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SEX WORK AND HEALTH IN LONDON

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Thesis submitted for the degree of Doctor of
Philosophy (PhD) by prior publication

City University London

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February 2010

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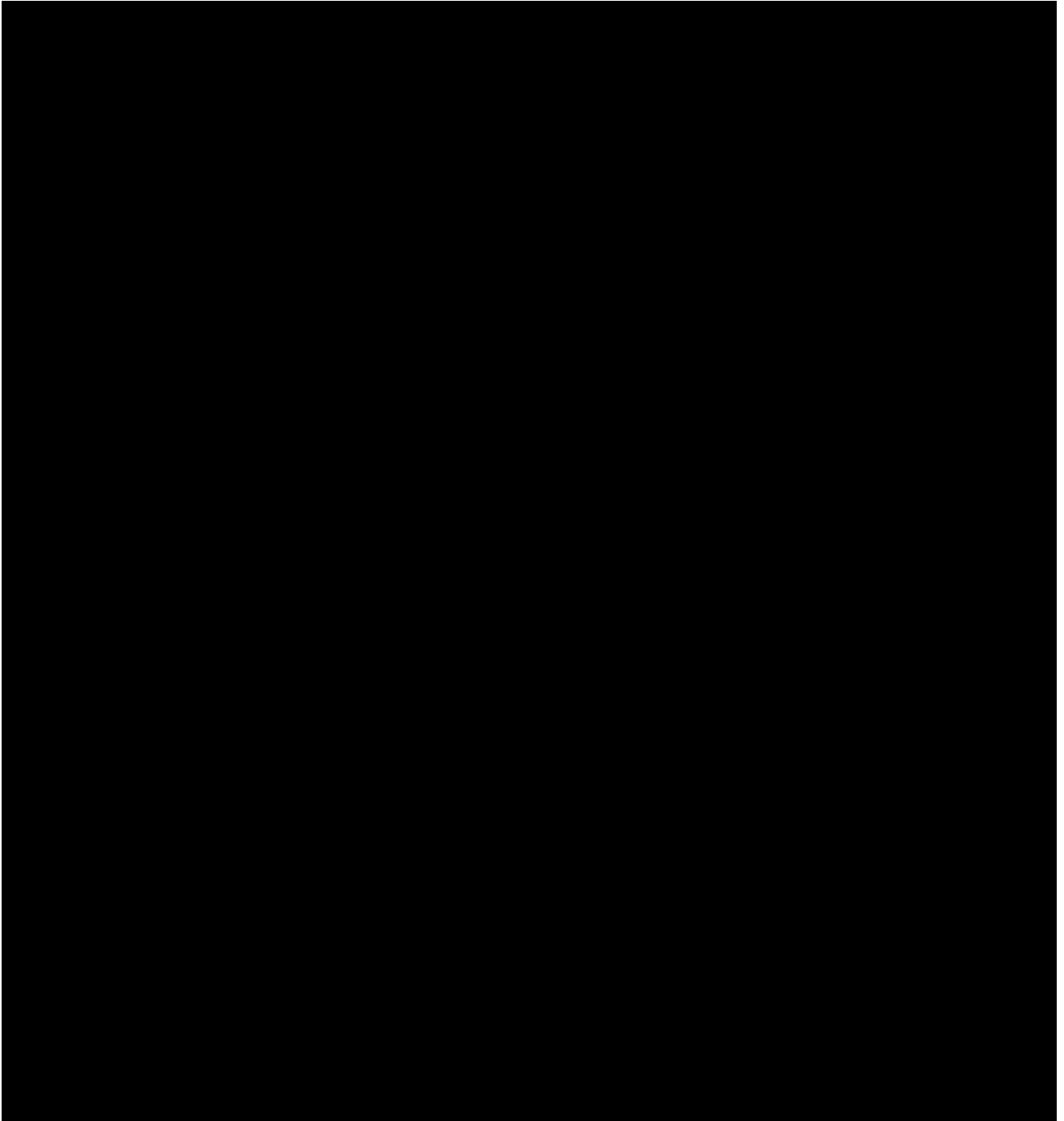
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Acknowledgements



Declaration

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Abstract

This thesis comprises 12 publications from two decades of research into sex work and health. The papers report on the risks and determinants of HIV and other sexually transmitted infections (STI) in women selling sex in London. The research combined clinical, epidemiological and anthropological methods in a programme that aimed to inform policies and interventions to reduce STI and HIV risks and improve the health and well-being of sex workers.

In the accompanying commentary, chapter 1 places the papers in a broad narrative by describing the context of the work which began with the early days of the AIDS epidemic and continued through new challenges including the impact of globalisation and migration.

Chapter 2 is a critical review of the major findings in relation to HIV and STI risk, and includes new tables summarising estimates of effect sizes from across the studies. I then discuss major risk factors, placing the findings in the context of the wider literature, and suggest a conceptual framework linking the determinants.

Chapter 3 provides a more detailed description of the ways that different research methods were used to test specific hypotheses. In particular, I show how qualitative work uncovers the importance of structural factors, such as the organisation of flats and the distribution and consumption of drugs, in determining individual and group level behaviours and risks. I provide a brief critique of the use of mixed methods in biomedical research, and stress the importance of grounding both qualitative and quantitative work in appropriate theoretical frameworks.

Chapter 4 summarises the thesis and re-asserts the need for a model of causation that incorporates social, economic, behavioural and structural factors. The development of interventions requires a synthesis of evidence from many disciplines, together with the perspective of participants whose agency will be the key to successful implementation.

List of Abbreviations

aOR	Adjusted odds ratio
CI	Confidence Interval
CLASH	Central London Action on Street Health
HIV	Human immunodeficiency virus
IDU	Injecting drug user
JWC	Jefferiss Wing Clinic
NPP	Non-paying partner
OR	Odds ratio
PSC	Praed Street Clinic
PSP	Praed Street Project
STI	Sexually transmitted infection
STD	Sexually transmitted disease

Chapter 1. Two decades of research: the story

1.1. Setting the scene

In 1984 an elegant woman dressed in a cream coat with a fur collar walked into the shabby consulting room I was using in the Praed Street Clinic. She asked for a check up. During the routine sexual history she reported several male partners over the past month; one was her husband, the rest were men who paid her for sex. After carrying out the usual examination and taking swabs and blood to search for signs of infection, I called her back in to confirm that we had found nothing wrong, and that the results of further laboratory tests would be available in about 10 days. When I had finished my standard script I paused and asked if she minded me asking her something. She said go ahead, and I asked if she enjoyed her work. That opened up a fascinating discussion, probably much to the annoyance of the line of women queuing in the corridor outside. I did not record her response in any way, but I recall her explaining that she found it a good way of earning a living, she met interesting people, enjoyed a lifestyle that many could only dream of, and that she felt able to work safely. She asked whether I too enjoyed my work.

At that time I was a junior doctor in the Praed Street Clinic. It was, according to our charismatic head consultant, Willie Harris, the busiest clinic in Europe. Around 70,000 patients walked through the doors each year and stepped onto the production line that characterised our "Fordist" model of care.(Navarro 1991; Walby et al. 1994) There were no appointments; people queued first outside the

doors and then again to register, men on one side, women at a matching hatch on the other side. Once registered, patients were given a number and directed to wait in the corridor outside the consulting rooms. Two doctors worked on the male side, two on the female side. Consultants had additional consulting rooms and offices in the middle with doors opening onto both sides so they could call in men or women. The clinic was open from 9 am until 7 pm each day, and doctors had an hour off for lunch. In those nine hours we could see 40 to 50 patients each, so I estimate that in my first six month attachment in 1984 I saw somewhere in excess of 3000 patients. So why did this woman stick in my mind?

It was because she challenged my assumptions about prostitution¹. She opened my eyes. I had seen many other women who sold sex – the clinic was located in a red light area and had a long tradition of providing care to prostitutes. The women were easily identified in the notes with “£sd” (shorthand for pound, shillings and pence, signifying money) scribbled next to the space for recording occupation (whether or not the woman had disclosed this as her job). Many of these women were a better fit with my stereotype – younger, chaotic, short skirts, mouthy. There will no doubt have been many others who did not disclose their work to me, sensing my prejudice.

But from this woman I learned not to pre-judge, an attitude that is in fact fundamental to effective work in genitourinary medicine, but all too difficult in practice. I realised, from her and from many other people I met in those first six months, that I could not assume I knew about people from how they looked, or from the label they carried. Prostitute, gay, drug user, old, black, Asian, disabled.

¹ Terminology is contested, with “prostitute” seen as a term of abuse by some who prefer the term sex worker, while others reclaim terms like “prostitute” and “whore” as part of asserting an identity. In this work I use both terms, reflecting norms at the time of the publications I discuss. However, I agree with the notion that prostitution is better presented as a form of labour and therefore prefer sex worker in contemporary writing.

None of these labels adequately described or grouped people, and certainly did not predict their sexual or health-related behaviour. I was starting to realise how much I didn't know.

I returned to the Praed Street Clinic as a Research Registrar in 1985 after a year in acute medicine had made me realise that sexual health was the career for me. I was soon asked to take over a special clinic that another Registrar, Simon Barton, had set up for prostitutes. Simon had carried out a small study in which he asked women about AIDS-related risk behaviours, and tested them for sexually transmitted infections (STI) and HTLV-III (as HIV was known at the time).

Taking over the clinic I wanted to continue the research, and was soon introduced to Sophie Day, an anthropologist who had been awarded a grant to explore AIDS and prostitution in London. The "challenge" that Sophie presented me with reflected her different disciplinary background which led her to constantly ask why, to question my assumptions, to query methods of collecting data, to pick holes in my naïve questionnaires and my interpretation of the data.

What followed was the coming together of our two research interests to create a programme of research that was to span two decades and to take us out of the clinic, onto the streets and into the agencies and brothels of west London. I came to realise that studying individual behaviour and measuring disease prevalence and incidence were never going to provide a coherent understanding of the risks of HIV for sex workers, still less inform effective strategies to minimise these risks. These research methods had to be combined with those that uncovered the contexts of those behaviours, the determinants of the determinants. Over the course of our work together, Sophie and I incorporated many methodological approaches - clinical research, descriptive surveys, analytic cohort and case

control studies, a clinical trial, ethnography, qualitative research, mapping, mathematical modelling and molecular epidemiology.

This chapter introduces that research programme in the form of a narrative linking together 12 papers published between 1988 and 2007. It is only part of the story since it focuses on the clinical, epidemiological and quantitative aspects of the research that I took primary responsibility for. But the story also includes some of the qualitative research that we undertook. For a richer, more in-depth account of the period with a focus on the anthropological work I recommend Sophie's prize-winning monograph, *On the game: women and sex work*.(Day 2007) For my part, I will start with the context in which we began the research, and then let the papers take the story forward.

1.2. The papers submitted as part of this thesis

- Paper 1. Day S, Ward H, and Harris JRW. Prostitute women and public health. *British Medical Journal* 1988;297:1585.
- Paper 2. Ward H, Day S, Mezzone J, Dunlop L, Donegan C, Farrar S, Whitaker L, Harris JRW, Miller DL. Prostitution and risk of HIV: female prostitutes in London. *British Medical Journal* 1993;307:356-8.
- Paper 3. Day S, Ward H, Perrotta L. Prostitution and risk of HIV: male partners of female prostitutes. *British Medical Journal* 1993;307:359-361.
- Paper 4. Ward H, Day S. Health care and regulation: new perspectives. In *Rethinking prostitution. Purchasing sex in the 1990s*. Scambler G and Scambler A (eds), Routledge, London, 1997:139-164.
- Paper 5. Ward H, Day S, Weber JN. Risky business: health and safety in the sex industry over a nine year period. *Sexually Transmitted Infections* 1999;75:340-343.
- Paper 6. Ward H, Pallearos A, Green A, Day S. Health issues associated with the increasing use of crack cocaine among sex workers in London *Sexually Transmitted Infections* 2000;76:292-293.

- Paper 7. Green A, Ward H, Day S. Crack cocaine and the transformation of prostitution in London in the 1990s. *Sociology of Health and Illness* 2000;22:27-39.
- Paper 8. Ward H, Day S, Green A, Cooper K, Weber J. Declining prevalence of STI in the London sex industry, 1985 to 2002 *Sexually Transmitted Infections* 2004;80:374-379.
- Paper 9. Fox J, Day S, Taylor G, Ward H. How safe is safer sex? High levels of HSV-1 and HSV-2 in female sex workers in London *Epidemiology and Infection* 2006;134:1114-1119.
- Paper 10. Ward H, Mercer C, Wellings K, Erens B, Copas A, Fenton K and Johnson AM. Who pays for sex? An analysis of the increasing prevalence of female commercial sex contacts among men in Britain *Sexually Transmitted Infections* 2005;81:467-471.
- Paper 11. Ward H, Day S. What happens to women who sell sex? Report of a unique occupational cohort. *Sexually Transmitted Infections* 2006;90:413-417.
- Paper 12. Cooper K, Day S, Green A, Ward H. Maids, migrants and occupational health in the London sex industry. *Anthropology and Medicine* 2007;14:41-54.

1.3. The story

1.3.1. Context: AIDS panic

In the 1980s at the start of the AIDS pandemic there was concern that sex workers would be at high risk of acquiring HIV, providing a route for it to spread into the wider population. By the mid-1980s this produced concern among sex workers, policy makers (including suggestions of opening regulated brothels) and people involved in HIV prevention.(Day 2007)

By 1986, when this story begins, what was known about AIDS and prostitution? It had been established that HIV was a sexually transmitted infection, primarily affecting gay men in the UK, Europe and North America, heterosexuals in Africa

and a smaller number of people infected through blood-borne transmission from blood products or infected needles.(Curran et al. 1985; Jaffe et al. 1985; Johnson et al. 1985; Peterman, Drotman and Curran 1985) Following on from this, many people assumed that prostitutes might be at risk of infection themselves, and that they might play a role in transmission of HIV to a wider population.(Kreiss et al. 1986; Neequaye et al. 1986; Quinn 1987; Van de Perre et al. 1985) For example, a study in Nairobi concluded that, “our results indicate that the AIDS virus was recently introduced into Kenya, that HIV can rapidly disseminate in a high-risk group of heterosexuals, and that prostitutes may have significantly contributed to the spread of the virus”.(Piot et al. 1987)

These early findings of high rates of HIV in prostitutes in Africa, together with epidemiological models of STI which explained the persistence of bacterial STI through the existence of core groups (Yorke, Hethcote and Nold 1978), led to the obvious conclusion that prostitutes would be both highly vulnerable and play a key role in transmission. Reviewing the literature at the time however, it became clear that the risk of HIV and of other STI was variable according to geographical setting, prostitution sector and time, and therefore a single model of vulnerability and transmission risk was crude. (Ward 1988; Ward and Day 1991) Indeed at that time very little was known about the organization of the sex industry, particularly about the variations that existed. Clearly an early priority was to identify whether high rates of HIV were to be found among prostitutes in different parts of the world, including London.

