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Heroin in brown, black and white: Structural factors and medical consequences in the US heroin market

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Abstract

Background—Heroin coming into the United States historically comes from three widely dispersed geographical regions: Southwest Asia, Southeast Asia and Mexico. A fourth source of US-bound heroin, from Colombia, originated in the early 1990s. The fact that the four heroin sources produce differing morphologies and qualities of heroin has not been critically examined. In addition, it is not well established how the contemporary competing dynamics of interdiction, or restriction of heroin flows across international boundaries, and neoliberal, e.g., global expansion of free trade, policies are affecting heroin markets. This paper will highlight changes in the US heroin market, including source trends, the political economy of the now dominant source and the resultant effects on the heroin risk environment by US region.

Methods—Using a structural and historical framework this paper examines two decades of secondary data sources, including government and drug control agency documents, on heroin flows together with published work on the political and economic dynamics in Latin America.

Results—Co-occurring neoliberal economic reforms may have contributed to paradoxical effects of US/Colombian interdiction efforts. Since entering the US market, heroin from Colombia has been distributed at a much higher quality and lower retail price. An increasingly exclusive market has developed with Mexican and Colombian heroin gaining market share and displacing Asian heroin. These trends have had dramatic effects on the risk environment for heroin consumers. An intriguing factor is that different global sources of heroin produce substantially different products. Plausible associations exist between heroin source/form and drug use behaviours and harms. For example, cold water-soluble powdered heroin (sources: Asia, Colombia) may be associated with higher HIV prevalence in the US, while low-solubility “black tar” heroin (BTH; source: Mexico) is historically used in areas with reduced HIV prevalence. BTH is associated with soft tissue infections caused by *Clostridium* bacteria.

Conclusion—Source and type of heroin are structural factors in the risk environment of heroin users: source dictates distribution and type predicts practice. How specific types of heroin are used and with what risk is therefore distributed geographically. Continued flux in the heroin market and its effects on the risk environment for drug users deserves further attention.

Keywords

Heroin; Structural factors; Drug economics; Drug trade; Bacterial infections; HIV

Introduction

It is well recognized that geopolitical instability fosters the international heroin trade (United Nations Office on Drugs and Crime, 2000; United Nations Office on Drugs and Crime Country Office for Afghanistan, 2008). What is less well established is how the contemporary competing dynamics of interdiction, or restriction of heroin flow across international boundaries, and neoliberal, e.g., global expansion of free trade, policies are affecting heroin markets. Using a structural and historical framework we examined two decades of secondary data sources, including United States government and international drug control agency documents, on heroin supply together with published work on the political dynamics in Latin America, to explore paradoxical effects of interdiction coupled with neoliberal economic reform on the US heroin market. This paper will highlight changes in the US heroin market, including source trends, the political economy of the now dominant source and the resultant effects on the heroin risk environment by US region.

Global heroin glut

Exclusive regional heroin markets have developed worldwide: poppies grown in Afghanistan predominately end up as heroin in Europe; Southeast Asian heroin almost exclusively goes to Australia and Western Canada; and Colombian and Mexican heroin retails in the US. Retail prices in these restricted markets are low by historical standards, despite the reduced competition from fewer sources (Gibson, Degenhardt, Day, & McKetin, 2005). From the vantage of economic theory, this helps develop the case that heroin supply exceeds demand in most developed consuming regions (Ciccarone, 2005). The establishment of regional exclusive markets and supply surpluses is consistent with boom and bust events recently noted. The Afghanistan Taliban induced opium shortage circa 2000 did not produce a price shift in its primary retail markets in Europe (Gibson et al., 2005) supporting the notion of a surplus in the supply chain. There is no evidence of an alternative supply coming from any other opium or heroin producing region. Since the ousting of the Taliban regime, record heroin crops have been reported (United Nations Office on Drugs and Crime, 2007a) and heroin prices in Europe have dropped substantially (Gibson et al., 2005; United Nations Office for Drug Control and Crime Prevention, 1999; United Nations Office on Drugs and Crime, 2003). Much has been written about heroin shortages in Australia and Canada circa 2001 (Degenhardt, Reuter, Collins, & Hall, 2005; Weatherburn, Freeman, & Makkai, 2003; Wood, Stoltz, Li, Montaner, & Kerr, 2006). Some consider the Australian heroin “drought” an example of successful interdiction with Australian law enforcement activities constraining the Golden Triangle/Australian wholesale/retail connection (Degenhardt et al., 2005). Data from Vancouver, Canada, which shares South East Asia as its heroin source, revealed similar shortage effects (Wood et al., 2006). The authors argue for reduction in source production over interdiction as the key factor. Closer examination of the Australia heroin “drought” data shows a longer duration heroin upswing, or glut, lasting years prior to the shortages (Dietze & Fitzgerald, 2002). It is conceivable that these exclusive markets have been honed by decades of interdiction policies. However, despite these constrained source-to-retail chains, supply control, including interdiction, policies have not been able to produce sustained reductions in heroin availability in retail markets. The remainder of this paper will focus in greater detail on the western hemispheric trade in heroin and the development of exclusivity in the trade routes ending in the US.

