (0.615-1.594)		0.967
Other/Mixed/Unknown	87	0.931 (0.465-1.864)		0.840
First seen			1	0.004
First seen prior to mid-04	709	Reference category		
First seen mid-04 to mid-06	612	1.743 (1.199-2.534)		
Pregnancy status			1	<0.001
Not Pregnant	1166	Reference category		
Pregnancy	155	2.429 (1.479-3.988)		
Antiretroviral therapy			2	0.351
No therapy	440	Reference category		
Triple or less	612	1.327 (0.848-2.077)		0.216
Quadruple or more	269	1.423 (0.860-2.354)		0.170
Stage of Disease			2	<0.001
Asymptomatic	720	Reference category		
Symptomatic	317	2.657 (1.693-4.169)		<0.001
AIDS/Death/Unknown	284	7.774 (5.016-12.048)		<0.001
Mean CD4 (cells/mm³)			2	0.004
>200	707	Reference category		
<201	130	2.143 (1.313-3.499)		0.002
Unknown	484	0.847 (0.412-1.741)		0.652
Mean Viral Load (per ml)			2	0.007
<10,001	563	Reference category		
>10,000	267	2.029 (1.296-3.177)		0.002
Unknown	491	1.629 (0.793-3.350)		0.184

Table 6.5: Logistic regression models for predicting a variation in CD4 of 100 cells/mm³ or more and a mean CD4 of 200 cells/mm³ or less in the study period in women

	n	Variation in CD4 of 100 cells/mm ³ or more			Mean CD4 of 200 cells/mm ³ or less		
		Adj OR 95.0% C.I. (-/+)	df	P	Adj OR 95.0% C.I. (-/+)	df	P
Residency			2	0.096		2	0.196
UK	382	Reference category			Reference category		
Non-UK	339	1.367 (0.889-2.101)		0.154	1.277 (0.698-2.336)		0.428
Unknown	78	0.718 (0.373-1.381)		0.320	2.019 (0.941-4.332)		0.071
Age Group			2	0.420		2	0.969
0-25	111	Reference category			Reference category		
26-39	477	0.754 (0.456-1.246)		0.271	1.091 (0.529-2.250)		0.814
40+	211	0.907 (0.515-1.599)		0.736	1.102 (0.495-2.451)		0.812
Ethnicity			2	0.004		2	0.367
White	226	Reference category			Reference category		
Black	518	0.490 (0.310-0.776)		0.002	1.006 (0.520-1.946)		0.985
Other/Mixed/Unknown	55	1.051 (0.516-2.141)		0.890	0.470 (0.153-1.443)		0.187
Antiretroviral therapy			2	<0.001		2	<0.001
No therapy	266	Reference category			Reference category		
Triple or less	342	3.791 (2.419-5.940)		<0.001	3.745 (1.933-7.258)		<0.001
Quadruple or more	191	3.954 (2.366-6.608)		<0.001	5.064 (2.469-10.390)		<0.001
Stage of disease			2	0.184		2	<0.001
Asymptomatic	453	Reference category			Reference category		
Symptomatic	203	0.678 (0.448-1.026)		0.066	3.011 (1.729-5.246)		<0.001
AIDS/Death/Unknown	143	0.819 (0.504-1.330)		0.420	4.002 (2.114-7.573)		<0.001
Pregnancy status			1	<0.001		1	0.141
Not pregnant	717	Reference category			Reference category		
Pregnant	82	0.204 (0.105-0.398)			0.539 (0.237-1.228)		
Inpatient Care			1	0.866		1	0.098
None	680	Reference category			Reference category		
One or more	119	0.959 (0.592-1.555)			1.603 (0.917-2.803)		
First seen			1	<0.001		1	<0.001
First seen prior to mid-04	441	Reference category			Reference category		
First seen mid-04 to mid-06	358	0.291 (0.204-0.415)			4.274 (2.537-7.198)		
Viral Load Variance (per ml)			1	<0.001			
<1000	539	Reference category			Not entered		
>1000	260	4.005 (2.738-5.859)					
Mean Viral Load (per ml)						1	<0.001
<10,001	540	Not entered			Reference category		
>10,000	259				2.945 (1.802-4.812)		