1.3.2. *Early findings*

Our earliest research, building on the preliminary



Figure 1.1 The site where the Praed Street Clinic was based in the 1980s, now a hospital ward.

work done by Simon Barton, involved interviewing women who identified as sex workers, testing them, with consent, for HIV and other STI and inviting them to come back periodically for follow-up.(Barton, Taylor-Robinson and Harris 1987) In 1988 we published our first academic paper, a short communication in the BMJ (paper 1), that reported an HIV prevalence in sex workers attending the clinic of 1.6%, three of 187 women tested.(Day, Ward and Harris 1988) Two of the women with HIV were injecting drug users (IDU) and one reported that she was infected by her boyfriend.

The same article showed that condom use was quite high for vaginal sex with clients, less for oral sex, and substantially less with boyfriends. Condom use with clients was increasing rapidly, and episodes of unprotected sex were not random. The paper reports data from a subgroup of 35 women who had provided detailed information on each sexual contact; 31 women (88%) had used condoms with all their clients. Of the four women who had unprotected sex with clients, this occurred with regular clients (i.e. men whom the women already knew and had previously had sex with). There was only one episode of unprotected sex with a new client. This finding is of interest because it can influence the risks of transmission: if all new partnerships are protected (ie unable to transmit infection) then the effective rate of partner change is much less, with only a smaller number of partnerships able to transmit organisms. It shows a methodological problem around the kind of data required to study risks, i.e. not just numbers of partners and level of condom use, but numbers of partners, characteristics of partnerships, for example duration, frequency of sex and condom use within partnerships.

We concluded that HIV was only indirectly related to sex work – these women were at risk from drug use and boyfriends rather than their large numbers of

commercial sexual partners. We also commented that “enumerating stigmatised populations such as prostitutes is not possible, and therefore findings from our study can be generalised only with caution”.

Several important themes are present in this short report and they continue through later work. These include the challenge of sampling stigmatised groups, the importance of correct exposure measures, including which behaviours, with which partners and over which time frame, and the importance of understanding context both for developing interventions and for interpreting and understanding findings from research.

Over the first two years of this research, it became apparent that there was both a need and a demand for services – health care (STI diagnosis and treatment, more general health care, reproductive health services, drug services), health promotion (advice, condoms, vaccination, contraception) and broader support (legal advice, education and careers, dealing with violence and abusive relationships, childcare etc).

1.3.3. *Founding the Praed Street Project*

Building on this initial research, I was fortunate to obtain a grant from the MRC to further explore the risks of HIV in sex workers. The three year project included a repeated cross sectional study to assess change in HIV and STI prevalence over time, including recruitment outside the clinic (through outreach) to try and address potential bias and the establishment of a cohort study to measure STI incidence and longer term problems.

Over the same period, 1987 – 1989, we obtained further research funding for a study of clients and other male partners to look at their risks and behaviours, and a small amount of NHS funding for the development of a service for sex workers,

starting with an outreach worker and premises for a drop-in centre.

The Praed Street Project was thus founded using a combination of research and service funding, and housed initially in a Portakabin in the car park under the clinic. The evolving project combined clinical services, outreach and a drop-in centre for sex workers with a detailed research programme.

1.3.4. *Reaching out beyond the clinic*

The next paper, published in 1993 (paper 2), is a report of the cross sectional study of 280 women recruited in a wider range of settings, and given the option of anonymised HIV testing.(Ward et al. 1993) These changes in design were included to try and address potential bias in both a clinic-based sample and in only including results from those who consented to HIV testing. We found a similar HIV prevalence (0.9%) and again noted differential patterns of condom use across partnerships. We also measured the prevalence of and risk factors for other sexually transmitted infections. Fourteen percent of the women had one or more acute STI at the time of recruitment, and we found this to be associated with younger age and the number of non-paying partners. The paper concludes with a call for health promotion campaigns to address these non-commercial risks rather than focus solely on sex workers as a potential source of infection for their clients.

The paper was published back-to-back with a report of a cross sectional study of 112 male partners of female prostitutes (paper 3).(Day, Ward and Perrotta 1993) These men were mainly clients, but included a small number of non-commercial partners. The prevalence of HIV was 5%, but only 40 had an HIV test. A relatively high proportion of these men reported one or more other potential risks for HIV, including sex with men as well as women, commercial sex contacts in other

countries, blood transfusions and injecting drug use. Once again we found differential condom use by partner type, with higher use in commercial contacts. There were clear limitations in both these studies, not least in sample size and possibly biases, but nonetheless, taken together they showed a higher prevalence of HIV in male partners than in the sex workers (OR 5.95, 95% CI 1.02, 34.80, $p = 0.047$). This finding challenged the still dominant assumption that sex workers were a risk to the “general population” in the UK.

These two research papers reported just a small fraction of the work that we had done on sex work after 1986 in London. The research developed hand-in-hand with a service for sex workers, the Praed Street Project. The next article (paper 4), published as a book chapter in 1997, describes the development of the project in relation to research and service delivery, and includes reports of outreach work

in the local area that help to provide a picture of the local sex industry.(Ward and Day 1997) In this chapter the concerns of the sex workers come through more vividly than in the other more academic papers, and the emerging sex workers’ rights movement is briefly introduced. We conclude with a note of caution about the role of “experts”, such as ourselves, who are often tempted to speak out as advocates for prostitutes when they would be better served in speaking for themselves.



Figure 1.2 Entrance to walk-in flat in West London.

Delivering services alongside research made it easier to maintain contact with

sex workers over time, and many of the original participants enrolled in a follow-up study that enabled us to measure STI incidence and behaviour change as well as carry out more in depth research. The next paper (5) reports a cohort of 320 women followed from 1985 to 1994, who made 2921 visits with a median follow up of 18 months (range 1 to 100 months). (Ward, Day and Weber 1999) Condom use increased substantially over time, particularly with commercial contacts. The incidence of HIV was 0.23, gonorrhoea 5.6, chlamydia 12.6 and genital herpes 6.5 (all per 100 person years). As in the previous papers, non-commercial contacts appeared to be the main risk for STI: for example, the relative risk of gonorrhoea increased by 2.30 (95%CI 1.41, 3.76) for each additional non-commercial partner (in the previous month). In this paper we also reported a mortality of 5.93 per 1000 person years, 12 times the expected rate for women of a similar age in London. This last finding highlighted the wider risks facing sex workers: two of four deaths were HIV-related, the other two were from violence. (Kinnell 2008)

1.3.5. *The 1990s: drug use and sex work*

In the early-1990s sex workers had become the focus of another set of scare stories, shifting the focus from spreading HIV to wreaking havoc through the use of crack-cocaine. Epidemics of crack use were reported from the inner cities of the USA, and by the 1990s these had apparently spread to London where there were fears of a chaotic crack-prostitution that would spread infection and public disorder. We carried out a detailed study of crack and other drug use, comparing patterns of use in 1989-91 with those in 1995-6.

The 6th paper reports on the health issues associated with crack cocaine use in women attending the Praed Street Project clinic. (Ward et al. 2000) Lifetime use of crack had indeed increased (from 11% in 1989-91 to 34% in 1995-6), but it

was less problematic than previously thought. A small proportion of the women who had used crack were found to have significant health and social problems linked to crack use, including unplanned pregnancy and hepatitis C infection.

The next paper (7) includes a more detailed exploration of crack use in the sex industry based on an ethnographic study.(Green, Day and Ward 2000) This method allowed the exploration of issues in more detail, looking at the relationship between drugs and sex work at a structural level as well as for individual women. Fifty-seven interviews were conducted with 37 women who described a wide range of patterns of crack use. As with the clinic study, for most women crack use was less problematic than suggested by media reports. However, we found that for some women crack use altered the nature of relationships such that greater risks were taken. Clients, dealers and boyfriends became interchangeable categories and the norms of safety of the sex industry often disappeared as a partner changed from, for example, being regarded as a client to being a “smoking partner”. One woman explained, “If I had a boyfriend I would do it without a Durex (a brand of condom). The only reason I went with all these boyfriends was because they had crack and loads of money for crack”. This study paints a more vivid and complex picture of parts of the local sex industry than is revealed in the clinical and epidemiological papers.

1.3.6. *Globalisation, migration and change*

In the UK there have been major shifts in the epidemiology of sexually transmitted infections over the past two decades. In the 1980s there was a steep decline in diagnoses of syphilis and gonorrhoea, generally attributed to changes in behaviour in response to the AIDS epidemic. By the mid-1990s the incidence of these two bacterial infections fell to a historic low. The second-half of the 1990s saw a reversal of this trend, with a steep increase first in the number of

cases of gonorrhoea, and later in syphilis as well. During the 1990s there was also a noticeable change in the sex industry which was apparent in the work of the Praed Street Project as well as in wider culture. In short, there was a shift to a more migrant workforce including large numbers of sex workers from eastern and central Europe and countries of the former Soviet Union, plus ongoing concern about the increase in crack use. These changes prompted us to initiate new research into the sex industry in a project funded by the Wellcome Trust, “Changes in Prostitution 1985 – 2000”. In the proposal we hypothesized that this restructuring of the workforce may undermine established norms of health and safety in the industry.

Paper 8 includes the first results of this later study, analysing trends in new patients registering at the Praed Street Project clinic from 1985 to 2002. (Ward et al. 2004) There was indeed a major restructuring in the sex industry, with a shift to a predominantly migrant workforce. These women did not

match the stereotype of very young, vulnerable and trafficked women. Comparing

more recent recruits (1996 – 2002) with those from an earlier period (1985 – 1992), we found significantly more migrants, but they were also older, older at first sex work and less likely to have any acute STI (gonorrhoea, infectious syphilis, chlamydia, trichomoniasis, first episode genital herpes or warts). The paper documents a steep and continued decline in the prevalence of acute STI among sex workers in contrast to trends in the wider population. We also



Figure 1.3 Phone box in west London with adverts for local sex workers

explored risk factors for acute STI through a nested case control study; this is the first analysis in which unprotected sex with clients (as opposed to non-commercial contacts) appeared as a significant risk factor.

This paper concludes, “We attribute the decline in acute STI to an increase in safer sex”. (Ward et al. 2004) It reinforces earlier findings that condom use is widespread in commercial sex, and that consistent use appears to provide effective protection from bacterial STIs and HIV. However, condoms are not equally effective against all sexually transmitted infections. In the next paper (paper 9) we used stored serum samples collected from women over the course of the study to measure the prevalence of IgG antibody to herpes simplex virus (HSV-1 and HSV-2) using type-specific ELISAs.(Fox et al. 2006) The seroprevalence was 74% for HSV-1 and 60% for HSV-2. The latter declined over time, with an odds ratio of 0.3 (95% CI 0.19, 0.49) for women first attending in 1996-2000 compared with those first attending in 1985-1990). HSV-2 was independently associated with time in sex work and being born in a developing country. This paper is important since it shows that “safer sex” is a relative rather than an absolute – women who can work very safely in terms of HIV, gonorrhoea and syphilis may still risk acquiring, and transmitting, genital herpes.

1.3.7. *The men who pay for sex*

The migration that had transformed the sex industry workforce was part of broader social and economic changes that have been termed “globalization”.(Ward and Aral 2006) These changes also appear to be having an impact on the demand side of the sex industry. In “Who pays for sex?” (paper 10) I collaborated with the National Survey Of Sexual Attitudes And Lifestyles (NATSAL) research group to analyse data from their two national population surveys.(Ward et al. 2005) Between the two surveys (1990 and 2000) the

proportion of men in the UK who reported paying for heterosexual sex in the previous five years more than doubled from 2.0% to 4.2%. Paying for sex was associated with other risk behaviours (higher numbers of sexual partners and meeting partners abroad), and most common in men aged between 25 and 34 years, who were never or previously married, and who lived in London. Unlike our earlier convenience sample (paper 3), there was no association with injecting drug use or with same sex contact.(Day, Ward and Perrotta 1993)

1.3.8. *The longer term*

The penultimate paper (paper 11) addresses a rather different question than the earlier work.(Ward and Day 2006) It is concerned with longer term outcomes and includes a broader approach to health and well-being. We report findings from a unique cohort of 130 women who were initially recruited to the earlier research between 1986 and 1993, and who were traced again some 15 years later. The majority (59%) of women were still in the sex industry and had sold sex for a mean of 13.6 years. As with the earlier follow-up (Ward, Day and Weber 1999) we found a relatively high mortality, and a high life-time risk of STI. However, the most troublesome long term health problems related not to infections but to mental health, including addiction, and were equally common in those who were still in the sex industry and those who had left. This paper presents a brief picture of the complex lives of women who have had to balance risks with opportunities while negotiating extensive obstacles and stigma. The toll on their mental health is not surprising while attitudes and policies towards sex work remain so universally repressive. This paper concludes with a brief discussion of the potential pitfalls of policies on prostitution.

The final paper (paper 12) reports an ethnographic study linked to the work reported in papers 8 and 11. A survey of local walk-in flats was carried out in

2001 alongside another local project (Central London Action on Street Health, CLASH), to provide a partial mapping of the sex industry in the area which included an estimated 95 flats in which women sold sex. (Cooper et al. 2007) Kate Cooper then carried out intensive fieldwork in five flats, and her detailed observations contribute to this article. The changes in the sex industry that we reported in papers 8 and 11, particularly the shift to a migrant workforce, are explored. Through this qualitative work we were able to identify clear mechanisms by which health and safety is sustained in this sector of the industry. Maids are, in effect, managers of the flats who deliver effective induction and training for new workers, and the complexities of these relationships are explored.

1.4. Key themes

The story told by these 12 papers has many threads, subplots and themes, some of which will be taken up in detail in later chapters. To conclude the overview I want to highlight two key issues that have been consistent challenges: research methods and politics.

1.4.1. *Research methods: understanding bias*

From the first paper to the last, the most significant epidemiological challenges presented by this work related to bias. After two decades we concluded that there was no change in the observed prevalence of HIV among female sex workers which remained at around 1% from 1986 through to the present day. Dealing with charges of bias is not easy. Are these estimates distorted because of sampling bias? There is no sampling frame, so the relationship of the sample to the population is unknown. Those who take part in research are likely to be different; they may be at increased or decreased risk. Initially the research was clinic based, suggesting a bias towards low (or is it high?) risk women. Taking

recruitment out onto the streets did not change the HIV prevalence estimates. But it did introduce us to women with many other health problems related to poverty, drug use and general vulnerabilities, which confirms that there is indeed sampling bias in clinic-based recruitment. The women we met on street outreach did not have good access to health care, and we expanded our services to try and meet their needs. Getting an STI check up wasn't always high on their agenda – access to ante natal care, legal advice about arrests or assaults, information on housing, self defence, counselling, etc. were more pressing, and if we wanted to engage with women in research and health promotion, then we had to address these needs as well.

