



## Review

## People who inject drugs in Bangladesh – The untold burden!



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## ABSTRACT

The rates of both HIV and HCV are exploding among the People Who Inject Drugs (PWID) subpopulation in the People's Republic of Bangladesh. 5,586 HIV confirmed cases have been reported since the first case of HIV was identified in 1989, of which, 865 new cases (15.5%) have been reported in the year 2017 alone. Among the new cases, 330 (38.2%) were from PWID population. The HCV prevalence is also high in Dhaka, with 40% of the PWID with unknown HIV status and 60.7% co-infected with HIV. The predominant HIV-1 strains circulating in the population are subtype C (41.4%) followed by CRF07 BC (24.2%), CRF01 AE (9.1), A1 (6.6%), and B (2.5%). HCV subtypes 3a and 3b are the most prevalent circulating strains (88.5%) among PWID. Harm reduction interventions particularly Needle Syringe Program (NSP) for PWID have been operating in Bangladesh since 1998. Opioid Substitution Therapy (OST) commenced in 2010 but only covers 2.9% of the total estimated PWID population in the country. A preliminary assessment of the needle/syringe sharing networks of HIV positive PWID was made in order to determine the HIV status among needle/syringe sharing partners. From a network of 36 HIV positive PWID seeds, 96 needle/syringe sharing partners were identified, of which 10 were HIV positive. Characterization of the nature of transmission within PWID networks is required in order to develop clinical services aimed at this vulnerable subpopulation and to halt the epidemic.

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## Introduction

Bangladesh is considered a low prevalence country for HIV with the prevalence in the general population being <0.01% (ASP, 2016). However, the national surveillance included only one at risk

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population and there is also limited HIV testing services (HTS) for the nation (UNICEF, 2009). Nevertheless, 5586 HIV confirmed cases have been reported since the first case of HIV was detected in 1989, of which, 865 new cases (15.5%) have been reported in 2017 (Figure 1) (ASP, 2017a).

This article aims to provide synthesized information about the magnitude of HIV and HCV infections and risk behaviours related to these infections among People Who Inject Drugs (PWID) in Bangladesh. The review has been done based on evidence generated through scientific reports, journal articles, book chapters, reviews, the National Strategic Plan for HIV and AIDS 2018–2022 and programmatic reports published till 2018 in Bangladesh. These documents have been collected from the AIDS and STD Programme (ASP), Ministry of Health and Family Welfare, the Government of Bangladesh, Save the Children Bangladesh, CARE Bangladesh and the icddr, by those who either were engaged in providing harm reduction intervention among PWID or conducted research with PWID. Furthermore, we have done an electronic search to collect relevant literature using the key words ‘HIV, HCV, PWID, harm reduction intervention and Bangladesh’.

**Emergence of HIV epidemic among PWID**

Among the newly diagnosed cases in 2017, 330 (38.2%) were from PWID (Table 1) (ASP, 2017a). The HIV case detection was done primarily through available HIV testing services (integrated with HIV prevention services) for key populations at risk of HIV. Moreover, the data from the last HIV surveillance survey (2016) reported a rapid rise of HIV among male PWID in Dhaka city which has significantly increased from 5.3% in 2011 to 22% in 2016 (ASP, 2017b). Further, a sub-analysis of the data showed that ‘Old Dhaka’ (i.e., Southern part of Dhaka city) is the epicentre of the HIV epidemic with 27.3% of PWID currently infected (ASP, 2017b). The highest number of cases were detected among male PWID between the ages of 35–39 years.