Table 6.6: Logistic regression models for predicting a variation in viral load of 1000 or more copies/ml and predicting a mean viral load of 10,000 copies/ml during the study period in women

	n	Variation in viral load of 1000 or more copies/ml			Mean viral load of more than 10,000 copies/ml		
		Adj OR 95.0% C.I (-/+)	df	P	Adj OR 95.0% C.I (-/+)	df	P
Residency			2	0.829		2	0.372
UK	382	Reference category			Reference category		
Non-UK	339	0.881 (0.572-1.356)		0.564	0.735 (0.473-1.140)		0.169
Unknown	78	0.877 (0.472-1.628)		0.678	0.909 (0.496-1.666)		0.759
Age Group			2	0.089		2	0.239
0-25	111	Reference category			Reference category		
26-39	477	1.150 (0.716-1.848)		0.563	1.140 (0.702-1.851)		0.595
40+	211	0.731 (0.421-1.271)		0.267	0.795 (0.450-1.406)		0.431
Ethnicity			2	0.404		2	0.657
White	226	Reference category			Reference category		
Black	518	1.364 (0.853-2.182)		0.195	1.225 (0.761-1.973)		0.404
Other/Mixed/Unknown	55	1.336 (0.680-2.625)		0.400	0.988 (0.468-2.085)		0.974
Antiretroviral therapy			2	<0.001		2	<0.001
No therapy	266	Reference category			Reference category		
Triple or less	342	0.205 (0.133-0.317)		<0.001	0.156 (0.101-0.242)		<0.001
Quadruple or more	191	0.371 (0.230-0.600)		<0.001	0.202 (0.122-0.335)		<0.001
Stage of disease			2	0.794		2	0.220
Asymptomatic	453	Reference category			Reference category		
Symptomatic	203	0.875 (0.575-1.332)		0.533	1.365 (0.882-2.111)		0.163
AIDS/Death/Unknown	143	0.883 (0.533-1.463)		0.629	0.890 (0.508-1.559)		0.684
Pregnancy status			1	0.175		1	0.062
Not pregnant	717	Reference category			Reference category		
Pregnant	82	0.632 (0.325-1.228)			0.538 (0.280-1.031)		
Inpatient Care			1	0.076		1	<0.001
None	680	Reference category			Reference category		
One or more	119	1.541 (0.957-2.481)			2.389 (1.478-3.864)		
First seen			1	0.607		1	0.044
First seen prior to mid-04	441	Reference category			Reference category		
First seen mid-04 to mid-06	358	1.104 (0.758-1.608)			1.460 (1.011-2.109)		
CD4 Variance (cells/mm³)			1	<0.001			
<100 cells	376	Reference category			Not entered		
>99 cells	423	3.956 (2.705-5.786)					
Mean CD4 count (cells/mm³)						1	<0.001
>200	682	Not entered			Reference category		
<201	117				3.053 (1.887-4.938)		

Discussion

The general female HIV positive population was of childbearing age and the majority of pregnant HIV positive women were of black ethnicity (table 6.1). Figure 6.1 shows that HIV positive women had higher rates of conception in all age groups apart from those in the 30-34 and 40-44 ages. This is likely to be because of the disproportionate number of women of childbearing age who are affected by HIV. Black women are disproportionately represented in the North West HIV epidemic⁹ therefore it follows that they would also be disproportionately represented among pregnant women with HIV. However, considering that they represented 69% and 65% of all female HIV positive cases in 2005 and 2004 respectively and white women represented 24% and 27% in 2005 and 2004 respectively, black women are slightly over represented and white women slightly under represented in these pregnancy data. This is because a greater proportion of the general HIV positive black women are of childbearing age (15-44 years) than white HIV positive women, 88% in both years for black women compared to 78% and 75% in 2004 and 2005 respectively for white women. However, a greater proportion of white women became pregnant at an earlier age than black women. Data in figure 6.2 show that although black and minority ethnic groups have higher rates of pregnancy in the North West than white females, black HIV positive females represent the group with the highest rate of pregnancy. These data indicate that HIV positive black women are more likely to become pregnant than any other group which may be due to cultural differences as the majority are non-UK nationals (64%). As such these data could represent a true picture of the childbearing differences between cultures (especially in those cases where the women are from outside the UK), since published research maintains that HIV positive women are no less likely to become pregnant than uninfected women¹⁰. However, it may partially represent differing views on the acceptability of the risks posed by pregnancy in a HIV positive woman. Alternatively it could represent the pattern of targeted antenatal screening in the North West. Previous research states that women from low-risk groups are more likely to decline testing¹¹ therefore any change in risk to this group would remain undetected for longer. However, these data may support the view that at the very least, higher risk women are not opting out of antenatal HIV testing. Although, with the number of undiagnosed heterosexual women born outside Africa at almost as much risk of being undiagnosed as those women born in Africa (2,300 compared to 3,100)⁷ antenatal screening should aim to target all pregnant women. Black and minority ethnic groups tend to reside in areas with higher levels of deprivation¹². In addition to this HIV positive people also experience high levels of deprivation (see chapter 4). As such figure 6.2 also helps to illustrate the pattern of deprivation in the childbearing population of the North West and the compound effect HIV has on already disadvantaged members of society.