Measurement bias is another recurrent theme. Problems of what to ask and how to ask it dog all behavioural research particularly on sensitive topics and with stigmatised groups. A poorly formed question will lead to measurement bias; there may be social desirability bias in responses to questions on behaviours. We explored many different ways of collecting data on condom use and numbers of partners, for example. The trouble is that there is no gold standard against which to measure new questions, and therefore a degree of uncertainty is inevitable. Good pre-testing of questionnaires can overcome some problems of reporting, but it is not always easy to identify which are the best ways to ask questions because it is not always clear which are the “correct” answers. An anecdote from the research illustrates a widely acknowledged problem with self-reported condom use. In a semi-structured follow-up interview discussing her work one woman commented:

‘Oh those things (pointing to the questionnaires). I always lie when I’m doing them. Like on condoms - I don’t use them with everyone, but I wouldn’t say that in one of those questionnaires. People

*wouldn't understand if I said I didn't use them. When I don't use condoms it's not with punters I just meet anyway. It's those that are my old regulars. They want it without. They know the risk so it's up to them isn't it?'***

This woman was indicating that the objectification of her actions involved in answering a questionnaire would deny her the ability, or right, to justify her behaviour, to explain the context which made it acceptable to her. In fact I was the person who had designed the questionnaire, administered it to her, and would interpret the results, and to whom she was now explaining why she had 'lied'. Clearly for her the questionnaire was something external to her relationship to me.

1.4.2. Politics and context

In the 1980s there was heavy policing related to attempts to "clean up" local areas of street prostitution. The number of women working on the streets visibly declined and during outreach we had to spend more time, later at night, to meet women. The presence of the police was a challenge for the delivery of a health promotion service. In order to work safely on the streets doing research and health work, we had to seek guarantees from the police that we, and the women we were talking to, would not be arrested as a result of our work. While we obtained reassurances on this from the chiefs in the local vice squad, the message didn't always get through to the ground level. It was clear that the law and the policing were not helping us to improve health. From this we concluded, together with many other academics and people working in health projects, that we need decriminalisation of prostitution. Opponents argue that sex work is a

** Interviews were either taped, or detailed notes taken during the interview and typed up. This

form of violence against women that needs to be abolished.

Sharp political debates around decriminalisation or abolition have been a consistent theme through these past two decades, and it is neither possible nor appropriate to separate them from the conduct and objectives of research. The link between research and politics has emerged most forcibly with recent debates about “trafficking” which have produced calls for the criminalisation of men who pay for sex, and the “rescue” of the victims. Anti-trafficking campaigners use figures, some gleaned from the research presented here, to show that 80% of sex workers are trafficked.(Home Office 2004) Debates have raged in the House of Commons, in the media and even in academic journals over the “truth” of the numbers of sex workers, the proportion that are trafficked, the impact of sex work on health and the levels of violence. As researchers and public health workers it is not possible to stand aside from such debates, which often quote (or mis-quote) one’s own research. It is crucial to engage with and to understand the political issues that affect both public policy, including health policy, and the conduct and use of research.

In the following chapters I review the wider social epidemiological literature to answer the question posed by this body of research, namely what is the appropriate theoretical and methodological framework for examining the relationship between sex work and health?

example is from notes, i.e. it is not a direct quote.

Chapter 2. Understanding the determinants of infection

“An ‘innocent’ woman could only get disease from a ‘sinful’ man.

But the man could only get venereal disease from a ‘fallen’

woman.” (Delacoste and Alexander 1988)

Summary

The majority of the papers in this thesis attempt to identify the determinants of HIV and other STI in sex workers with the aim of informing policies and interventions to reduce this risk and, as a result, contribute to the control of STI/HIV. In this chapter I review the relevant findings to see how robust they are, and include new tables that summarise estimates of effect size from the different papers. I carry out a more detailed discussion of the determinants, placing the findings in the context of the literature, and suggest a conceptual framework linking the different factors. I discuss how this approach could improve the design, analysis and presentation of results from such observational research.

2.1. Introduction

Public health concern with prostitution has generally focussed on the role of the sex worker as a transmitter of infection, reflecting deeply held cultural and social beliefs.(Ditmore 2006; Parent-Duchatelet 1836) We now have ample evidence to show that prostitution *as such* does not equate with a high prevalence of HIV or other sexually transmitted infections, and neither do prostitutes inevitably play the role of a core group sustaining disease in a wider population.(Bautista et al. 2006;

European Working Group on HIV Infection in Female Prostitutes 1993; Sobela et al. 2009) Rather, the risk of HIV/STI in sex workers is highly variable. The quote at the start of the chapter, paraphrasing widely held attitudes, suggests a simple and universal model, but rather begs the question of who infected the fallen woman?

2.2. HIV

Table 2.1 shows the prevalence and incidence of HIV reported from the different papers in this thesis, together with confidence intervals. Confidence intervals have been re-calculated for each estimate using the adjusted Wald method to take into account small event rates.(Sauro and Lewis 2005) The measured prevalence of HIV infection in the sex workers ranged from 0.9% to 1.6% with no significant difference between samples or over time. The numbers cannot be pooled as some of the same women were included in these different studies. The one report of incidence was 0.23 per 100 person years of follow-up. Injecting drug use was the major risk factor with an odds ratio of 20.6 and 32.5 in two separate analyses.

Table 2.1 Risk of HIV: sex workers and male partners of sex workers

Population	N	Dates	Events	Prevalence (95% CI) ¹ⁱ	Incidence*	Risk factor: OR (95% CI)	Notes	Paper
Sex workers								
Clinic	187	1986-1987	3	1.6%(0.33, 4.83)		n/a		1
Clinic and outreach	228	1989-1991	2	0.9% (0.03, 1.66)		IDU: 20.6 (1.79, 237.3 ²)		2
Clinic	312	1985-1991	4	1.3% (0.38, 3.37)		IDU: 32.5 (3.27, 324.1)		5
Clinic	162	1985-1994	1		0.23	n/a	Follow up 432 person years	5
Clinic	200	1996-2002	3	1.5% (0.31, 4.52)				
Clinic, outreach	98	1997-2000	0				Cohort follow-up	10
Male partners								
Clinic and self report	40	1988-1991	2	5.0% (0.50, 17.4)		n/a		3

¹ Where 95% confidence interval is not given in the paper, or where it includes 0, it has been (re-)calculated using the adjusted Wald method (see Sauro, J & Lewis, J R (2005) Estimating Completion Rates from Small Samples using Binomial Confidence Intervals: Comparisons and Recommendations, in Proceedings of the Human Factors and Ergonomics Society Annual Meeting (HFES 2005) Orlando, FL)

² OR = infinity since no cases in non-IDUs, but here estimated using nominal addition of one case to that cell.

2.2.1. *How robust were the estimates of risk?*

Paper one was a report of a clinic-based study with unknown bias in terms of the profile of participants. One weakness of this short report is that no data are given on those who decline testing. Indeed the methods in this paper are extremely limited, reflecting both the early development of the research in terms of understanding of epidemiological methods, and the imposition of the short report format which provided for only a couple of paragraphs to summarize methods and results. The prevalence of HIV-1 was 1.6%; there is no estimate of association with risk factors, simply the observation that two of the women had shared needles, and one had “probably been infected by her boyfriend”. The lack of information on the frequency of injecting drug use or risky non-commercial partnerships in the sample as a whole makes it impossible for the reader to interpret the findings or to calculate measures of association. In the comment we offered some reflection on the findings, linking these data to the finding of differential condom use in commercial and non-commercial relationships.

We concluded that risks of HIV infection, “are not associated only with a high rate of change in clients”, but also with shared injecting equipment and private sexual relationships. The report ends with reference to limitations, where we assert that “enumerating stigmatised populations such as prostitutes is not possible, and therefore findings from our study can be generalised only with caution”, a prudent comment in general, and particularly given the obvious limitations of this study.

The second paper is a longer report covering the years 1989 to 1991, which includes a fuller description of the sample, of how women were recruited, a detailed description of potential bias in the total sample, and analysis of the bias in the prevalence estimate based on differences between those who accepted testing and those who did not. This is a clear advance on the earlier paper in

terms of methods and reporting. In an explicit attempt to improve on the earlier work, we looked to a more representative sample by including women recruited through field work (local streets and other sex work venues, courts, and through a drop-in centre). To reduce the possible selection bias introduced by the exclusion of women who refused HIV testing, women who did not want an HIV test were asked to consent to anonymous testing of a blood or saliva sample.

The paper does not report on either the numbers who had anonymous testing, nor on any differences between the groups. One reason for this is that all of the tests carried out anonymously were negative, which undermines the purpose of unlinking the samples. In the paper we explored remaining bias through analysing differences between all those tested (including anonymously) and those who declined, and found few differences, although the numbers were small. Those who accepted testing had significantly more years in education, but there were no significant differences in age, duration of sex work, sex work sector or established risk factors. The very small number who had never been tested (18 women) also appeared unremarkable. This analysis therefore added confidence to our estimate of HIV prevalence, allowing us to generalise to a wider group of sex workers. While it was still not possible to be “representative”, it provided greater weight to the finding that sex workers in London had not been at high risk of acquiring HIV up to that point.

2.2.2. *HIV in male partners*

The study of male partners of sex workers, reported in paper 3, includes an HIV prevalence estimate of 5%, based on those tested through study together with self-reports of recent tests. However, the estimate is based on a relatively small number (40) and therefore there is great uncertainty, with a confidence interval ranging from 0.5% to 17%. In addition, only a minority of the sample were tested

which introduces selection bias; the estimate would be an overestimate if those tested were those with higher risk, or an underestimate if those at risk were more likely to decline testing. If the former were the case, as seems likely given the relatively high prevalence observed, then it is helpful to consider the minimum prevalence. This can be calculated by assuming that all those who declined testing were negative, which would mean a prevalence of 1.8%, still higher than that found in sex workers in papers 1 and 2.

There is no attempt to quantify risk factors for HIV in this paper, which seems appropriate given the poor response to testing, not to mention the rather “accidental” nature of the sample which combined clients and private partners of sex workers, and was recruited through a genitourinary medicine clinic, voluntary agencies and advertising in newspapers and a contact magazine. The main findings in relation to HIV were that the prevalence was higher than in sex workers, and that these men reported other risk factors that may result in them posing a risk to female sex workers rather than the other way round. While the generalisability of these findings is unclear, it certainly raised questions for policy makers and for further research.

2.2.3. *Measurement and classification bias*

The importance of possible classification bias is illustrated by the case of one woman with HIV who is included in paper 1 as having “probably been infected by her boyfriend who was positive for the virus”. A short biography of this woman is included in the epigraph for paper 4. (Ward and Day 1997) “Alison”¹ had been diagnosed with HIV elsewhere, and always insisted that she had been infected by this boyfriend. She didn’t report any other risk factors at the time of her diagnosis nor at the time of her first visit to us. She denied ever having injected drugs. Over

the course of the next five years I got to know her quite well as she attended for HIV care and for other services of the project. She led a chaotic life, was often homeless, had a spell in prison, and after two years started to inject drugs.

Several conversations cast doubt on the initial attribution of HIV acquisition to that boyfriend. During one interview I asked how she had met that her boyfriend, and she reported that it was through an HIV support group, which suggested they met after both were diagnosed. In a different interview she described having run away from home a few years prior to her HIV diagnosis, and ending up sleeping rough and sharing injecting equipment with some drug addicts. On yet another occasion, she reflected that she must have got HIV in her home town when she was a child and had been paid for sex by an old man who she thought was gay. Of course the source of the infection was irrelevant to her – she was vulnerable in many different ways. It is easy to dismiss her as an unreliable historian, but the inconsistency also reveals much about the way we ask questions, and suggests caution in interpreting exposure data, particularly when behaviours are heavily stigmatised.

Misclassification is a wider problem than shown by this example of “recall bias”. It is also an issue in relation to language used in designing instruments for data collection. An example from our work indicates potential for misclassification based on a belief that we share similar concepts and language with those we interview. Sex workers repeatedly refer to sex with clients as “work”. This was revealed in a series of interviews with one woman who, in reply to the question “when did you last have sex?” would report periods of weeks and months ago. In response to questions about numbers of clients for vaginal intercourse, it was clear that she had worked during each previous week. It became apparent that

¹ In case histories names and some biographical details are changed to preserve confidentiality.

she would only use the term “sex” to refer to what she did with her boyfriend (who she saw only occasionally). What she did with clients was something different.¹

2.2.4. Wider perspectives on HIV

The quantitative reports are difficult to interpret. Firstly they are likely to be subject to selection bias in the samples, to participation bias in relation to uptake of HIV testing, and to measurement bias in relation to risk factors; injecting drug use is a stigmatised behaviour and therefore likely to be underreported. Secondly, the relatively low prevalence of HIV may have been a function of an early epidemic phase. However, the stability of the rates over time, and the consistency with reported preventive behaviours, adds weight to the conclusions that these sex workers were at relatively low risk.

The literature at the time and more recently is consistent with these findings. HIV in female sex workers in Europe is generally low, with higher risks in male to female transgender sex workers and drug users. (Belza 2004; Bruckova et al. 2006; Folch et al. 2008; Vall-Mayans et al. 2007; van Veen et al. 2008) For example, a multi-centre study of HIV in female sex workers in nine European countries in the early 1990s found an overall prevalence of 5.3% (95% CI 3.9% to 7.0%) (European Working Group on HIV Infection in Female Prostitutes 1993) In a study carried out 10 years later in seven countries using similar sampling methods, the prevalence was 1.6% (95% CI 0.9% to 2.6%).(Day and Ward 2004b) Both these multi-centre studies found higher rates in women who injected drugs and who were born in a high prevalence country. The risk of HIV appears to be higher in male sex workers.(Belza 2005; Bloor, McKeganey and Barnard 1990; Bruckova et al. 2006; Sethi et al. 2006)

¹ See Day 2007, page 35 for fuller description of this interview.

Recent literature on HIV risks in sex workers appears to support the patterns described in early work: sex work per se is not a universal risk factor, but in many settings sex workers are at risk due to links with injecting drug use, or to concentrated epidemics in heterosexuals. (CDC 1987; Day and Ward 1997b; European Working Group on HIV Infection in Female Prostitutes 1993; Hart and Whittaker 1994; Kozlov et al. 2006; Kruglov et al. 2008; Mann et al. 1988; McKegane et al. 1992; Piot et al. 1987; Quan et al. 2000; Rhodes et al. 1994; van den Hoek et al. 1988; Wang et al. 2009) The low prevalence, in the absence of other risk factors, is explained by the high level of condom use in commercial sex and the relatively contained heterosexual HIV epidemics in Europe. It appears that early fears of widespread transmission associated with the sex industry were misplaced, although the contribution of preventive interventions is unclear (see chapter 3).