In 2016, a serological surveillance survey was done among PWID using a two-stage time location random sampling technique (Amon et al., 2001). In the first stage, to make a sampling frame of spots, a mapping of spots was done of the entire of old Dhaka city where PWID met to inject drugs. In the second stage, spots were

**Table 1**

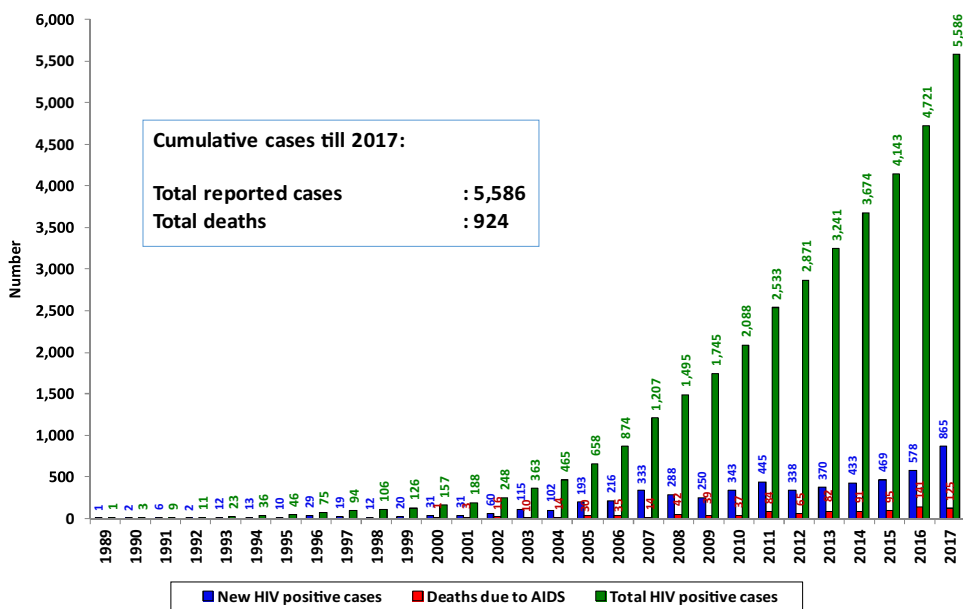
Reported number of HIV positive cases among key at risk populations in Bangladesh diagnosed from 2007 to 2017.

Year	FSW	MSW	MSM	TG	PWID
2007	8	0	4	4	30
2008	5	0	8	2	11
2009	8	0	4	5	18
2010	10	0	14	8	32
2011	9	6	5	8	68
2012	12	3	6	7	52
2013	9	0	9	4	46
2014	9	2	8	4	79
2015	13	17	16	8	93
2016	12	1	13	11	110
2017	20	7	40	13	330
All	115	36	127	74	869

Note: FSW = Female Sex Workers; MSW = Male Sex Workers; MSM = Males Who Have Sex with Males; TG = Transgender women (*hijra*); PWID = People Who Inject Drugs.

selected using systematic random sampling and then from each spot, PWID were randomly chosen for risk behaviour interviews, testing for HIV and active syphilis. Whilst in 2011, HIV serological surveillance among PWID were conducted using a take-all approach of all PWID who were enlisted at the drop-in-centres (DICs) for HIV prevention services (NASP, 2011). However, the sampling methodology in conducting the behavioural survey in the IBBS was similar to the last that was conducted in 2006–2007 using a two-stage time location random sampling technique. Therefore, there was a difference in the sampling frame between the serological surveys conducted in 2011 and 2016.

Data from the HIV behavioural surveillance survey (BSS) conducted in 2016 among PWID in Dhaka city showed that 53.1% of PWID shared needles and syringes in the last week compared to 60.7% in 2006–2007 (ASP, 2017b; NASP, 2009). This clearly shows that the needle/syringe sharing practices have not changed among this segment of population over the past decade despite the ongoing NSP. Studies indicate that the needles/syringes sharing practice among PWID in Bangladesh is much higher than other three countries in the region. For instance, the Integrated Bio-behavioural Survey (IBBS) data of PWID in Pakistan showed that 22–25% reported shared needles/syringes during the last



Source: ASP, 2017

**Figure 1.** Cumulative number of reported HIV positive cases in Bangladesh diagnosed from 1989 to 2017.

injection and the prevalence of HIV was 38.4% (National AIDS Control Programme (NACP), 2017). In Nepal, IBBS data showed that 6.3% shared needles/syringes during last week and the prevalence of HIV was reported as 8.5% (Ministry of Health and Population, 2017). IBBS data in India showed that 15.4% of PWID shared needles/syringes and the prevalence of HIV was 9.9% (National AIDS Control Organization, 2015). PWID also perform unprotected sexual intercourse with their non-transactional and transactional female sex partners where condom use ranged from 23.5 to 55% respectively (ASP, 2017b). This represents a significant threat to the general population.