Trends in US heroin markets

The development of a more exclusive heroin market in the US is intriguing. Prior to 1980, heroin in the US was sourced from the three predominate producing regions in the world: Southeast Asia, aka the Golden Triangle of Myanmar (Burma), Laos and Thailand; Southwest

Asia, i.e., Afghanistan, Pakistan and Iran; and, to a minor degree, Mexico. The largest producer at that time was the triumvirate called the Golden Triangle, the name referring to the shape of the three constituent countries and the richness of the opium trade. Opium from the Golden Triangle accounted for 55% of the world's opium in 1986 (United Nations Office for Drug Control and Crime Prevention, 1999) and the heroin derived from it accounted for 19% of the US market (National Narcotics Intelligence Consumers Committee, 1992). The market share of these sources has changed dramatically over the last two decades, especially since a new source of heroin, Colombian, began exporting in the early 1990s. In 1986, the US President's Commission on Organized Crime reported the market share of US retail heroin from each producing region was 17% from Southeast Asia, 51% from Southwest Asia and 33% from Mexico (President's Commission on Organized Crime, 1986). By 1990, heroin from Southeast Asia and Mexico had larger market shares than that from Southwest Asia (US Department of Justice & National Drug Intelligence Center, 2007). By 2000, the distribution of US retail heroin changed dramatically with 48% coming from Colombia, 39% from Mexico, 3% from Southwest Asia, 1% from Southeast Asia and 9% unclassified (US Drug Enforcement Administration, 2002). This trend has only continued, with the latest data showing that market share has increase to 58% for Colombian-sourced heroin, 40% for Mexican-sourced heroin, with Southeast and Southwest Asia heroin combined falling to 2% share (US Drug Enforcement Administration, 2007).

The heroin market has become increasingly restricted to two sources, Mexican and Colombian, with dramatic effects on the risk environment for heroin consumers. Consistent with worldwide trends, the development of a more exclusive market in the US has led to a paradoxical decrease in the price of retail heroin. According to US Drug Enforcement Administration documents, the mean price per milligram pure of US heroin has fallen from 4.36 USD/mg-pure in 1990 (US Drug Enforcement Administration, 1991) to 1.07 USD/mg-pure in 2000 (US Drug Enforcement Administration, 2002). The potential consequences for consumers of these market shifts, including increasing drug use, emergency room utilisation, overdose and bacterial and viral infections, will be explored in greater detail shortly. First, it might help to further investigate the political economy of heroin in Latin America and the paradoxes of interdiction in an era of neoliberal economic reform.

Political economy of Colombian heroin

After entering the US heroin market in the early 1990's, Colombia's drug manufacturers, building on earlier successes with cocaine distribution, became the top regional heroin supplier to the US by 1997. Heroin from Colombia rapidly dominated regional markets due to high quality and low cost; market competition subsequently drove out heroin from Southeast and Southwest Asia. An examination of recent Colombian history suggests the forces behind the de novo successful introduction of an illicit substance to the US.