A recent review of the literature on female sex workers, “with an emphasis on hard to reach populations” identified 30 published studies between 1995 and 2006 that included estimates of HIV. (Cwikel et al. 2008) The prevalence ranged from zero in six of the studies to over 50% in three studies from sub-Saharan Africa. These findings all underline the importance of looking in more detail at factors that place sex workers at risk for HIV, rather than focusing on sex work itself as the major determinant.

2.3. STI risks

If my findings on HIV provide little room for a detailed exploration of the different risks within sex work, data on other STI show greater potential. Table 2.2 (on page 45) shows the risk factors for STI identified in the various papers, together with estimates of effect size presented as odds ratios and/or adjusted odds ratios (with 95% confidence intervals) where these were in the original articles. Since

there were small numbers of cases of individual STI in each of the reports, despite some including over 400 women and others with long term follow-up, for some reports infections were combined. Cases of gonorrhoea, chlamydia, trichomoniasis, infectious syphilis and clinically incident cases of genital herpes and warts were combined as “acute STI”. This approach has been used in a number of other studies where the prevalence of individual infections is low. (Sopheab et al. 2008a) Serological evidence of HSV-1 and HSV-2 infection was analysed separately. References to the individual papers are given in the table.

In the following section I will discuss the trends, validity and main risk factors for STI found in the different papers. I will then suggest a model for understanding the relationship between the different determinants.

2.3.1. Temporal trends

There was a major change in the risk of STI over time from the start of the study in 1985 to the most recent data in 2002. Paper 8 shows a 68% decrease in prevalent STI (i.e. being diagnosed at first visit with an acute STI¹), with the proportion falling from 25% among earlier (1985 to 1992) recruits to 8% among later (1996 – 2002) recruits (see paper 8 table 2).¹ There was a similarly steep decline over time in the proportion of women reporting a past history of STI (see paper 8 table 1), with a fall of 85% in the proportion reporting past gonorrhoea, from 50.5% to 7.3%.

This secular trend did not parallel patterns in the wider population. To make any meaningful comparison with population trends the infections need to be considered separately, since their epidemiology may diverge. Looking at the data in paper 8 on first visits, there was a decrease in prevalence of 76% for

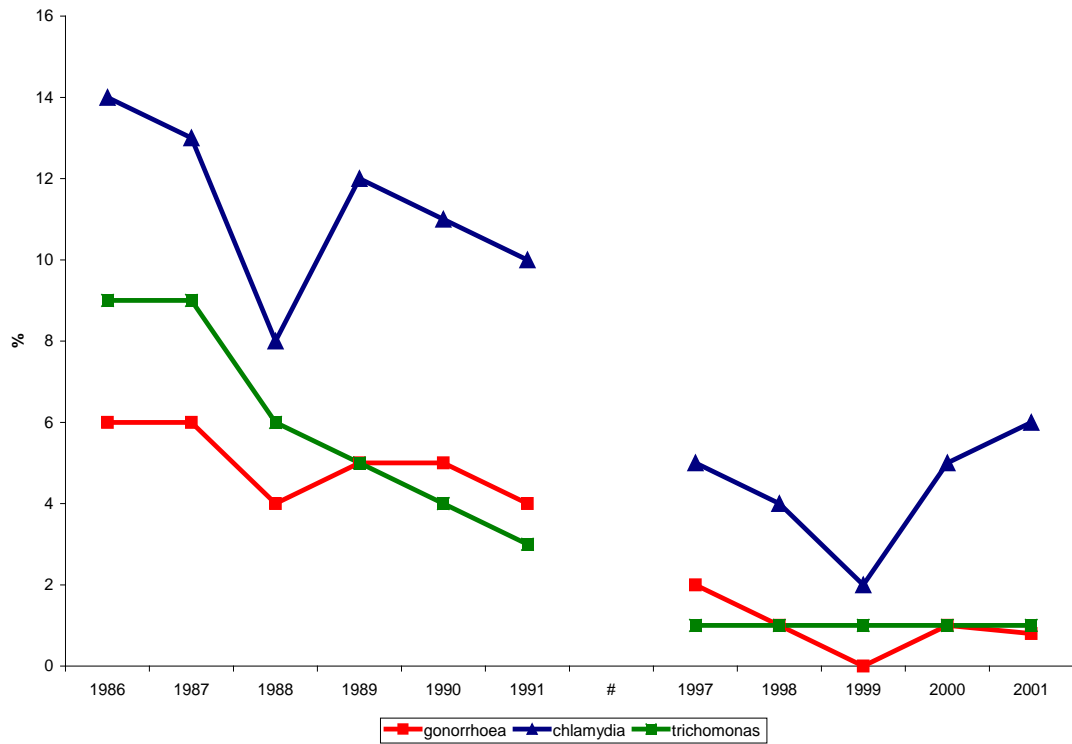
¹ Acute STI defined above

gonorrhoea (from 4.5% to 1.1%), 55% for chlamydia (10.7% to 4.8%) and 78% for trichomoniasis (5.1% to 1.1%) from early to later recruits.

Figure 2.1 is a new graph drawn using the data set from paper 8, and shows the trends in prevalence for gonorrhoea, chlamydia and trichomoniasis. I have used three-year moving averages to smooth the fluctuations seen in the raw data which includes small numbers for any one year, in order to show broad trends.(Allard 1998)

¹ There were no data collated on STI and risk factors for women joining the PSP from 1993 to 1995 as there was a gap in research funding.

Figure 2.1 Prevalence of gonorrhoea, chlamydia and trichomoniasis at first visit to PSP clinic, 3-year moving average, 1986 to 2002 (n=1050)



Legend: This graph shows the baseline prevalence of gonorrhoea, chlamydia and trichomoniasis in women sex workers joining the Praed Street Project by year of their first visit. A three-year rolling average is provided, and therefore no estimates are given for the first and last years of each period. Detailed data were not routinely collected for the years 1993 to 1995 so these are excluded. Details of recruitment and diagnostic methods are found in paper 8 of this thesis.

The prevalence of gonorrhoea in the sex workers declined from 6% to 4% between 1986 and 1991, to 2% in 1997 and then between 0 and 1% until 2001. Routine surveillance data for England, using aggregate reports from genitourinary medicine clinics, also showed a decline from the mid-1980s in the general population, but this reached a low point in 1995 after which there was a steep rise. While this was steeper in men than women, the trends were similar (CDSC 2004) and contrasted with the continued decline in the sex workers.

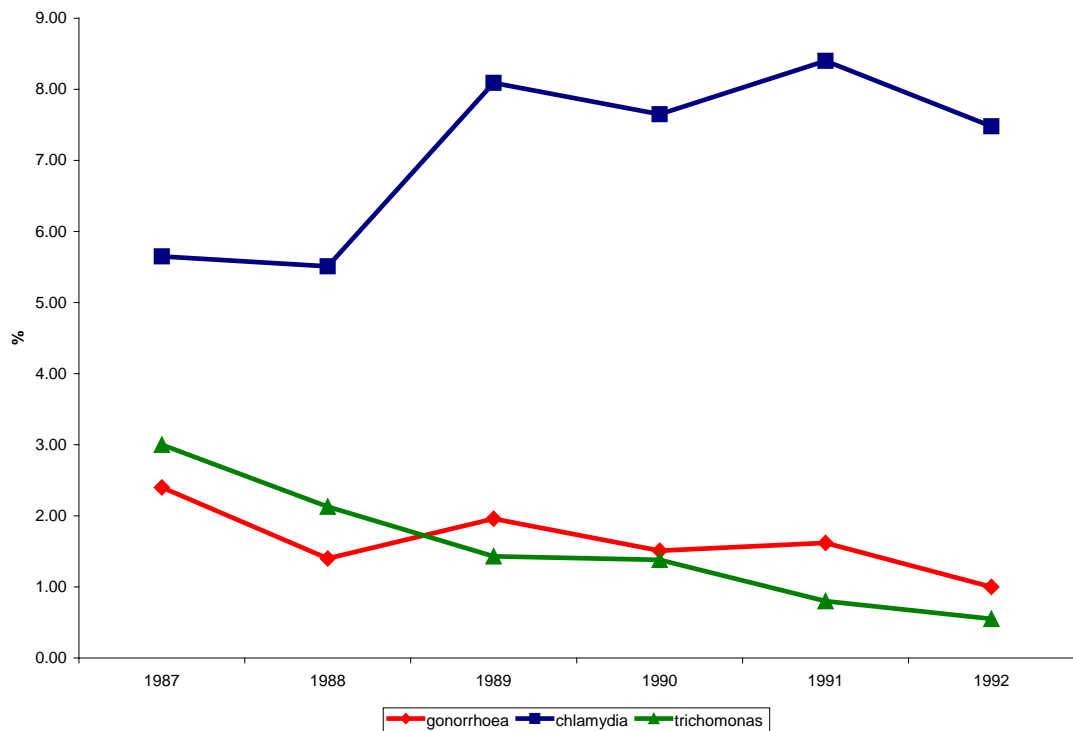
In our study the prevalence of chlamydia fluctuated more, with an overall decline from 14% in 1986 to 2% by 1999 followed by a small rise. Over the same period the rate of diagnosed chlamydia in women in England increased steadily. (Lowndes and Fenton 2005) However, a large part of this increase was thought to be due to increased testing, which is not relevant to prevalence data, and to the use of tests with greater sensitivity. (ECDC 2009b) The latter may have been part of the reason for the increase in observed prevalence in the sex workers after 1999 when we switched to the use of more sensitive testing using nucleic acid amplification methods (see methods in paper 8 for details).

The largest decline was in trichomoniasis, from 9% in 1986 to 1% in 2001. This also contrasts with population data which show a relatively stable number of cases diagnosed in women from 1990 to 2000. (CDSC 2000)

To explore whether these trends observed in new recruits to the project were reflected across all sex workers attending the clinic, i.e. including repeat attendances, I have gone back to data documenting results of tests from 2830 clinic visits made by 611 women between 1986 and 1993. From these data I have calculated positivity for the three main infections across all visits, new and repeat. The results are plotted by year in Figure 2.2, showing a significant decline

in gonorrhoea and trichomoniasis but not for chlamydia which fluctuates around an average of 6.9%.

Figure 2.2 Positivity for STI all visits, 3-year moving average, 1986 – 1993 (number of visits = 2830)



Legend: This graph shows the positivity for gonorrhoea, chlamydia and trichomoniasis from 2830 visits made by 611 women (see paper 5 for methods) from 1986 to 1993. A three-year rolling average is provided, and therefore no estimates are given for the first and last years of each period. There is a significant decline in gonorrhoea (test for linear trend, $\chi^2 = 5.065$, $p = 0.024$) and trichomoniasis (test for linear trend, $\chi^2 = 19.664$, $p < 0.001$) but not for chlamydia.

This analysis provides additional evidence for the decline in gonorrhoea and trichomoniasis, but shows a more complex pattern for chlamydia: while prevalence appeared to decline in new recruits, it was stable or even increased among those who were regular attendees of the project. However, this additional analysis is limited as it only goes up to 1993, and I have not controlled for repeat events in the same person.

The conclusion of paper 8 on trends begins, “We have documented a two-thirds decline in acute STI among sex workers in London. This finding is particularly striking in the context of a doubling of gonorrhoea and chlamydia infections since the mid-1990s in the United Kingdom.” (paper 8, page 377) The more detailed analysis presented above supports this conclusion in part, albeit with a divergent pattern for different STI.

2.3.2. Major risk factors

These strong temporal trends had to be taken into account when looking at other factors associated with STI in sex workers, and this was done either by matching for year (in the nested case control study, see paper 8) or by including year or period of recruitment as a covariate in the analyses.

The other factors associated with STI are reproduced in table 2.2, grouped by factor with the particular infection or group of infections, the direction of the effect and estimates of the effect (adjusted where possible).

Table 2.2 Risk factors for sexually transmitted diseases, sex workers in London, results from all studies

Risk factor	Direction	Infection	Sample	Events	Dates	Odds Ratio (95% CI) ¹	aOR ²	Design (paper)
Period of recruitment	-	STI (any) ³	765	128	1985-2002	0.26 (0.17, 0.40)		Cross sectional (8)
(later vs earlier)	-	Gonorrhoea	765	22	1985-2002	0.23 (0.08, 0.70)		Cross sectional (8)
	-	Chlamydia	765	59	1985-2002	0.42 (0.24, 0.76)		Cross sectional (8)
Age (quartiles)	-	STI (any)	280	27	1988-1992		0.57 (0.37, 0.88)	Cross sectional (2)
(years)	-	STI (any)	354	128	1985-2002	0.91 (0.87, 0.95)	0.95 (0.82, 1.11)	Case control ⁴ (8)
Age first sex work	-	STI (any)	354	128	1985-2002	0.92 (0.87, 0.97)	0.95 (0.81, 1.10)	Case control (8)
Time in sex work (years)	-	STI (any)	354	128	1985-2002	0.94 (0.88, 1.00)	0.95 (0.78, 1.14)	Case control (8)
Unprotected sex clients	+	STI (any)	354	128	1985-2002	2.10 (0.97, 4.54)	4.42 (1.51, 12.95)	Case control (8)
Non-paying partners (NPP)	+	STI (any)	280	27	1988-1992		1.92 (1.04, 3.22)	Cross sectional (2)
(number)	+	Gonorrhoea	320	50	1985-1994		2.30 (1.41, 3.76)	Cohort (5)
	+	Chlamydia	320	118	1985-1994	n/a		Cohort (5)
Any unprotected sex NPP	+	STI (any)	354	128	1985-2002	2.28 (0.94, 5.53)	1.54 (0.60, 3.97)	Case control (8)

¹ Where odds ratios not given in the published paper, I have calculated them from aggregate data using methods in Bland, 2000.

² Exact adjustments reported in the original papers

³ Any STI: gonorrhoea, chlamydia, infectious syphilis, trichomoniasis, clinical first episode genital herpes or genital warts

⁴ The case control study was matched for year of recruitment as this was a major determinant for risk of bacterial STI

Once again the papers are weakened by the grouping of different STI for the analyses due to the relatively small numbers of events for each infection separately. As seen in the discussion on temporal trends earlier, each STI can behave differently even in the same population due to differences in their biology, transmission, immunogenicity and epidemic phase.(Hamers et al. 1995) Therefore to combine them into a single “acute STI” is likely to have masked some specific risk factors in favour of more generic indicators. However, they were selected for presumed recent acquisition and would be expected to share some key determinants.

The risks identified for the acute STI, and for gonorrhoea and chlamydia where shown separately, are young age, young age at first sex work, less time in sex work, having any unprotected sex with clients, having more non-paying partners, and having unprotected sex with non-paying partners. Some of these associations occurred with different study designs, some persisted in multivariate analysis and others were removed.

Paper 2 reports the risks for acute STI from cross sectional data; the multivariate analysis showed a significant and substantial reduction (OR 0.57) in risk for each increase in age group (by quartiles), and a significant increase in risk (OR 1.92) for each additional non-paying partner.