Till 2011, the epidemic of HIV among PWID in Dhaka city was 5.3% (NASP, 2011). This was credited to the harm reduction program and was cited as one of the best programs in the region (Foss et al., 2007). In 2016 an increased HIV prevalence was observed despite the presence of a Needle and Syringe Program (NSP) which has been operating since 1998 (UNAIDS B., 2006). Although the reasons for the recent increase in HIV incidence have not been scientifically explored, findings from different studies have shown that a significant proportion of PWID reported needle/syringe sharing (ASP, 2017b; NASP, 2009). However, it is noteworthy that funds for the harm reduction program were cut in 2016. In order to keep the service coverage level at 80% in Dhaka city, some changes were made in the program design compared to the previous years. For instance, during 2016–2017, some DICs were closed in Dhaka city for which the work load of each outreach worker increased significantly. Furthermore, in 2016, the number of needles/syringes per PWID/day came down to one syringe with 3–5 needles compared to 3–5 syringes/needles. Hence, it was claimed that the harm reduction program was compromised and assumed that the current NSP could not control sharing practices even among HIV positive

PWID who might have transmitted HIV to other PWID within their sharing network. An ethnographic study among PWID in Dhaka is currently ongoing, and being conducted by the Program for HIV and AIDS of icddr. This study is expected to explain some underlying reasons for sharing of needles/syringes and other contextual reasons.

### Emergence of HCV epidemic among PWID

Although the HCV prevalence rate among the general population in Bangladesh is low (0.2–1%) (Mamun Al, 2016), among PWID high rates have been documented since the late 1990s (NASP, 2011). The latest nation-wide HCV prevalence data is available from the 9th round of HIV serological surveillance which was conducted among PWID between December 2010 and June 2011. A total of 7529 individuals were sampled from 30 different geographical areas of Bangladesh and HCV antibodies was tested using enzyme linked immunosorbent assays and confirmed by line immunoassay. The overall prevalence of HCV was 39.6% in the capital city Dhaka with a maximum of 95.7% recorded in the Northwestern region of the country (NASP, 2011). Figure 2 shows that national distribution of confirmed HIV positive cases (ASP, 2017a) and the prevalence of HCV (NASP, 2011) for the nation of Bangladesh. The HIV cases are predominately distributed in the Southeastern sector of the country, whereas HCV is found in the Northwestern corridor. The reason for this contrasting geographical distribution is unclear, but clearly access to Opioid drugs in the Northwest on the border of India may be easier given the government crack-down on drug trafficking in the 'golden triangle'. The sex trade industry and religious differences in the Southeast may also play an important factor in the spread of HIV in the South of the country.