While a full political history of Colombia is beyond the scope of this paper (for review see: Kline, 1995; Springer, 2006), a brief historical overview may facilitate an understanding of the situation in which the drug trade flourished. Since independence in 1830, Colombia has suffered from a high number of internal civil conflicts. The core conflict started between two major political parties who were, at the time, largely divided over the authority of the church and the issues related to class inequality, e.g., land reform (Bowden, 2001; Central Intelligence Agency, 2007; Kline, 1995). This evolved into conflicts between the government and armed insurgency groups, including "Fuerzas Armadas Revolucionarias de Colombia" (FARC) and "Ejército de Liberación Nacional" (ELN). Right-wing paramilitary groups developed in response to left-wing insurgencies and ideology. These groups were, and still are, associated with large numbers of human rights abuses. Largely due to these conflicts, Colombia has the second largest number of internal refugees in the world, next to Sudan, and a large proportion

of land not under government authority (Central Intelligence Agency, 2007; The Office of the United Nations High Commissioner for Refugees, 2007). The drug trade fuels these conflicts and these conflicts facilitate the drug trade.

Certain aspects of Colombian drug trade history help illustrate why Colombian traffickers were capable of quickly and effectively entering the US heroin market. In Colombia, marijuana was the first illicit drug grown in substantial quantities. It has been exported since the 1960s. This trade increased exponentially during the 1970s due to increased US demand and marijuana crop spraying and interdiction efforts in Mexico by the US (Thoumi, 2002; Toro, 1999; US Drug Enforcement Administration, 2005). Coca, a stable crop with endemic local use throughout Colombia, Bolivia and Peru, began being processed into cocaine for export during the 1970s (US Drug Enforcement Administration, 2005). Receptive demand in the US during the late 1970s, coupled with strong supply, set the stage for a cocaine epidemic. According to the DEA, the explosive growth in cocaine exports seen in the 1980s was largely an opportunistic response to US drug policy by what became the Colombian drug cartels. This policy placed less emphasis on cocaine and marijuana in favour of greater intervention with more harmful drugs, e.g., heroin and injectable barbiturates, and in Mexico—the country with greatest illicit drug flow to the US at that time (US Domestic Council Drug Abuse Task Force, 1975; US Drug Enforcement Administration, 2005). Early successes with cocaine and marijuana trafficking catalysed the development of the drug cartels and put systems in place for large-scale drug production and distribution. Historically, the neighbouring countries of Bolivia and Peru produced the majority of the coca leaf and paste supply, while most of the cocaine processing and packaging for export occurred in Colombia (United Nations Office for Drug Control and Crime Prevention, 1999; US Drug Enforcement Administration, 1993).

During the 1980s, the Medellin and Cali cartels ran the enormous US cocaine market. Continued weak government control allowed the drug trade to flourish and diversify: in 1986 the first poppy plants were detected in Colombia. International pressure in the late 1980's and early 1990's to extradite cartel leaders led to greater conflict, but also some transformative events: several key arrests of cartel leaders in 1990, the assassination of Medellin cartel's Pablo Escobar in 1993 and the capture of top Cali cartel members in 1995. The major cocaine cartels had the resources to begin development of heroin production, but it took the toppling of the cartels' leadership for minor leaders to progress with it. During the 1990's mid-level leaders formed smaller, low profile drug organisations (Milford, 1997); these had their root in the more compartmentalised Cali cartel (US Drug Enforcement Administration, 2000). As power was decentralized, drug production was increasingly diversified. The size of the new trafficking organisations was consistent with the smaller volume of US heroin demand and higher price to weight ratio of retail heroin (United Nations Office for Drug Control and Crime Prevention, 1999; US Drug Enforcement Administration, 1995).

The diversification of Colombian drug production and export to include heroin in addition to cocaine, with the resultant increase in heroin availability in the US, despite reduced supply from traditional sources, highlights a paradoxical effect of interdiction.