Pregnancy appears to be one of the compelling reasons behind women seeking HIV treatment and care, with 72% of pregnancies coinciding with first access to HIV care services. Although 28% of pregnant women were seen prior to this study period we cannot be sure that they did not discover their positive status during a previous pregnancy, as we do not have data prior to mid-2004. However, it is clear from the sample we have that the majority of pregnant women are presenting for HIV treatment and care for the first time during pregnancy. This is likely to be due to the success of resident antenatal screening. As such antenatal screening should continue to encourage a minimum 90% testing uptake in all pregnant women especially as the latest North West figures show that there is currently only 75% uptake⁵.

For those women whose residency status is known, around half were non-UK nationals (including asylum seekers, immigrant workers, students and dependents of these groups). Non-UK nationals were not more likely to be pregnant, but they did form the largest number of pregnant women (56% of those where residency status was known). For some of these individuals, pregnancy has no doubt occurred at a stressful time (i.e. while seeking asylum), and such individuals have already been shown to have greater need of support services¹³. Should their application for asylum fail then these women could lose their right to free treatment and care. However, with current policies surrounding eligibility for treatment, including antenatal care generally (including screening), and antenatal HIV care specifically, still to be clarified BHIVA guidance recommends that full antenatal care be given to all pregnant women regardless of their immigration status¹⁴.

Findings show that pregnant women do not experience more variation in their CD4 counts or viral loads. However, women who are not pregnant are more likely to have variation in their CD4 counts compared to pregnant women. Pregnant women may have more stable CD4 counts and viral loads if they are diagnosed at a very early stage in their infection and also due to the commencement of ART during, or at the end of, their pregnancy. Ethnicity was a significant predictor of variation in CD4 count but not for other virulence markers or an indicator of ill-health. Yet women from black and other/mixed/unknown ethnic groups were more likely than white women to experience variation or poor health indicators (tables 6.5 and 6.6). The significant impact of ethnicity on virulence markers has been previously documented. Muller et al. (2006) undertook a study to explore the virulence levels of HIV-1 in a Swiss population to detect local disease evolution. Pilot results indicated that ethnicity (black versus white) had a significant effect on the virulence markers therefore black participants were excluded from the final analysis¹⁵. Therefore, ethnicity may account for the difference between the variance in CD4 among pregnant women compared to non-pregnant women, as the majority of non-pregnant women are of black ethnicity. However, it may also be due to the fact that the vast majority of pregnant women were at the asymptomatic stage of HIV and were relatively new to treatment and care and may therefore not be experiencing high levels of the virus to begin with resulting in less dramatic variation in CD4. As we do not have full knowledge of the baseline data further work is required to determine the impact gender and ethnicity have upon, not only CD4 counts and viral loads, but on the

extent of variance of both CD4 counts and viral loads over time on treated and untreated general populations before we can fully understand the impact pregnancy may have on the stability of women's health.

Pregnant women did experience a higher level of inpatient care than their non-pregnant counterparts (table 6.4). This finding is not surprising as one inpatient stay to give birth is almost inevitable. However, it is likely that the true extent of this additional care is not fully represented in these analyses as only inpatient stays from their main centre of HIV care is collected as part of the routine HIV monitoring in the North West and many women receive antenatal care from other centres. The question remains as to whether HIV positive women use more inpatient care than pregnant HIV negative or serostatus unknown women. This question cannot be addressed as part of this work. However, findings showed no significant difference in the number of outpatient service use between pregnant and non-pregnant women. Without the means to monitor the difference in service use (both antenatal outpatients and inpatients) and any subsequent differences between HIV positive pregnant women and HIV negative or serostatus unknown women this question will remain unanswered.