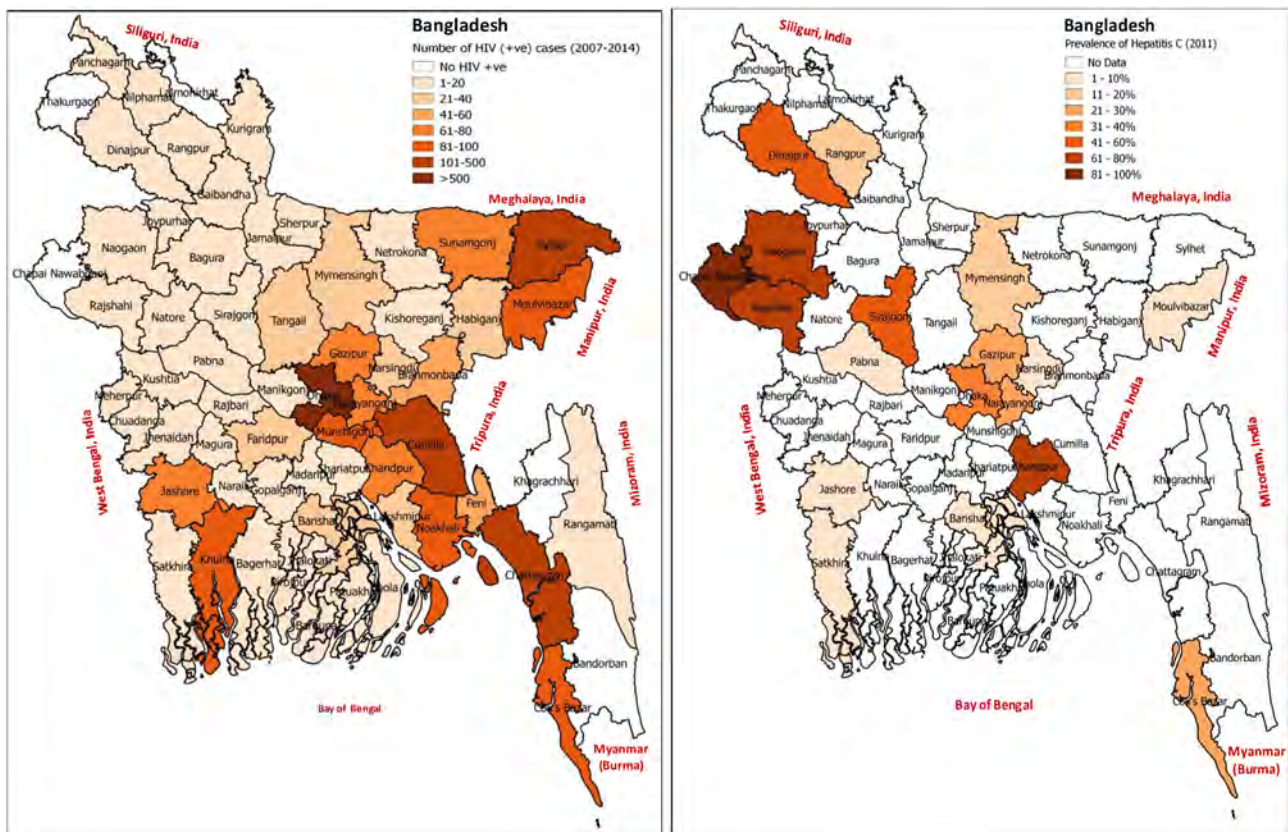


Figure 2. Reported number of HIV cases in Bangladesh from 2007 to 2014 (left panel) and the national prevalence of HCV in 2011 (right panel).

A feasibility study of HCV treatment among PWID was conducted in 2017 in old Dhaka by International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) with funding support from the World Health Organization in order to assess the adherence to treatment with Direct Acting Antivirals (DAA) (Rahman et al., 2018a). Blood specimens were tested for HCV antibodies using a microparticle enzyme immunoassay. Face-to-face interviews were conducted to determine HCV related risk behaviours using a semi-structured questionnaire. Adherence was defined as completing at least 80% of the prescribed dose for at least 80% of the time. Adherence percentage was calculated by subtracting the missed days from the expected total treatment duration of 12 weeks (84 days). This study identified an HCV positive rate of 40% among HIV negative PWID (Rahman et al., 2018a), which indicated that the HCV has remained a major concern among PWID (NASP, 2011). However, 60.7% of the HIV-positive PWID in old Dhaka were also co-infected with HCV (Alam et al., 2015). It is well documented that among co-infected individuals that the interaction between HIV and HCV has profound effect on the transmission and progression of HCV infection (Mohsen et al., 2003). Co-infected individuals, therefore, present even greater challenges in the provision of care thus there is an urgent need to develop and implement effective interventions specifically for co-infected PWID. Findings from the HCV feasibility study revealed that adherence (80%) is possible but there are several barriers. Most of the PWID lead a chaotic lifestyle which is typically characterized by mental and physical health problems, unemployment, financial difficulties, crime, unstable housing, and lack of social relationships (Rahman et al., 2018a). Without close follow-up, counselling of family members, and raising awareness, adherence will not be possible (Alam et al., 2015; Rahman et al., 2017; Azim and Reid, 2018; NASP, 2016).