Paper 5 reports risks for gonorrhoea from cohort data; the multivariate analysis also showed an increase in risk (OR 2.3) for each additional non-paying partner, and for earlier years of the study (no estimate given), but no association with condom use.

The paper with the most detailed analysis, paper 8, reports risks for acute STI from a nested case control study matched for year of diagnosis; the final

statistical model shows unprotected sex with clients to be the only factor significantly associated with STI, conferring a 4-fold increase in risk (OR 4.42). In the paper, we conclude, “Individual risk of acute STI was largely defined by year. In addition, younger age and inconsistent condom use with clients increased risk; there was no association with country of origin.” It is useful to reflect on this conclusion and consider how it relates to the data presented, since this reveals some of the limitations of this kind of analysis.

Looking at the results in detail (reproduced in table 2.2), univariate analysis showed young age, young age at first sex work and shorter time in sex work to be associated with STI. Unprotected sex with clients or non-paying partners increased risk, but neither were significant. In the text we report that there was no association with drug use, working outside London or the UK, being non-UK born or working in a particular sector, but no quantitative data are shown to support these statements. In the case control analysis it is not possible to assess the impact of time as cases and controls were matched.

The multivariate model included those variables that were significant on univariate analysis, plus those “of borderline significance that are known determinants of risk”. Interestingly, this leads to the three significant factors becoming non-significant (although the direction and size of effect remains similar), while unprotected sex with clients becomes significant, with an increase in the odds ratio from 2.10 to 4.42. Unprotected sex with a non-paying partner remains non-significant, and the odds ratio decreases from 2.28 to 1.54.

What does this analysis suggest about the different determinants of risk (notwithstanding the previous caveats and limitations of combining different STI)? Current age is correlated with age at first sex work ($r=0.661$, $p<0.001$) and with time in sex work ($r=0.569$, $p<0.001$). This may explain some of the change in the

model, but not the increase in the association with unprotected commercial sex. Explaining this requires a consideration of the actual mechanisms of risk, i.e. a model of causation.

One approach is the proximate determinants framework, in which risk factors are explored according to their place on a causal pathway. (Boerma and Weir 2005) In such a framework, the most immediate antecedents, such as having unprotected sex with someone who has an infection, are considered proximate, while other risk factors, for example education and knowledge about STI, are considered underlying or distal. The framework implies a relationship between risk factors in which distal determinants operate through more proximate ones.

For example, having unprotected sex, either with clients or boyfriends, is a risk factor for acquiring an acute STI. It is clearly on the causal pathway, being a necessary but not sufficient cause for acquisition.(Rothman, Greenland and Lash 2008) In the proximate determinants framework unprotected sex is a key proximate factor, while other risk factors are less clear cut, and might be considered distal.

Young age, for example, is a well established risk for STI, but the mechanism is unclear and may differ between infections. The higher risk of STI at younger age observed in this study is consistent with research on general populations,(Fenton et al. 2001; Latka et al. 2001; Moller et al. 2003) and sex workers.(Klausner et al. 1999; Pettifor et al. 2007; Sanchez et al. 2003) Young age is a particularly strong determinant of chlamydia and gonorrhoea in women, and may be due to biological susceptibility (due to an immature cervix and lack of acquired immunity), different sexual behaviour, risk networks, poor access to care, lack of knowledge of prevention, or a combination of these factors. (Holmes et al. 2008)

Young age at first sex work has also been described as a risk factor, (Shannon et al. 2007) and in our study correlates with young age now and with less time in sex work. Women who enter sex work at a young age are likely to be vulnerable in many ways. They may turn to sex work to escape abusive home lives, they may be coerced, and they will certainly have limited education. All these factors may contribute to a lack of knowledge, motivation and resources to ensure preventive behaviours such as condom use.

A shorter time in sex work has also been described elsewhere as an independent risk for acquisition of infection, (Sopheab et al. 2008b) and it is likely that sex workers lack experience, knowledge and skills when they first start. We certainly observed that numbers of condom failures reported declined over time in sex work.(Day 2007)

These reflections on possible explanations for associations suggest a model of causation for STI in sex workers which will have influenced the way that we conducted our analyses. However, this model was not explicit, and in retrospect the analyses, and the papers, would have been stronger with a more explicit reference to such a model.(Gomez, Ward and Garnett 2009)

2.3.3. *A tentative model of risk*

In the results just explored, it seems plausible that young age at first sex work, and young age itself both lead to less knowledge about STI and methods of prevention, poorer access to resources such as condoms, less motivation to adopt preventive behaviours, and greater vulnerability to pressures (financial, social, psychological and physical) to have unprotected sex. A shorter time in sex work will magnify these risks. These could combine to increase the probability of STI through the pathway of less condom use.

Other factors, such as numbers of partners, will modify this risk. In the analyses presented in these papers, the number of clients was not associated with risk, although the number of non-paying partners was. The reason for this disparity is likely to be that since the overwhelming majority of all commercial contacts were protected with condoms, the numbers became less important than whether condom use was universal or not. In contrast, condom use was sporadic with boyfriends and therefore numbers and condom use were both likely determinants.

These explanations can sound speculative, and it is important to try and validate them using, for example, the proximate determinants model in which distal determinants operate via the proximate ones.(Boerma and Weir 2005) If both proximate and distal factors are included in a multivariable model, then the more distal determinants will be removed as their effect is captured by the proximate ones. (Lewis et al. 2007) In the example provided here, the effect of young age and young age at first sex work on STI risk appear to operate through the proximate mechanism of condom use, and when all are included in the same model then condom use captures it and the other factors become non-significant.

2.4. Determinants of the determinants

To test this model further, I carried out some further analyses of the main data sets. If young age and younger age at first sex work operate through the common proximate determinant of condom use, then there should be clear correlations between them. Younger women and those who started sex work at a young age would be less likely to use condoms, and this would support the model.

I used similar methods to those presented in paper 8, but rather than take a nested case control design I have included all participants with data on STI and

risk factors, providing a larger data set with greater power to explore interactions, and allowing time to be analysed as a covariate rather than controlled for in the case control design. The expanded data set includes the same number of cases of STI (128) and a larger number of women without (637).

In this larger data set additional factors are found to be significantly associated with acute STI on univariate analysis: being born in the UK and working on the streets both increased the risk, while being born in a less developed country decreased the risk of STI (see table 2.3). Time in sex work is no longer a risk (it was of borderline significance in paper 8). In a multivariate model including all of the factors, acute STI remained independently associated with year of recruitment, unprotected sex with clients, and age, with all other factors no longer significant.

Table 2.3 Risk factors for acute sexually transmitted infection at first visit, expanded data set

Risk factor	Odds Ratio (95% CI)	p	aOR*	p
Year of recruitment	0.88 (0.84, 0.91)	<0.001	0.87 (0.82, 0.93)	<0.001
Age	0.90 (0.86, 0.94)	<0.001	0.87 (0.82, 0.92)	<0.001
Age first sex work	0.89 (0.84, 0.93)	<0.001		
UK born	2.08 (1.37, 3.17)	0.01		
Born in less developed country	0.32 (0.15, 0.67)	0.003		
Non-paying partners (NPP)	1.83 (1.09, 3.07)	0.023		
Condom use NPP	0.32 (0.12, 0.92)	0.034		
Unprotected sex clients	3.39 (1.67, 6.89)	0.001	4.56 (1.89, 11.00)	0.001
Street work	1.80 (1.01, 3.20)	0.047		

Legend: Data from baseline visits of 765 women registering with the Praed Street Project between 1985 and 2002; 128 had an “acute STI” (gonorrhoea, chlamydia, infectious syphilis, trichomoniasis, clinical first episode genital herpes or genital warts). The model included all variables significantly associated on univariate analysis as described in the text.

I then explored the association between these various risks to see if patterns are consistent with the proximate determinants model outlined above. Figure 2.3 shows the direction of association between variables and indicates whether this is consistent with one of two mechanisms: the first is that underlying factors increase risk by reducing condom use, as suggested in the model presented earlier, the second is that they increase risk through contact with non-paying partners.

In relation to the first mechanism, which suggests that underlying determinants operate via reduced condom use with clients, four factors (early year of recruitment, being born in the UK, not being born in a poor country, and less condom use with non-paying partners) are indeed associated with lower condom use with clients. But two factors (young age and street based work) are inversely associated, i.e. they are associated with more condom use and thus conflict with this mechanism.

In relation to the second mechanism, which suggests that underlying determinants operate through increased contact with non-paying partners, two factors (being born in the UK and street based work) are associated, while two (early year of recruitment and young age) are inversely associated with non-paying partners. The rest are not significantly associated in either direction.

Overall this shows a possible mechanism for five of the underlying risk factors but not for the other three (younger age, younger age at first sex work, and shorter time in sex work). The association of these three factors with STI therefore needs further exploration.

Figure 2.3 Exploring mechanisms of risk: direction of associations between underlying determinants and infection risk

	Proximate mechanism for increasing risk	
	Less condom use clients	Non-paying partners
Underlying factors increasing risk*		
Earlier year of recruitment	+	-
Younger age	-	-
Younger age first sex work		
Shorter time in sex work		
Born in UK	+	+
Not born in poor country	+	
Less condom use non-paying partners	+	
Street-based		+
Non-paying partner(s)		

Legend: This figure shows factors associated with increase risk of an acute STI, and how these correlate to possible causal mechanisms. Data are taken from baseline visits of 675 women between 1985 and 2002. These data have not been published in any of the papers.

** significantly associated with infection on univariate analysis*

+ the factor is significantly associated with the proximate mechanism

- the factor is significantly inversely associated with the proximate mechanism

2.4.1. Young age

The most difficult challenge is interpreting data on age. As discussed earlier, young age is consistently associated with increased risk of STI in sex workers as in other people. In the initial logistic regression model (paper 8) it is no longer significant when other factors are included, but with the larger data set it remains significant and there is an increase in effect size (OR 0.90 to OR 0.87). Figure 2.3 shows the rather counter-intuitive finding that younger women are more likely to report using condoms with clients, and less likely to report one or more non-paying partners, both of which would be expected to decrease rather than

increase risk of STI. Thus young age does not appear to be a risk factor for less condom use. This could be explained in a number of ways.

Firstly, the increased STI risk in young women may be through pathways and mechanisms other than the proximate determinants considered here. These would include biological factors such as the immature cervix, the relative lack of acquired immunity from prior exposure, different sexual mixing patterns and partner characteristics, which are unaccounted for in our model and are harder to measure.

Secondly, younger women may be less likely to disclose not using condoms, or having non-paying partners. This is possible, and there is some literature suggesting that younger women are more prone to social desirability bias and under-reporting of risk behaviours.(Aho et al. 2009; Gregson et al. 2002) This raises a more general caveat with this quantitative analysis, which is based on an assumption that measurements of exposures are equally valid across the sample, i.e. that there is no internal bias that could distort the findings. If there is bias then it is not possible to control for it, but it may be important to explore different data collection methods for future studies.

To better understand how infection decreases with age despite decreased condom use, I looked at condom use with clients in more detail. In the very first paper we reported that condom use was highest with new clients, and less with regular clients. Older and more experienced women are likely to have accumulated a cohort of regular clients, some of whom they have known for many years and with whom they do not use condoms.

The large baseline data set analysed here does not include information on new and repeat clients, but this was collected in the cohort study reported in paper 5.

At each visit we recorded numbers of new and regular clients in the previous week, and also the proportion of clients with whom condoms were used. This allows for a simple ecological analysis of this association for the 1847 visits where this information was fully recorded. Unprotected vaginal sex with at least one client in the previous week was reported at 16% of these visits, and this was strongly associated with the proportion of regular clients (OR 23.56, 95% CI 14.44, 39.31, $p < 0.001$), and inversely associated with age (OR 0.88, 95% CI 0.86, 0.89, $p < 0.001$) and year (OR 0.69, 95% CI 0.65, 0.74, $p < 0.001$).

2.4.2. *Young age at first sex work*

In univariate analysis young age at first sex work is also associated with increased risk of infection, but there is no significant link to condom use or non-paying partners. Young age at first sex work is correlated with young age now and there may be common explanations or indeed confounding. To explore possible explanations for the association I looked at characteristics of women who were young when they first sold sex. Using data from initial questionnaires, 8% of the women had started work before the age of 16. This was significantly associated with being young, street work, leaving school before age 16, and being born in the UK (data not shown). Each of these factors can be considered to reflect a general vulnerability with lack of opportunities. This is reflected in a strong association with injecting and non-injecting drug use and being less likely to have another job or be in education. This complex picture of disadvantage produces poor outcomes: in addition to the observed risk of acute STI, these women are much more likely to have had a previous STI (OR 3.35, 95% CI 1.77, 6.34, $p < 0.001$), including a four-fold higher risk of gonorrhoea (OR 4.39, 95% CI 2.52, 7.63). In absolute figures, this means that of 57 women who began sex work under the age of 16, 32 (56%) had a history of gonorrhoea, compared with

153 (23%) of the other 664 women. They were also more likely to have had at least one miscarriage (42.9% compared with 12.5%, OR 5.23, 95% CI 1.72, 15.90).

This description suggests that young age at first sex work reflects a general vulnerability which increases women's risk of STI, and that this is not captured fully by reported condom use or numbers of non-paying partners.

Exploring these associations is possible using quantitative data, as the example above shows, but it is clear that a full understanding of the relationships and mechanisms underpinning risks requires the greater insight offered by qualitative data. I will go on to discuss this in the next chapter.

2.5. The broader picture

In this commentary I have focused on explanations and determinants within this particular study population. Findings from other research in the UK and Europe shows a varied picture, although comparisons are made difficult because of a lack of standard approaches to surveillance or research.(Day and Ward 1997a; Mak 2004; Ward and Day 1991) Published reports have tended to concentrate on HIV (see section 2.2.4) rather than STI, or they have concerned specific outbreaks. (Arumainayagam et al. 2007; Resl et al. 2003)

In other countries in Europe and North America a resurgence of syphilis has been linked in some areas to commercial sex together with either drug use or particular migration patterns for sex workers or clients.(Hiltunen-Back et al. 2002; Patrick et al. 2002; Schulte et al. 1994) In the UK, an outbreak of infectious syphilis in 1997 in Bristol (Battu et al. 1997; CDSC 1997; CDSC 1998) heralded a new epidemic phase.(Simms et al. 2005) A number of young women in that initial outbreak

reported sex work and the use of crack cocaine, but none of the men appeared to have been infected through commercial sex. (CDSC 1998) Further outbreaks of syphilis have been described in the UK that also involved women who sell sex. (Creighton, Tariq and Perry 2008; Lomax et al. 2006; Righarts et al. 2004)

These syphilis outbreaks, and reports of sex workers with a high burden of infections, (Creighton, Tariq and Perry 2008) clearly contrast with the findings in sex workers using the Praed Street Project, and underline the wide variation in the industry in the UK. The former reports are all based on case series or small projects based on incidents or outbreaks whereas our findings are from ongoing research and provide the only comprehensive picture in the absence of systematic surveillance. (ECDC 2009a)

2.6. Conclusion

The papers in this thesis show that the risk of HIV and STI for sex workers in London has varied over time and between women. Understanding this variation is important in determining interventions and ensuring that they are effective in reaching those at risk. Exploring the determinants of risk within sex work, rather than through sex work as a single risk factor, has been challenging, and I have identified areas where the work could have been improved. Specifically, I recognise the need for a more explicit use of a theoretical framework for understanding risk, in which population, group and individual levels determinants are tested to identify their interactions. Through this a better causal model can be developed and then tested through further research, as I have shown in the new analyses presented towards the end of this chapter in which I tested a tentative model of risk and identified limitations. This new analysis indicated that the association between young age and STI is complex, and not fully explained by factors such as condom use and numbers of partners; rather it appears to reflect

a general vulnerability and complex of factors not easily captured in this kind of model.