Paradoxes in interdiction

A central focus in the United States' "war on drugs," now in its fourth decade, is the constriction of illicit substance inflows across its international borders. Supply reduction efforts involve interdiction and source country control of crop and drug production. Expenditures in this so-called "war" rose dramatically from 2 billion USD in 1991 to 11 billion USD in 2003 (The White House: Office of National Drug Control Policy, 2004). Illicit drug supply reduction efforts in Latin America were escalated in 2000 with the US government financed Plan Colombia. This venture, involving aerial crop spraying and direct military intervention, has

cost \$4.7 billion since its inception (Dermota, 2007) This program has yielded mixed results: a 52% reduction in the area under coca cultivation, but no real change in cocaine production from 2000 to 2006 (United Nations Office on Drugs and Crime, 2007b).

These efforts focused largely on coca growing, while opium poppy fields for the most part escaped crop eradication efforts. Detection and fumigation of poppy crops was more challenging: mountainous growing, which compared to low-land growing of coca, involved smaller, more dispersed plots planted by subsistence farmers; steep terrain; camouflage by other crops and cloud/fog obfuscation. External supply control pressures also forced market efficiencies: increasing drug crop yields per acre, reduced profit margins, especially at the street seller level, and elimination of middlemen (Dermota, 2007). The first two factors favour the diversification towards heroin and the latter is part of increasing sophistication in international markets; a strong point of the Cali cartel and its splinter groups (United Nations Office on Drugs and Crime, 2000).

The idea that supply reduction efforts alter heroin sources and trafficking routes is not new. A strong example is found during the Vietnam War era. Heroin supply to the US shifted from Turkey and Europe to the Golden Triangle during the period of the late 1960s to early 1970s for several reasons (House Committee on Foreign Affairs, 1973). Increased demand in South Vietnam, largely by US servicemen, spurred technological advances in converting type-3 heroin to type-4. US financial support to Turkey to stop growing opium poppy was successful. By the early 1970s, organized crime syndicates in the US and Europe seized the opportunity following the decline in troop levels in Vietnam and the resultant glut of high-grade heroin (McCoy, Read, & Adams, 1972). The result was a profound rise in the availability of Southeast Asian heroin in the US.

Paradoxes in globalisation

Co-occurring neoliberal economic reforms may have contributed to paradoxical effects of US/Colombian interdiction efforts: dismantling of major cocaine cartels led mid-level distributors to flourish with diversified drug product (already discussed); concentration of cocaine money in Colombia resulted from structural adjustment reform in Bolivia and Peru; interdiction in Caribbean drug routes led to cooperation with Mexican traffickers and trade route diversification; and the North American Free Trade Agreement (NAFTA) has expanded border flows.

Neoliberal market reforms in Latin America were meant to increase economic prosperity by reducing state control of markets and increasing flow of capital investments. However, reduced state control of national and export economies also meant reduced ability to control drug exports since legal and illegal markets are intertwined (Andreas, 1995). The economic crises in Latin America in the 1980's led to externally imposed structural adjustment policies. These policies accepted first in Bolivia in 1985 and then in Peru in 1990, imposed new debt obligations requiring cash payments. Initially, the servicing of international debt facilitated increased tolerance of drug market monies flowing through national coffers (Andreas, 1995). In the mid-1990s, the success of air interdiction between Peru and Colombia was evident, encouraging coca cultivation in Colombia. By 1997, Colombia's coca cultivation was equal to Peru's and by 1999, had surpassed it (United Nations Office on Drugs and Crime, 2000). This strengthened the Colombian drug traffickers' control over cocaine profits. In a recent peak year, 2004, over 1000 metric tons of cocaine was estimated to be produced in the region—the bulk of which was coming from Colombia (United Nations Office on Drugs and Crime, 2007b).