### Circulating HIV and HCV subtypes in Bangladesh

There have been limited studies on the HIV subtype distribution in Bangladesh. HIV-1 positive blood samples were collected between 1999–2005 from population groups most at risk of HIV infection in Bangladesh through the national surveillance, from clients of the Voluntary Counselling and Testing (VCT) Unit for HIV at the icddr,b and a survey of HIV in patients with tuberculosis. Partial sequences of the gag gene were used for subtyping the HIV strains by nested PCR using selective primers (Sarker et al., 2008). Of the 198 HIV strains tested, the predominant HIV-1 strains circulating in Bangladesh were subtype C (Sarker et al., 2008). The subtype distributions within Bangladeshi are depicted in Table 2 (Sarker et al., 2008). Overall, subtype C (41.4%) was the most

predominant subtype followed by CRF07 BC (24.2%) and CRF01 AE (9.1%). Other strains such as subtype A1 (6.6%), B (2.5%) and several recombinant forms were also detected.

The proportion of subtype C strains varied between subpopulations but 97% of PWID had HIV subtype C and C related recombinants (Table 3) (Sarker et al., 2008). HIV subtype C strain specific clustering among PWID suggests that the transmission of HIV is occurring within this subgroup through the sharing of injection equipments (ASP, 2017b). Moreover, phylogenetic analysis suggests that the initial introduction of these strains into the PWID subpopulation may have been from India (Sarker et al., 2008). Heroin smokers often inject and when they inject they share their used needles with other injectors and, therefore, it is not surprising that the strains from heroin smokers were identical to those from PWID. This is based on clustering patterns (subtype C) seen among heroin smoker strains within a phylogenetic tree (Sarker et al., 2008). None of the strains (except one HIV subtype C 35 year old female worker) from the sex workers clustered with the PWID strains, suggesting that crossover from PWID into sex workers via sexual intercourse is limited.

Unlike the PWID strains, the majority of HIV-1 strains from other subpopulations were not of subtype C, suggesting a heterogeneous source of transmission. Since the sample size is very small especially for the subpopulations other than PWID, these findings should be interpreted cautiously. The diverse patterns observed by phylogenetic analysis were acquired heterosexually from the Middle East, South Asia, or from other South East Asian countries. Some of them have transferred the virus to their wives and children. Interestingly, none of the strains from the migrant workers clustered with isolates obtained from PWID, sex workers, or transgender women, suggesting that once migrants return home their interaction largely remains within families. This view is supported by a behavioural study of married couples separated due to migration (Mercer et al., 2007). In sum, genotyping results indicate that HIV subtype C is the predominant subtype circulating in Bangladesh. Subtype C is found chiefly among PWID where the epidemic is driven by indigenous transmission. In contrast, there are many and regular introductions of HIV through migrant workers but these appear to spread primarily within families. The data also suggest there is spread between the different key subpopulations at risk for HIV.

While HIV may be transmitted through multiple routes, it is believed that HCV in PWID is transmitted mainly via percutaneous exposure. Thus, the origin of HIV and HCV infections among PWID may differ and, therefore, lead to the different prevalence rates observed. We conducted a study using stored blood samples collected between January and December 2011 from 965 clients

**Table 2**  
HIV-1 subtypes circulating in Bangladesh obtained from different sources during the years of 1999–2005.

Population group <sup>a</sup>	Subtypes (numbers) <sup>b</sup>															Total
	A1	B	C	D	G	CRFs					10 C,D	13 A,AE	14 B,G	15 A,E,B		
						01 A,E	02 A,G	06 A,G,J,K	07 B,C	08 B,C					09-02 AG,AU	
IDU		1	49			1			10							61
HS			2													2
FSW	1		4			3			14		1					23
TG	1		1						2	1						5
MSM	1		1					1	2							5
STI			3					1	1							5
VCT	10	4	21	4	9	14	4		19	4	1	2	1	1	2	96
TB			1													1
Total	13	5	82	4	9	18	5	1	48	5	2	2	1	1	2	198

<sup>a</sup> IDU, injecting drug users; HS, heroin smokers; FSW, female sex workers; TG, Transgender women (hijra); MSM, males who have sex with males; STI, patients with sexually transmitted infections; VCT, patients from voluntary counselling and testing unit; TB, patients with tuberculosis.