Antiretroviral therapy has dramatically reduced the rate of HIV transmission from mother to child. Quadruple therapy (using a triple combination with a booster level of Saquinivir and Ritonivir) is the most commonly prescribed regimen for HIV positive women (table 6.2). Women were more commonly prescribed triple therapy when not pregnant. Since two thirds of asymptomatic people with HIV do not take ART, this may raise the question of the additional drug costs incurred during pregnancy. It is very likely that additional costs are incurred in prescribing ART at an early stage of the course of HIV disease where ART would not normally be prescribed. However, these drugs are only prescribed for the duration of the pregnancy where deemed necessary. The increased level of therapy prescribed can produce further overheads (compared to triple therapy) and BHIVA guidelines do not support this level of therapy for the purpose of reducing the number of pills prescribed, however the cost often depends upon supplier and treatment centre purchasing power which could potentially make the difference in the cost of quadruple therapy compared to triple therapy negligible¹⁶.

The main health care issue regarding drug therapy in pregnancy relates to multi-drug resistance. Concerns have been raised about medication decisions becoming increasingly complicated in the next few years as more HIV positive women choose to become pregnant⁴. These worries focus upon women prescribed therapies for short periods of time who return to no therapy due to the end of their pregnancy and their overall good health. Concerns also relate to teratogenicity and the development of resistance to the drugs prescribed in utero as this may reduce future prescribing options if the child seroconverts and have an overall negative impact on morbidity and mortality. However, current research measuring Nevirapine resistance has shown promise. Findings from this study showed that detectable resistance appeared to be transient and was no longer present in plasma 12-24 months post-partum¹⁷.

Limitations of the data

HIV conception data for 2005 were compared to North West conception data for 2004 as this was the latest available for comparison, which may have had a minor impact on the findings. Conception data by ethnicity had to be explored from an area-based classification of conceptions as such it may not fully represent all conceptions for all ethnicities accurately. However, as these data are not collected nationally this method represents the best available data. Further, detailed demographic data are not collected as part of the regional antenatal screening and this has hindered efforts to highlight the regional picture of antenatal screening. Further joint work between the Health Protection Agency (HPA) and the Centre for Public Health (CPH) could improve data collection for both newly diagnosed cases and those cases diagnosed antenatally. This would ensure that cases outside the traditional HIV services are not missed from the Survey of Prevalent HIV Infections Diagnosed (SOPHID) thereby securing subsequent funding.

The pregnancy data extracted from the HIV/AIDS Monitoring Unit may conceal conceptions as data are only captured once in any six month period and a full term pregnancy is assumed in those cases where pregnancy is recorded over two six month periods. With this method it is possible that the HIV pregnancy rates are under estimated. Pregnancy is not followed up to record the outcome, including the HIV status of the baby. Therefore we cannot report on it here. Further, although inpatient stay was significantly higher for pregnant women it is important to note that these data are collected only from the clinic where the patient receives her HIV treatment and care. The inpatient care a woman may receive at a maternity unit in a different hospital is not reported to the HIV/AIDS Monitoring Unit and, therefore, cannot be included in these analyses. As such the full use of treatment and care services during and after childbirth cannot be calculated for the purposes of this study.

To conclude, these data show clearly that the majority of HIV positive women are of childbearing age. They also show a higher rate of pregnancy in HIV positive women compared to that in the general North West female population. More HIV positive black women are affected by pregnancy than any other ethnic group however ethnicity is not a predictor for pregnancy in the HIV positive female population. Yet black HIV positive women show the highest rate of conceptions compared to other ethnic groups in addition to much higher conception rates than black women in the general population. These data also reveal a picture of deprivation among black and minority ethnic HIV positive women of childbearing age. Overall, pregnancy is a driver behind HIV diagnosis and initial access to treatment and care. Pregnancy did not appear to be detrimental to health although it did impact upon treatment decisions relating to ART. HIV positive pregnant women are significantly more likely to experience

inpatient care; however the full extent of this remains unknown. With the successes in mother to child prevention interventions, concerns continue over their long term implications and future longitudinal work relating to ART effectiveness in women who have previously undertaken an ART regimen during pregnancy would be valuable. Further research is also needed to address gaps in knowledge over ethnic and gender differences in viral progression and fluctuation in both treated and untreated groups. Also, research focusing on the influence of culture on women's reproductive decision-making would highlight the issues faced by HIV positive women of childbearing age. Finally, it is important to continue monitoring the number of pregnancies within the HIV positive population of the North West so that we are aware of changing trends and the impact of pregnancy upon service use and women's health.

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