US interdiction efforts in the Caribbean and Florida in the 1980s catalysed collaboration between Colombian and Mexican drug traffickers. The Southern Florida Task Force was a

large-scale operation, including US Drug Enforcement Administration agents and US armed services, to clamp down on drug trafficking, violence and money laundering (US Drug Enforcement Administration, 2005). These early efforts had broader effects on the drug trade stemming from Colombia. Profit sharing agreements fostered Colombian cocaine smuggling through Mexico, which ultimately accounted for 50% of all cocaine entering the US (Constantine, 1996; US Drug Enforcement Administration, 2000). A more complicated arrangement eventually developed in which Colombian traffickers, relying on long-established trading routes (US Drug Enforcement Administration, 1996), controlled eastern US distribution of cocaine and Colombian-sourced heroin (US Drug Enforcement Administration, 2000), while Mexican traffickers control distribution of Mexican-sourced heroin and Colombian-sourced cocaine to the western US.

Free trade is a key aspect of neoliberal policies promoting hemispheric and global commerce. The NAFTA increased flow of goods and people to the US. For example, the number of persons entering the US from Mexico rose from 204 million in 1995 to a peak of 293 million in 1999 before settling to 242 million in 2004 (Bureau of Transportation Statistics & Research and Innovative Technology Administration, 2007). Interdiction is an increasingly insurmountable challenge since illicit drugs are but a small fraction of total border shipments, e.g. 400 tons of cocaine compared to 170,000 tons of coffee was imported annually into the US on average during the 1990s.

Mexico is the second largest US trading partner and the two countries share over 30 legal and many illegal border crossings. Post-NAFTA, Mexican drug organisations have increased in size and power (Constantine, 1996; Milford, 1997) and resulting violent conflicts have led to calls for an anti-drug aid package from the US (The Economist, 2007). Depressed corn prices – secondary to US farm subsidies and NAFTA – has led to the abandonment of legitimate farming by 1 million Mexican farm workers; some of whom may have entered the drug trade (Andreas, 1996). Additionally, increased border security following the 9/11 attacks in the US appears to have led to increased supply and local use of heroin in Mexico (Bucardo et al., 2005).

Heroin in brown, black and white

Complicating this portrayal of the political economy of heroin is the fact that different global sources of heroin produce substantially different products. Source and type of heroin are structural factors in the risk environment of heroin users: source dictates distribution and type predicts practice. How specific types of heroin are used and with what risk is therefore distributed geographically.

To restate an earlier theme, heroin production source and retail market have become increasingly intertwined: heroin from Colombia and Mexico is sold exclusively in the US; heroin from the Golden Triangle of Southeast Asia, once smuggled throughout the world, is currently limited to Australia and Canada; and heroin originating from poppies grown in Afghanistan and refined in Pakistan (Southwest Asia) is sold predominantly in Europe. Furthermore, there is regional distribution in the US: Colombian heroin prevails in the eastern US, while heroin from Mexico is found almost exclusively in the western US. These routes have been shaped by competition and supply control efforts complicated by liberalized global trade. There is no evidence that these trade routes are shaped at all by consumer demand.

Heroin has several characteristics that affect how it is used and even how it is distributed: colour, physical state; water solubility, pH balance, heat stability, weight/volume and purity (Ciccarone & Bourgois, 2003). The colour palette of heroin is summed in the title of this paper: brown, black and white; with a high degree of spectral variability. The extremes of black and white are heroins stereotypically coming from Mexico and Southeast Asia, respectively. Brown

heroin can come from any of the source regions, but typically is seen coming from Southwest Asia. Physically, most of the world's heroin is in powdered form; the only exception being the solid form of heroin coming from Mexico called "black tar" heroin. Water solubility varies, with type-4 heroin, a highly purified heroin traditionally stemming from Southeast Asia, having the highest water solubility. On the acid-base spectrum, the chemically basic form ($\text{pH} > 7$) of heroin comes exclusively from Afghanistan/Pakistan; all other heroin forms are in a chemically acidic ($\text{pH} < 7$) form. The basic form of heroin is heat stable; it therefore begins to burn and subsequently vaporize (sublime) at a higher temperature. Black tar heroin also appears somewhat heat stable. Powdered heroin, again most the world's heroin, is light with minimal volume by weight. Light weight/low volume heroin is distributed, as one would expect, over greater distances, usually by air transport, than the one solid heroin—black tar heroin. The heavier weight and higher volume black tar heroin is only distributed to the US and mostly by land routes. Distribution at the retail level also varies by physical form of heroin: powdered heroins are sold in glassine folds or tiny plastic zip baggies, while solid black heroin is wrapped in plastic and sealed in tiny balloons for sale (unpublished data). Finally, heroin purity, while highly variable, seems to have some limits by form: black tar heroin seems to plateau at about 25–30% pure (National Drug Intelligence Center, 2000), which may have a purity limit based on manufacturing.