I have pointed to some of the limitations of the papers presented in this thesis. The multivariate analyses in the papers were only briefly described, unadjusted and adjusted estimates were not provided together, and there was insufficient detail to allow consideration of complex interactions. This is a common limitation of descriptive epidemiological papers that often lack a theoretical framework to underpin the development and testing of different models. In this chapter I have shown through relatively simple examples that further insights can be gained by a more systematic approach. (Diez Roux and Aiello 2005)

In the next chapter I will look at how two specific hypotheses were elaborated and then tested during the latter part of this research, and consider the relative utility of quantitative and qualitative methods in this task.

Chapter 3. Models of change

“No kissing. Nothing was personal and nothing was done without a condom. Under no circumstances. And now everyone is doing it. It's just changed, the girls do anything now ... But most of the girls are foreign and their currency is a lot lower than ours anyway so... they don't mind because it's still more money than they would get in their own country. Then they start doing anal and things like that. Then you have got every man walking around asking for anal... for £5 less than you are charging for normal sex. That's how it has gone dodgy. Another reason is there is a lot more crack around now. Everyone is on it. It's not safe.”¹

“A customer rang. He was catching a flight to New York and wanted to meet a girl for the evening in 5 hours time. Tom (receptionist) took his details and described two women at different prices. Tom rang the £1000 girl to check that she was available. The customer was interested in this girl and Patricia (agency manager) said he would not be disappointed. Tom provided contact details to the girl and the customer, confirmed the price in

¹ Sex worker, interviewed 1999

dollars, and the customer told the girl he wanted her to dress in jeans or something else casual”¹

Summary

In this chapter I describe in more detail how we integrated different research methods in the testing of hypotheses. In the mid-1990s there were changes in the local sex industry including greater use of crack cocaine and an increase in the numbers of migrant women that might undermine established norms of health and safety. I show how the combined methods were used to partially refute these hypotheses, and specifically how ethnographic work enabled us to understand how structural factors influenced risk. I then discuss the growth in use of mixed methods in biomedical research and the importance of grounding qualitative work in an appropriate theoretical framework.

3.1. Introduction

The first five papers presented in this thesis cover the years 1985 to 1994, and paint a picture of a diverse sex industry in London where the risks of HIV and STI are relatively well controlled. The final article in this group (paper 5) concludes, “this study shows that it is possible to have a large number of sexual partners and remain free from sexually transmitted infections provided that condoms are used consistently: there has been a sustained increase in condom use in the sex industry. None the less, prostitutes are at increased risk of sexually transmitted infections, primarily through non-commercial sexual partnerships”.(Ward, Day and Weber 1999)

The remaining papers largely report from a second phase of research that was explicitly developed to assess the impact of changes taking place from the mid-

¹ From fieldwork notes by researcher visiting London agency, 1999. Names have been changed.

1990s onwards. In a funding proposal to the Wellcome Trust in 1996 we made a number of predictions to be tested in the combined anthropological and epidemiological project. Specifically, we asked whether health and safety in the sex industry would be undermined by recent changes in the sex industry because of disruption to networks through which occupational health and safety was transmitted. We anticipated this disruption as a result of a more migrant workforce, an increase in use of drugs such as crack cocaine, and a shift from established sex work sectors towards more isolated forms of work.

We wrote that changes “may have exacerbated the problems causing prostitutes to work in even greater isolation than they did previously. New recruits may suffer serious morbidity before they learn skills in the prevention of disease, pregnancy and other aspects of occupational health and safety.” In addition, we asked whether increased migration and drugs use may produce new infectious disease challenges, citing hepatitis C and syphilis outbreaks as potential threats.

The construction of these hypotheses reveals our understanding of the sex industry up to that point. We anticipated problems as a result of the disruption of well-established structures through which safe work practices were sustained. Interestingly, these “structures” do not appear in the analysis of determinants of risk in chapter 2 (or the related papers) which is based on individual level data.

In the additional analyses presented in chapter 2 I used a proximate determinants framework to see whether underlying factors operated through established proximal causes. (Lewis et al. 2007) This worked for some factors but not others, leaving some uncertainty about pathways of risk which could not be resolved using this data set. Some of this may be attributable to the “structures” referred to above, which may be operating at a population, industry, neighbourhood or relationship level. Explicit inclusion of such factors is a key part of the social

epidemiological approach, which includes further hypothesis testing using multi-level modelling. (Diez Roux and Aiello 2005; Gomez, Ward and Garnett 2009; Morisky et al. 2006)

In this chapter I will discuss methods for studying such contextual factors, and then consider how they can be incorporated into epidemiological models. I will use examples from our own research into the impact of changes on the sex industry, specifically looking at (i) crack-cocaine use and (ii) migration.

The quotes at the start of this chapter are indicative of the changes we wished to investigate in the second phase of research. The first is from an interview with a sex worker who had been asked what she thought had changed since she started working in 1995. She points out many of the factors that we had raised in our research proposal, describing falling prices, pressure for more risky behaviour and a general concern for safety which are framed with reference to migration and crack use.

The second quote, by way of contrast, is from fieldwork notes about the operation of a London-based escort agency that brought together sex workers and clients across many countries. One of our researchers had been invited to the agency by the manager who knew that we were trying to map the local sex industry. Her business had grown in the late 1990s into a global agency, using new technologies such as the internet and improved telephone communication to provide a service to mobile clients. A decade earlier women might have worked in sit-in premises, where clients would arrive to choose an escort for the evening, or be confined to home, waiting for a call from the agency. (Ward and Day 1997) Now the women, as well as their customers, are more mobile and potentially more independent, although still reliant upon the “madam” for business.

Both quotes show the potential added value of qualitative research in helping an investigator understand the sex industry. Interviews can show something of the motivations and perspectives of participants, and field work can provide a window into the actual places and people involved. It is obvious that such insights would be valuable to anyone planning an intervention, for example. But for this to amount to research, rather than anecdote or voyeurism, this too needs to be based on appropriate theories and valid methods. The explosion of qualitative studies in the health field, often linked to quantitative research, has not been wholly positive since much of it is poor quality and could be considered window dressing rather than rigorous investigation.(O'Cathain, Murphy and Nicholl 2008)

3.2. Participant observation

In formulating our hypotheses about the likely impact of changes on health and safety in the sex industry in London, we used a combination of quantitative and qualitative data from earlier work, together with observations from the staff who continued to work in the Praed Street Project. The emphasis on the role of “structures” came mainly from the anthropological component of the work, led by Sophie Day. Remarkably little detail of this aspect of the work is included in the articles we published in medical journals, although specific qualitative analyses make up papers 7 and 12. (Cooper et al. 2007; Green, Day and Ward 2000) Indeed paper 4, the book chapter that provides a narrative history of the Praed Street Project, is the only one of my publications that describes early fieldwork in any detail.(Ward and Day 1997) In keeping with anthropological traditions, much of this aspect of the work appears in book chapters and monographs.(Day 1990; Day 2007)

The qualitative data included conversations, observations and interviews with sex workers over several years. This was not carried out separately, but in conjunction with clinical interviews, completion of questionnaires or in the course of outreach, or through discussions in the drop-in centre. While my role was one of clinician and epidemiologist, I was also a “participant” in this anthropological research, albeit with no prior training in ethnography or qualitative methods. The experience of conducting the research alongside an experienced anthropologist inevitably influenced the research that I had responsibility for, and informed many of the conclusions and recommendations that I made.

Revisiting this work has reminded me of the strengths of the combined approach we developed. This strength is not simply in the use of both types of data, but the integration of both approaches in the whole process of research from the generation of the questions, through study design, data collection and all the way through to analysis, dissemination and implementation of interventions.

Qualitative research has been defined as “multi-method in focus, involving an interpretive, naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meanings people bring to them.” (Denzin and Lincoln 1994) Such research has become increasingly common and accepted in health research (Mays and Pope 1995), including in the fields of public health and epidemiology, but not always with a clarity or rigour that we would expect from quantitative studies.(Pope and Mays 2009)

The qualitative work around the Praed Street Project was undertaken within the disciplinary framework of anthropology which studies people and their society, cultures, beliefs and practices. The relevant tools of anthropological research include participant observation, informal interviews and structured interviews.

(Lambert and McKevitt 2002) Anthropologists may also use analysis of documents and literature, mapping and life histories. (Reeves, Kuper and Hodges 2008) These and other methods produce an ethnography, a detailed description of the society or sub-culture, and the terms anthropological research and ethnographic research are often used interchangeably although the former actually encompasses many other methods. (Lambert and McKevitt 2002; Reeves, Kuper and Hodges 2008)

3.2.1. *An ethnography of sex work*

Our ethnography of sex work in west London in the late 1980s and early 1990s revealed a highly structured industry which had proved capable of a swift and effective response to the threat of HIV. A dramatic increase in condom use occurred across the different sectors of sex work and became the accepted norm for workers, managers and clients. Understanding how this occurred is of fundamental importance for other health-related interventions. In part it was due to individual fear about HIV, a response shared by wide sections of the population in the late 1980s and reinforced by government publicity campaigns.(Berridge 1996)

Within sex work individual responses became “normalised” in part through the operation of the market which moderates prices and services. In some agencies, for example, condom use as a standard was “imposed” on workers and customers by diktat of management. In flats it was the maid, often a retired sex worker, who provided induction to the workers and laid out the ground rules.(Whittaker and Hart 1996) In contrast in street work it was often imposed by workers themselves who set their own standards and excluded others who breached them. By the end of the 1980s the few women who reported unprotected sex tended to work in more isolated ways, for example through

private referral, or did not identify closely with the industry but traded sex in a more informal way.

It is tempting to say that much of this shift was the direct result of projects such as our own, but that would be rather presumptuous. It is difficult, nigh impossible, to attribute causation to any one factor, but there is no doubt that medicalisation accompanying health projects played a particular role:

“By the late 1980s, women said that it was much easier to insist on condoms at work and they noted in amazement that some clients even provided, and insisted on using, their own. Clients appeared to follow the lead of sex workers, particularly after the first general government media campaigns. Some women talked with relief about the possibility of avoiding ‘sex’ (penetrative sex) altogether. They modeled their ideals of cleanliness and hygiene on the clinic, stressing their ‘clinical’ practice in, for example, the use of surgical gloves and chlorhexidine for hand-washing. They appeared to borrow these aspects of the clinic in the process of asserting a professional status.” Day 2007:107-8

Day goes on to describe how this expertise in risk management and harm minimisation was used to promote visibility for prostitution as work rather than deviancy and consequently to claim rights and recognition. Thus the “structures” facilitating health behaviours thus included not only sex industry organisations and health projects but also cultural factors and political movements.(Day 2000; Doezema 2004)

This and other elements of our understanding of the local sex industry

underpinned our hypothesis that health and safety may be undermined by changes occurring in the mid-1990s.

3.3. Hypothesis testing

3.3.1. *Crack whores wreaking havoc?*

From 1995 to 1996 we investigated the impact of crack in the local sex industry. Links between cocaine and other drugs and the sex industry were long established (Berridge 1988; Rosenbaum 1981), and in our initial studies we had found relatively high levels of cocaine use; in the cross sectional study of 280 women in 1989 – 1991, (paper 2) 56% of the women reported using cocaine (unpublished data). Cocaine addiction was a problem for a small minority of sex workers, but for a larger number cocaine use was an occasional “treat”, or was directly linked to work for example in agencies where “cocaine bookings” required the sex worker to take cocaine with the clients and sometimes to provide the drug.

From the late 1980s cocaine was increasingly being distributed as crack, a freebase form of the drug. Crack rocks were cheaper than powder cocaine and easier to distribute leading to crack being more closely linked to street drug scenes associated with poverty.(Green et al. 1994; Power et al. 1995) Concern about the overlap with HIV risk was growing in the USA (Chiasson et al. 1991; Edlin et al. 1994; Sterk 1988) and outbreaks of syphilis were attributed to the growth in crack use.(Greenberg et al. 1991)

To test the hypothesis that the expansion in crack use had altered health and safety in the local sex industry we carried out two linked pieces of research, one quantitative and the other qualitative. Paper 6 reports on the quantitative study of 143 sex workers attending the Praed Street Project clinic in 1995 and 1996 who

were compared to 193 women recruited in the same clinic between 1989 and 1991.(Ward et al. 2000) We did indeed find that crack use had increased and was associated with a history of termination of pregnancy and with hepatitis C infection. But we also reported that in the main, crack use was less problematic than previously assumed and occurred in all the different sectors of the sex industry. In relation to the initial hypothesis, the study was inconclusive; we had identified some problems (increased need for terminations) but had not detected a significant increase in risk behaviour to explain a general increase in risks. Women who used crack reported marginally less condom use with clients, but this was not statistically significant.

The accompanying qualitative research provides additional insights into the link, or not, between crack use and risk in the sex industry (paper 7). (Green, Day and Ward 2000) This element of the research included more in-depth interviews with women who reported using crack or having other relevant experience, together with field work in the Praed Street Project drop-in, local drugs agencies, streets and magistrates courts where observation was combined with informal and formal interviews. Through this work we found a wide range of patterns of crack use, and overlap with use of other drugs and other forms of cocaine which were not always easy to distinguish. For some women crack was seen as a major problem, leading them to take risks in relationships and at work, while for others it was used for pleasure and not seen to be associated with risk. Somewhat in contrast to the clinic survey, we did find evidence of how crack use could undermine norms of safety in sex work and this was primarily through blurring definitions and boundaries.