To sum up source and heroin type: Southeast Asian heroin is stereotypically white, powdered, highly water soluble and acidic; Southwest Asian heroin is typically a brown coarse powder with poor water solubility (until acidified from its basic form by the addition of an acid) and good heat stability; Colombian heroin is off-white to light brown, powdered and acidic with good water solubility; Mexican heroin is dark brown to black, solid, vaporisable, of lower purity and despite its acidity, requires heat to go into aqueous solution.

As function follows form, drug use patterns are highly suggested by heroin type. A heroin injector in Europe quickly learns that the locally available heroin does not simply dissolve; placing the basic heroin into water and heating or shaking would produce bubbles that would be difficult, if not dangerous, to inject. Rather, a new user of Southwest Asian heroin would, perhaps, learn to smoke it first followed in time by a ritualized use of citric, acetic, or ascorbic acid and heat to aid solubility in the pursuit of injection. "Chasing the dragon," a form of smoking in which heroin is inhaled as it is vaporized off a sheet of creased metal foil—the shape of smoke symbolising the idiom, has been documented in Europe after spreading from Asia (Strang, Griffiths, & Gossop, 1997). Interestingly, heroin smoking in Asia involved either the addition of a base to the acidic heroin, forming a heat stable salt, or the use of a cruder form—type-3 heroin. In the US there is little evidence of heroin smoking (Strang et al., 1997), despite the "smokability" of black tar heroin. Perhaps the acidity of this form irritates users' mucous membranes and no cultural tradition has enabled the use of a basic additive to aid in smoking black tar heroin.

Nasal inhalation, or insufflation, of heroin has two specific heroin-form-related techniques: powdered heroin can be snorted dry, or misted as a solution, while solid heroin can only be misted. Typically, black tar heroin is dissolved in water and placed into a medical spray bottle for insufflation. This technique is not popular among black tar heroin users, or used for long, as it is reportedly irritating (unpublished data). US public treatment admissions data suggest an increase in heroin inhalation and smoking during the 1990s (Substance Abuse and Mental Health Services Administration: Office of Applied Studies, 2004). Most heroin inhalation treatment admissions were in the US Northeast, with only 3% coming from the West. The lower purity, and perhaps irritability, of black tar heroin may limit the popularity of this route of administration.

As risk-taking follows function *and* form, the spectrum of public health concerns has some correlation with heroin source/form. HIV prevalence among injection drug users is much higher in cities with powder heroin than in cities where black tar heroin is endemic (Ciccarone & Bourgois, 2003). This hypothesis extends back to the 1980s, prior to the dominance of Colombian heroin, when powdered heroin from Southeast and Southwest Asia was exclusive to the eastern US and HIV prevalence was on the rise. One might suspect that black tar heroin reduces HIV transmission at the population level because it can be smoked or insufflated, but that has not been documented. Rather, the need to heat this solid heroin into solution, combined with the ritual residue rinsing that has been observed, likely accounts for the observed variation in HIV prevalence. In addition, black tar heroin appears to induce venous scarring and users migrate to injecting it subcutaneously or intramuscularly (unpublished data); routes that have lower HIV transmission potential (Rich, Dickinson, Carney, Fisher, & Heimer, 1998). Speculatively, we might expect lower HIV prevalence in those regions in which brown heroin predominates. The reasons for this include its ability to be smoked, the use of acid to aid in solubility (e.g. acid should reduce the viability of HIV and self mixing of the acid may lead to lower pH than that seen with heroin in its acid form); and finally, brown heroin is associated with soft tissue infections, which suggests subcutaneous use.