“A common theme concerned the difficulty of separating professional work practice from recreational drug use. The former

implied payment in money and condom use with clients. The four women who did not see themselves as sex workers but reported trading sex for crack, did not identify with peer norms and practices of the industry. They reported not using condoms with these commercial partners who they described as 'casual boyfriends'. Women who did identify as sex workers generally insisted on condoms with clients, but some reported exceptions when the man was a supplier or smoking partner."(Green, Day and Ward 2000)

Anthropology focuses attention on categories and meanings, challenging existing classifications that produce incorrect generalisations. The literature at the time focused on a particular pattern of crack use, creating a new category of "crack whore" who came to represent risk and chaos, threatening previous norms. We discovered a more mundane reality, in which crack use was widespread and varied and where occasional use was often hidden because of the stigma of the crack whore.

Our recommendation, included in both papers, was to integrate information about crack use into general information for sex workers. We argued that since it was at one and the same time widespread but hidden, it was important to warn all sex workers of the potential risks associated with its use rather than to restrict advice to those who appeared to have a problem.

3.3.2. Migrants breaking down borders

Another major change that caused concern in the 1990s was the relatively rapid transformation from a predominantly UK-born to a predominantly migrant workforce in the sex industry in London. Once again, we anticipated disruption to

established networks for sustaining health behaviours, and designed research to test this hypothesis. The project, "Changes in prostitution 1985 – 2000", addressed two linked issues. The first was to explore changes over the course of sex work careers through a longitudinal study of the interrelationships between occupation, family and health based on the cohort initially studied between 1985 and 1993. Results from this study are described in paper 11 and in Sophie Day's book.(Day 2007; Ward and Day 2006)

The second issue related to the concern over changes in the industry. We promised to "compare prostitution today with the situation ten years ago". Both elements were to be addressed through integrated anthropological and epidemiological approaches and to be used to "inform interventions to reduce morbidity".

The methods for comparing the sex industry in different time periods included a quantitative survey of sex workers, using similar sampling methods to earlier work to help comparability. We also collated data from all sex workers registering with the Praed Street Clinic to provide quantitative data on trends. These methods were complemented by more in-depth work with individuals including repeated interviews, the use of structured and unstructured interview schedules, diaries, life histories, and accounts of social networks. We also conducted fieldwork to explore the organisation of prostitution in the local area. This took the form of participation in drop-in sessions and outreach of the Praed Street Project and some other local projects, plus four surveys (carried out annually from 1998 – 2001) during which we mapped local advertising, businesses, services and courts. We interviewed key informants in the police, local businesses, health care and social services.

Our extensive findings are presented in short summary form in paper 8, which

documents broad changes in women using the project over the 15-year period, paper 11 which reports on the long-term follow-up of the early cohort, and paper 12 which is an ethnographic study of local walk-in flats. (Cooper et al. 2007; Ward and Day 2006; Ward et al. 2004)

I have referred to paper 8 in chapter 2 in relation to the determinants of STI. That aspect is only part of the paper; most of it documents the substantial changes in the sex industry. In it we use the data from new registrants at the clinic to show the increase in migrants, defined as women not born in the UK, from 37% of the early sample (1985 to 1992) to 75% of the later group (1996 – 2002). This was perhaps the most visible change, and the one we were already aware of, but there were other changes, shown in table 1 of paper 8. There was a shift over time towards slightly older women (median 26 compared to 25 years), to women who had started sex work at an older age (median age of 24 compared with 20 years) and to women who attended the Praed Street Project earlier in their sex work careers (after a median of 12 compared with 24 months). Additional (unpublished) data show that the later group were less likely to have a non-paying partner or to report using drugs.

The paper also shows changes in sex work sector: the proportions working in clubs, saunas, escort agencies or for madams were stable, but the proportion working on the streets decreased from 18% to 3%, working privately decreased from 11% to 3%, while flat work increased from 19% to 34%. There was also an increase from 0.2% to 6.5% in women classified as working in “other” sectors. This was a category that included working exclusively through the internet or in adult entertainment.

Condom use increased for vaginal sex and from 1990 onwards remained stable with around 98% of women reporting using condoms with all clients in the

previous seven days. Use of condoms for oral sex increased between 1985 and 1991 (from 41% to 91%) and then fell to around 66% by 2002. The proportion of women selling anal sex increased from around 1% to 6%. Condom use increased significantly with non-paying partners, to 44% in 2002.

In a departure from my earlier medical publications this paper explicitly incorporates elements of the qualitative work, particularly the local mapping which is used to explore bias in the clinic sample. Similar shifts were observed in terms of migration and sex work sectors. The fieldwork identified groups of women who were not in contact with sexual health services; in the late 1980s these were mostly street workers, UK-born, who often used drugs and were vulnerable to violence and repeated arrests. In the later period similar women were identified, including some of the same women who still had little contact with services, but we also identified groups of migrants who were reluctant to present to services for a variety of reasons.

These results both confirm and refute parts of our hypothesis. Yes, the shifts in the sex industry had been profound in terms of workforce and sectors. But somewhat counter-intuitively this had led to an increase in health and safety, reflected in a lower rate of infections. The proposition that migrants would work less safely was based on our interpretation of literature that linked the globalisation of sex work with increasing variation in occupational norms of health and safety.(Castilla, Sobrino and del Amo 2002; D'Antuono et al. 2001; Hamers and Downs 2004; Mak 2004; O'Connor et al. 2007). Earlier collaborative research including the PSP had established that risks for HIV infection included non-European origin.(European Working Group on HIV Infection in Female Prostitutes 1993)

In retrospect, we appear guilty of one of the crimes we had accused so many

others of in relation to prostitution, namely that a category (migrant) would carry with it a set of risks and behaviours. It is also possible that we played on contemporary fears about migration and risk in order to “sex up” the proposal and increase the chance of getting further funding.(Kulick 2003) After 1993 and the publication of our and other research on prostitution it had proved difficult to obtain AIDS funding for work in this field. Whatever the reason for our concerns, it is worth exploring the relationship between migration, migrants and health and safety in more detail.

As discussed in the previous chapter, we ascribed the decrease in STI over time to an increase in safer sex, and this occurred at the same time as the shift to a more migrant workforce. Was this migration a key factor causing the decline? Further quantitative analysis of data from 1985 to 2002 shows that UK-born women have a significantly higher risk of having an acute STI than migrants (OR 2.08, 95% CI 1.37, 3.18, $p < 0.001$), supporting the notion that migrant workers are safer. But looked at in more detail, as in chapter 2, migrant status is not a strong predictor of infection, and stratifying by time period shows that in the later period there is little difference in the prevalence of STI when women are grouped by country of birth into UK, other rich countries, low income countries and East Europe/ former Soviet Union.

However reassuring the reduction in STI rates, the observation does not explain how it occurred in terms of the structures of the industry. If migration *per se* may not have been responsible for the reduced risk, other changes in the workforce and industry may have had a major impact. There was, for example, a shift towards slightly older women, with more education who entered the sex industry at an older age, all of which are associated with reduced risks of infection (see previous chapter). Migrants in particular are far more likely to have been

educated beyond the age of 18 (24% compared with 7% of UK-born women). The existence of the project itself over many years is likely to have had an impact; certainly women attended the project earlier in their working lives: 44% of migrants attended the project within 6 months of starting work.

3.4. Understanding structural factors: ethnography

Qualitative work provides further insights and explanations. As an example, the ethnography of walk-in flats published in paper 12 shows how migrant workers, particularly those new to the country and the industry, are trained by maids. (Cooper et al. 2007) The organisation of these flats is key to health and safety since it is one of the largest sectors of the industry, and is where new workers often start. In the past more women would start on the streets (34% of the early cohort, see paper 11), but intensive policing has made this less common. Migrants of uncertain immigration status avoid street work as they fear contact with authorities which may lead to deportation. Flats on the other hand are more hidden from the police and immigration officials, although this has changed in more recent years with flats coming under more extensive surveillance.

Maids are women who manage flats in London, an arrangement that has developed to try and get round laws that make it a crime for more than one woman to sell sex from the same premises. (Release 2008) The organisation of some London flats has been described in previous qualitative work (Whittaker and Hart 1996), and our field work updated this picture.

“Many of the flats in Soho were in a state of disrepair – others were more cheerful, having been recently redecorated. The lasting impression however was of ill lit, shabby, poky flats with bad

soundproofing, damp wallpaper or yellowing paint. Women were dressed in lingerie, which they sometimes covered with towels or dressing gowns when clients were not there. Shifts were long, with women often starting around midday and staying until 3-4 in the morning and time was passed by chain smoking, eating, watching TV or chatting to each other. Women often made reference to each other and to other flats in the vicinity and appeared to watch out for each other – if a client called and the woman was busy, the maid would often recommend the flat upstairs or downstairs.

In general, maids were quite elderly – on one session, all 10 maids met were over the age of 70 years – one was 85. Many of the maids had worked in the flats for long periods of time and had had many girls working for them – they often forgot the names of the women present on each day and characterised the different flats by the maids rather than the women working... A large number of the maids we had time to chat to spoke about how they loved their work – often talking about the tight community of flats in Soho. Many dressed as if they were housewives – wearing aprons, permed hair, slippers - and talked about the cleaning they had been doing that day; how important it was to keep surfaces clean, often comparing other flats unfavourably.”(Fieldnotes, survey of central London flats, 1999)

The notes above refer to visits carried out alongside an outreach team, CLASH,¹ in central London, and provide a flavour of the area. It reveals how a certain stability of the sex industry is embodied in the buildings and the maids whilst sex workers and clients are more transient. Maids presented themselves in a classic female role of carer, cleaner, proud of the “homes” they kept. In Whitaker and Hart’s earlier work in the same area they described the maids playing this rather contradictory role of carer and manager, and suggested that the authoritarian aspects would be detrimental to the health of the sex workers.(Whittaker and Hart 1996)

In a later period, 2002, one of our researchers carried out an intensive period of fieldwork in a small number of flats in West London. She used more classical anthropological methods of participant observation in the flats for three months, getting to know the sex workers and maids, seeing how business was conducted, immersing herself in the area. We also found the role of the maid to be complex, particularly in relation to health and safety.

In paper 12 we describe the maids, who are mostly from the UK, providing detailed induction to new workers who are mostly from outside the European Union. “Maids play a key role in settling ‘migrant’ sex workers into an unfamiliar environment extending beyond occupational health to a knowledge of English, accommodation, financial management and, at times relationships with partners outside work.”(Cooper et al. 2007)

Much of the literature on health promotion stresses the effectiveness of peer approaches to marginalised groups such as sex workers, but such programmes are not without problems, both in relation to delivery and sustainability, and the impact the programmes have on the educators and their relationships to the rest

¹ CLASH, Central London Action on Street Health

of the community.(Campbell and Mzaidume 2001; Ziersch, Gaffney and Tomlinson 2000) Alternative approaches have been described as “top down”, in which behaviour changes are imposed by regulation or management, for example in the 100% condom programme in Thailand.(Rojanapithayakorn and Hanenberg 1996) These too have been criticised, both for denying sex workers autonomy and increasing the power of managers and state officials(Loff, Overs and Longo 2003) and for lack of sustainability.(Sopheab et al. 2008a)

The role of maids in London flats also shows the strengths and weaknesses of a hierarchical approach to health and safety. While problems of inexperience are minimised through close “governance” of the flat and the workers within it, that same level of supervision and control can have seriously harmful effects on the worker in the longer term. In their role as managers the maids were not only there to help sex workers in areas of safety, but also to play a crucial role in ensuring that they made sufficient money. If the workers stepped out of line in any way they risked being sacked or bullied. The uncertain immigration status of many of the sex workers, together with the lack of any legal framework for the working relationship, meant they had no recourse to an external arbiter. We also noted how recent migration and the contrast between UK-born maids and “foreign” workers produced many examples of implicit or explicit racism within in these oppressive relationships. (Cooper et al. 2007)

3.5. Competing or complementary paradigms

The qualitative work has provided a wealth of other insights into the functioning of the industry and the complexities of women’s lives. I asked how these insights could help explain potential pathways of causation and improve models of risk. In

relation to risks associated with crack use, the qualitative work revealed how changing categories and boundaries linked to crack distribution and consumption led to increased risks that would be difficult to capture in standardised quantitative data collection. Epidemiological models built on differentiating paying and non-paying partners, for example, may be misleading when the use of these categories varies within the population.

Quantitative work is based on categorising people by exposures and outcomes while qualitative work explores those categories. Another example relates to migration. As I mentioned earlier, the category is both laden with meaning whilst at the same time being rather meaningless. We speak and write of the transformation to a migrant workforce, but in fact for two decades the majority of sex workers were mainly “migrants” in that very few were local women.(Day 2007) In the 1980s they came from the midlands or from “up north” where jobs were scarce. In the early 1990s they were joined by women from elsewhere in Europe, or from Australia or North America, in the mid-1990s by women from Eastern Europe, Asia, South America and Africa. British women themselves were also migrants, particularly in the 1980s as they moved to other countries to work, temporarily or permanently.

Different waves of in-migration are met with similar responses from established workers, and the quote at the start of the chapter about “foreign girls” and how it has “gone dodgy” represents a common perception. Other people are seen as the problem, not me or us, a view that helps create a sense of identity and worth for people who themselves are marginalised.

“There are two reasons people are prostitutes. First, there are women with no education, like people... they meet the right guy

and they are introduced to the work. They are usually young girls. They need support. There is no way out for them. Then there are people like me. We earn money, we invest it, we work for a few years. It's a great job for this but not for the young girls or the migrants.” (Sex worker, interviewed 2000)

This woman was a Brazilian in her mid-30s who clearly distinguished herself from the migrants who she perceived as lacking the autonomy and control that she had acquired.

The strengths of integrating quantitative and qualitative methods in a single research programme are relevant here. If we had simply conducted qualitative research based on interviews and informal discussions with sex workers and key informants, we could have come up with a distorted view of the industry. Many women reported a decline in standards, an increase in risks variously attributed to migrants, drugs or state interference. The common themes relating to change were that it was more difficult to make money, there were more foreign women who charged less and did more with less concern for safety. Comments were often tinged with prejudice about others:

“More girls and less money. The economic state has changed. Used to be Arabs buying flats here and then they got wise! Now it is the Russian men, they have no manners and lots of money.” (Sex Worker, 1998, UK)

“Major change since being here has been the internet and that prices are going down because there are so many girls on the

scene. Clients are now very spoilt because there are so many girls that they can get whatever they want.”(Sex worker, Russian, 2000)

“I’m unique in many ways because I’m English.” (Sex worker, UK, 2000)

An interview with the local vice squad chief in 2001 painted a similar picture. He reported major changes over the previous six years, including the “appalling risks that women are taking now – anyone would think that HIV had never happened”. He said that oral sex without a condom was now routine, and that anal sex without condoms was becoming more widespread. He noted a huge increase in women from Balkan countries who were mainly trafficked by Albanian men.

Within these interviews personal experience and knowledge is overlain with opinion and impressions. Sex workers often talked about change in the industry as something that happened around them rather than change in their own lives and experience.