The risk of bacterial infections is well established with heroin use. Heroin use is associated with blood disseminated bacterial infections, e.g., endocarditis, and osteomyelitis (Gordon and Lowy, 2005). Recently, there has been renewed interest in bacterial skin and soft tissue infections and their relationship to use of black tar heroin (Ebright & Pieper, 2002). Black tar heroin has been associated with wound botulism (Passaro, Werner, McGee, Mac Kenzie, & Vugia, 1998; Werner, Passaro, McGee, Schechter, & Vugia, 2000), necrotizing fasciitis (Kimura et al., 2004), tetanus (Bardenheier, Prevots, Khetsuriani, & Wharton, 1998) and soft tissue infections (Binswanger, Kral, Bluthenthal, Rybold, & Edlin, 2000; Ciccarone et al., 2001; Harris & Young, 2002; Murphy et al., 2001). These infections may be due to contamination of the heroin form or by function of subcutaneous injection in users with heroin-scarred veins. Clostridium species, e.g., those bacteria that cause botulism and tetanus, may be able to survive the harsh chemical environment of black tar heroin by forming spores; indeed, these spores may be made more viable by the heating required to solubilise tar heroin. There have also been reports of Clostridium infections among users in the UK (Centers for Disease Control and Prevention, 2000) and subcutaneous injection and/or contamination are suspected risk factors (Williamson, Archibald, & Van Vliet, 2001).

Heroin flows and risk environments

Two heroin sources, Mexico and Colombia, now dominate the US heroin market. The political history of Colombia and the diversifying of both drug products and routes by fragmenting cartels, reveals insights into the current distribution of heroin types. The development of an increasingly exclusive heroin market in the US has several structural implications for the risk environment for heroin users.

Competitive forces in the restructuring of the US heroin market from four sources to two were likely responsible for the general downward trend in the price of heroin over the last two decades. Rising numbers of new users, younger users and overall treatment admissions were documented consequences of this trend (Substance Abuse and Mental Health Services Administration: Office of Applied Studies, 2003). Medical complications such as soft tissue infection (Ciccarone et al., 2001), endocarditis (Cooper et al., 2007) and heroin-related overdose (Bryant et al., 2004; Frank, 2000; Oxman, Kowalski, Drapela, Gray, & Fafara, 2000) also rose during this time.

Understanding the impact of structural changes in heroin supply is important for public health (Ciccarone, 2005). Indeed it is puzzling as to why the structural issues raised in this paper have not been previously addressed systematically. Possible explanations include funding streams, low social value of drug users and structural barriers in knowledge transfer. Recent US governmental funding on the medical complications of injection drug use has largely gone towards research on blood borne pathogens, esp. HIV and, to a smaller extent, hepatitis C virus. Despite widespread heroin user concern about the effects of black tar heroin their low social value and agency leaves their concerns largely unheard. In addition, poor cooperation between those with knowledge of heroin markets (law enforcement) and those with knowledge of disease distribution (public health) leave large gaps in our understanding of the themes presented in this paper. Collaboration on surveillance efforts between drug enforcement and public health agencies would aid our understanding of the distribution, use patterns and consequences of different sources of heroin in the US. Research into the micro-logistics of heroin use, coupled with a full understanding of the structural risk environments of heroin would lead to multiple avenues for improved drug user health and disease prevention.

What are the potential implications of future changes in the source/form/function of the US heroin supply? For example, how would HIV rates change if Colombian heroin distributors further increase their geographic market share in the US? Determining the relationship between heroin type and HIV on the population level is difficult for precisely the reasons outlined in this paper. The rise of exclusive markets creates geographically defined risks that cannot be directly examined using epidemiological methods because of colinearity. Ethno-epidemiological research in cities with two or more types of heroin is an obvious next step.

Increasing border flow of persons and goods in a globalised market economy presents opportunities as well as challenges. Emerging diseases, e.g., SARS and avian influenza, and illicit substances, including heroin, have increasing fluidity across national boundaries. Neoliberal economic policies create a near-futile situation for constraint of the drug trade in a world with increasingly porous boundaries.

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