Similarly the policeman was generous in providing his opinion about what was going on in terms of risks and trafficking, but less open about the changes in his work and that of his team. Indeed he said that prostitution evolves irrespective of the vice squad and the work they do. He did report that 10 years earlier they would go out on the streets in Paddington and meet 70 women in one shift, whereas now they could do the same and would be lucky to see 10 women, a finding that fits with our research. But he also said that, in his experience, “women found their niche, and then there was little movement between the

different sectors of work.”¹

In the same way as many women told us of dangers and risks all around them, this policeman’s observations, about the lack of mobility between sectors, widespread trafficking and declines in health and safety, contrast with our quantitative findings. On the issue of mobility within the sex industry, Paper 11 reports on the long term experiences of 130 women who had been in the sex industry 10 years before. (Ward and Day 2006) One key finding, shown in detail in table 4, was the enormous mobility between sex industry sectors. Less than one in five women remained in the same sector throughout their time in sex work, with almost a third working in all sectors (streets, agencies, flats, and saunas). So despite over 30 years experience in the vice squad, the policeman does not necessarily see, or know, what is going on.

If our research had been over-reliant on “subjective” accounts we too may have arrived at a distorted picture of the truth. Fortunately, or rather by design, we had many sources and forms of data upon which to base our conclusions about changes in the sex industry. The quantitative data from the clinic corroborated the reported increase in “foreigners” but challenged the view that such women were less safe than “locals”. The quantitative data itself, showing high levels of safety and low levels of risk, needed validating, analysing and interpreting; survey data are particularly prone to social desirability bias, and in this study we were also able to use the “hard” biological endpoint of infection. Our approach allowed for triangulation of the data, based on the idea that different sources or types of data are used to measure the same thing. (Denzin and Lincoln 1994)

¹ Based on notes from an interview with Chief Inspector Paul Holmes, Vice Squad, January 2001. Interview was not recorded so these are not direct quotes but rather based on field notes taken during the interview.

3.6. Subjectivism?

It is through using such methods that we can reject the charge of “subjectivism”, while still basing a lot of our understanding on the subjective accounts obtained. While we can reject much of the policeman’s account of what has changed, based on results of our quantitative analyses, we can still find his interview a valuable part of data assuming that we have the appropriate theoretical framework and analytic skills.

Subjectivism is a charge often made against qualitative research, particularly by biomedical scientists, while others, including some anthropologists, embrace it as a strength. (Albert et al. 2008; Porter 2006) The biomedical critique is often based on a false counter-position of the “objectivity” of biological measurements or quantitative data to the “subjectivity” of words and descriptions from people.

“There’s always interpretation to the data. So it’s not like there’s an absolute answer to every set of data. For instance, when we get bands on a gel, or we get some kind of numbers, it has to do with how you set up the machine, what you take as background, and how you control for external variables. (...) All we can do is interpret things based on what we know already. There’s nothing wrong with that. That’s how science goes.”(Albert et al, 2008)

This quote is from a study by Albert and colleagues who interviewed 31 biomedical scientists to explore their perceptions about social science research, and shows that some do recognise that all science involves a level of interpretation. The presumption that biological measurements are objective while social science measurements are subjective undermines both disciplines.(Day 1994) Careful measurements, repetition and critical interpretation are key to

research in any field. In qualitative research subjective opinions and statements form part of the data, and it is then the role of the researcher to analyse and interpret the data in the light of other knowledge and theories.

In the quotes I provided earlier in relation to changes and specifically migration, there are many factors influencing the words – several of these quotes were in a semi-structured interview where women were asked what had changed in the sex industry. Phrasing the question in this way invites a general, sweeping answer, the kind that makes for lively quotes, but taken in isolation are not a particularly useful source of data on change. But taken in the context of whole interviews, and across many women, they can make up a very rich source of data with which to understand how sex workers regard themselves in relation to others, how they perceive the conditions under which they are trying to make a living, the factors that influence how they make decisions and behave.

The skills involved in such analysis and interpretation are considerable, as is the substantive knowledge and theoretical understanding required. As Lambert and McKeivitt (2002) point out, this is not necessarily widely practiced. “The main problem with the quality of qualitative research in health lies not in the methods but in the misguided separation of method from theory, of technique from the conceptual underpinnings.”

Unfortunately the explosion of qualitative research in health has not been accompanied by a corresponding expansion in numbers of people with the requisite skills and expertise, and all too often qualitative research is a rather formulaic add-on to a quantitative study. This undersells the potential of research that combines methods. “Mixed methods” research is definitely *de rigueur* at the moment; to reach its potential it must be more than the sum of its parts. Pope and Mays warn of the dangers of mixed-up methods, and argue that “the challenge is

to provide an account that is dialectical - that uses the different insights from different methods to tell us something new.”(Pope and Mays 2009)

3.7. Conclusion

At the start of this chapter I asked whether an improved understanding of contextual factors in the sex industry, gleaned primarily through qualitative research, could inform epidemiological models such as those developed in chapter 2. I have shown how qualitative work uncovers the importance of structural factors, such as the organisation of flats and the distribution and consumption of drugs, in determining individual and group level behaviours and risks. This work has also provided insight into the importance of categories and how these can change and create difficulties in interpreting quantitative results. While the importance of qualitative input into the design of questionnaires is widely accepted, our work shows how this cannot be a one-off exercise as words and their meanings change. I then discussed how quantitative work provides a framework for interpreting interview data and checking the limitations of subjective accounts.

The final challenge is whether this approach can help inform the epidemiological models themselves and not only aid in their interpretation. This requires the development of theoretical frameworks that can incorporate individual, network and structural determinants. Multi-level modelling has been developed that can explore such factors at the level of statistical analysis.(Diez Roux and Aiello 2005) For these to be useful we need first to develop theoretical frameworks for understanding the potential connections between levels, and second to collect data on structures and relationships using appropriate methods.(Oakes and Kaufman 2006) I explore this further in the concluding chapter, followed by a brief reflection on the findings from my own research that have been most useful when

developing preventive interventions.

Chapter 4. Conclusion

Historically, society has blamed prostitutes for spreading all kinds of disease. Syphilis was blamed on prostitutes. The plague was blamed on prostitutes. During World War One the government locked up prostitutes to protect enlisted men from VD . . . We prostitutes knew that, sooner or later, AIDS would spread into the heterosexual community and that when it did not only would we be blamed but, if history was any guide, we would also be arrested, quarantined, and worse.(French 1989)

4.1. Introduction

Writing this thesis motivated me to re-visit articles that were published many years ago, and which I have rarely consulted since. In some ways it has been a revelation, highlighting the strengths and limitations of the research, but also helping me to uncover some of the treasures buried under layers of academic sediment.

The paper that tells the reader most about the topic, namely sex work in London, and provides both a vivid picture and many in-depth insights is the only one that is not from a journal. Paper 4, *Health care and regulation: new perspectives*, is a chapter from Graham and Annette Scambler's collection, *Rethinking prostitution. Purchasing sex in the 1990s*.(Ward and Day 1997) Freed from the confines of a scientific paper, it presents a coherent narrative and ample evidence to justify a

particular model of preventive intervention. In contrast, many of the other papers are so densely written, so littered with data, references and caveats that it is often hard to see what is actually being reported. I do not think this is unique to my writing, rather it is in the nature of the beast. But this realisation is a little unnerving, given that I have spent the past seven years of my life editing a scientific journal, *Sexually Transmitted Infections*, introducing ever tighter controls on structures and word limits in the name of improving scientific communication.

The discursive chapter is of course much longer than the other articles, at over 8000 words. It is essentially a history of the Praed Street Project from 1985 to 1996, complete with timelines and vignettes. But what surprised me was the level of insight that it displayed while it went from epidemiological theories of core groups, the validity of quantitative and qualitative methods, the medicalisation of sex workers, right through to the paradox of preventive interventions. A journal editor would probably feel that the wide range of areas detracts from a scientific argument, but I am left with quite the opposite view. I think it is the closest any of the papers comes to providing a coherent argument that could inform decisions about healthcare and regulation.

Such decisions need to be made on the basis of sound evidence, and in this thesis I have explored one part of that knowledge base in detail, namely our understanding of the determinants of STI in sex workers. The focus on infection is problematic if the aim of this work is to improve the health of sex workers. As the paper on long term outcomes demonstrates, (paper 11) infectious disease is only one health issue, and a relatively minor one at that in comparison to problems of addiction or mental health.

But like other people in this field my work started with a focus on infection, and relevant data have provided a useful example for exploring methods and

pathways in causation. In chapter 2 I tested a proximate determinants model for acute STI acquisition and found that it helped to explain some, but not all of the relationships between risk factors. Chapter 3 considered the contribution of quantitative and qualitative research methods in testing hypotheses concerning change in the sex industry in the latter part of the 1990s. I ended the chapter with a discussion about mixed methods research and the challenge of achieving a higher synthesis through a dialectical process. In this brief concluding chapter I draw together the implications of the work for social epidemiological theory and methods, and then ask whether the combined methods used in my work have been effective in providing evidence to inform effective action.

4.2. Methods and models in social epidemiology

The model developed in chapter 2 was based on an analysis of individuals, using a proximate determinants framework to try and unravel causal pathways. In chapter 3 I showed that individual behaviours are influenced by group-level factors such as the organisation of sex work businesses, local factors such as immediate relationships (with maids or clients for example) as well as by individual characteristics such as age, level of education or country of origin. In some areas each of these levels will interact. For example, the structure of walk-in flats (ownership, methods for attracting workers and clients) will have an impact on the type of women who work there, but also on the role of the maid (whether she is an exploitative manager or more of a supportive co-worker); government policies and police priorities will determine whether these working structures are stable, and this will affect whether women working there are experienced or new; decisions of funding bodies and local health services will determine whether their health care and preventive interventions are available to sex workers.

The list of factors and potential interactions could grow and grow creating the kind of web of causation that captures multifactorial models of disease. Creating a visual diagram of the interacting factors is tempting, but creates an immediate challenge since it requires representation of some kind of structure.(Joffe and Mindell 2006) What is close to the centre, what is further away, which factors are adjacent, and does it require arrows indicating pathways within the web?(Krieger 1994) Before, or perhaps instead of, producing such a picture it is worth considering why. I asked whether understanding contextual factors could inform a model of causation, an improvement on the rather simplistic proximate determinants model suggested in chapter 2.

Such a model would have to explain, for example, how young women come to have a higher risk of infections than older women, and why condom use, the main weapon in our armoury, seems to protect some women more than others. In other social epidemiological models of causation the social, including class, gender and ethnicity, is considered to operate at many levels from the political through the literal embodiment of disadvantage within the person.(Krieger 2005; Kuzawa and Sweet 2009; Najman and Smith 2000)

The danger with developing models that include multiple factors at many levels is that they can become descriptive, all encompassing and not specific enough to lead to effective action.(Krieger 1994) Krieger argues that the focus on models has actually distracted epidemiologists from developing theories that attempt to explain *why* disease is distributed as it is, since models only aim to portray *how* factors interact.(Krieger 1999) She is particularly critical of the proximate determinants model, and the web of causation which she sees as a more complex version of the same concept. She suggests that the notion of proximal is misleading in that some factors are seen as acting more directly on or within the

body, while others are both “further away” and less specifically associated with the disease. This reflects a “causal pragmatism” in which the focus is on those factors that are considered amenable to control and relative disregard for underlying (or distal) factors such as economics and power.(Krieger 2008)

Reflecting on this debate in relation to sex work, and in particular the contribution of quantitative and qualitative research methods to understanding health, I am struck by two common elements of recent discussions on causation and on prostitution. First, the need for theory in terms of understanding causation of disease is closely allied to the need for theories to understand social relationships and interactions. Both require an understanding of how societies function and the ways that changing economies, politics and power affect health and behaviours.

4.3. Information for action

The second common thread is the need for knowledge to be useful. The attraction of relatively simple models of causation is that they may point to key points at which interventions can interrupt the chain and prevent disease. This is particularly attractive for epidemiologists who strive to measure the population attributable risk – the amount of disease that could be expected to be prevented by removal of a particular risk factor (assuming that it is a causal factor). It is also tempting in debates on sex work, where an apparently simple understanding might hold promise of a simple solution. Current policy debates are dominated by an understanding of sex work as violence against women which then leads to simplistic responses, for example the criminalisation of men who pay for sex.(Day 2009; Ward 2007)

In public health terms, the factor that seems most amenable to change in the sex work – STI relationship is the use of condoms. In the proximate determinants

model this is suggested as key to most pathways. From the model we could estimate the proportion of infection that would be prevented if only everyone were persuaded to use a condom, and this is indeed a pragmatic approach that seems to have worked well in terms of reducing infection risks in sex work.

But to achieve this in practice we need to understand the determinants of condom use, which turn out to be complex and related to structures, power and relationships. Developing a more complex model may help to guide both research and intervention, but would a focus on theory be more useful? A theory of prostitution, understanding its relationship to the family, social and economic systems and gender should be able to explain much of the variation in risks of STI and other health problems. Understanding sex workers according to their status as workers, traders, employers or slaves, rooted in a theory of social and gender relations under capitalism, will provide insights into how their position can be improved, for example.(Ward 2007)

While that might sound rather distant from a public health intervention, in my experience an understanding of the politics of sex work and gender have been crucial to implementing things that we know to be effective and in assessing the impact of new interventions and policies. For example, many health and social interventions for sex workers are now required to encourage women to leave the industry through “exiting” strategies. At face value this may appear to be wholly useful, providing opportunities for alternative work. Yet this approach can undermine health promotion actions in many ways which can be understood and anticipated by someone with a rounded understanding of the issues. Promoting exiting can raise barriers to accessing services as women fear being lectured; it can increase stigma for those who do not wish to change, and stigma leads to ill-health in a wide range of ways; it can undermine self-esteem which in turn can

reduce self-efficacy and lead to increased risk taking.(Allen et al. 2006; Day and Ward 2004a; Scambler and Paoli 2008)

4.4. Final reflections

In conclusion, I consider that the body of work presented in this thesis, together with this commentary, demonstrate the importance of a rounded approach to examining the relationship between sex work and health. The approach needs to incorporate a theoretical framework of causation that incorporates social, economic, behavioural and structural factors. Epidemiological research into risk factors must be guided by such a framework, and by qualitative work that informs categorisation, language and points to relevant structural determinants that should be measured.

This is not a particularly comfortable conclusion, since it requires researchers to draw on a wide range of disciplines and skills and therefore embrace a multi-disciplinary approach. Unfortunately scientific theory generally splits into intellectual silos, with epidemiology, anthropology, history and political economy operating in parallel, when to understand and act requires a materialist approach based on insights and findings that cross academic disciplines. Nowhere is this more pertinent than in public health where, whatever model or theory you look at, social factors remain the major determinants of differential outcomes.

Recognition of such complexity leads to the conclusion that the development of interventions requires a synthesis of evidence from many disciplines, and should include the perspective of participants whose agency will be the key to successful implementation.

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