<sup>b</sup> Subtyping was determined based on partial gag gene sequence using genotyping tools in HIV database.

**Table 3**

HIV-1 subtype C strains in Bangladesh obtained from different sources during the years of 1999–2005.

Source of HIV strains (collection years)	Number of samples positive for HIV-1	Subtype C, n (%) <sup>a</sup>
Surveillance (1999–2005):		
Injecting drug users	61	59 (96.7)
Heroin smokers	2	2 (100)
Female sex workers	23	18 (78.3)
Transgender	5	4 (80.0)
Males who have sex with males	5	3 (60.0)
Patients with STI <sup>b</sup>	5	4 (80.0)
Subtotal	101	90 (89.1)
Voluntary Counselling and Testing Unit (2002–2005)	96	44 (45.8)
Survey on patient with tuberculosis (2001–2002)	1	1 (100)
Total	198	135 (68.2)

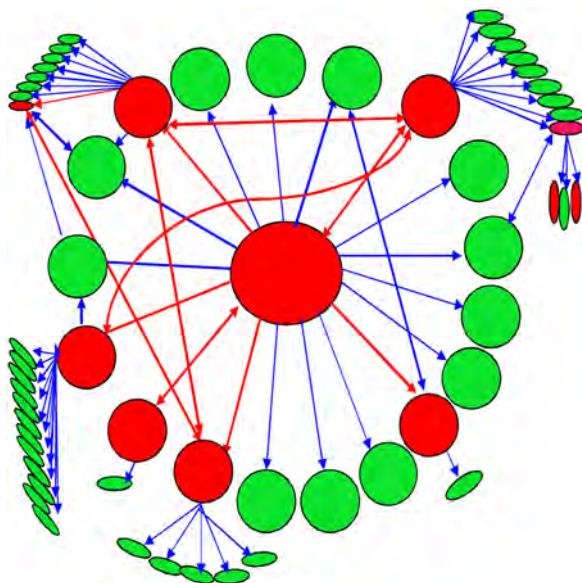
<sup>a</sup> Percentages represent proportions of HIV strains that are subtype C in each population group.

<sup>b</sup> STI - sexually transmitted infections.

attending the VCT unit of icddr, which provided HIV testing services with counselling to clients from all over the country (Rahman et al., 2018b). For HCV genotyping, a 382 bp fragment covering the partial NS5B region was amplified and sequenced. This study shows that HCV subtype 3a and 3b are the most prevalent strains (88.5%) among PWID with few cases of genotypes 1a and 1b (Rahman et al., 2018b). Data analysis from HIV-HCV co-infected PWID indicates that although PWID shared genetically related HIV strains, they harbour different genotypes of HCV strains.

### Injection sharing networks

The social network (e.g., sexual and injecting) of PWID has never been systematically studied in Bangladesh. As a result 'core transmitters' within PWID hidden networks have not been identified or been the focus of control efforts. A preliminary assessment of the needle/syringe sharing networks of HIV positive PWID was made in order to identify the HIV status of their needle/syringe sharing partners. From 36 HIV positive PWID seeds, 96 needle/syringe sharing partners were identified, of which 10 were HIV positive (Azim et al., 2009). Figure 3 illustrates the sharing



**Figure 3.** The injection sharing network of one HIV positive PWID. Red circles indicate an HIV positive individual, while green circles indicate an HIV negative individual. Arrows show who was sharing with whom (both active and receptive); red for HIV positive partners; and blue arrow indicate one HIV positive person is sharing with one HIV negative person in the sharing network (Azim et al., 2009).

network of one HIV positive PWID who had a very large network (Azim et al., 2009). It is noteworthy that most PWID had much smaller networks, with an average of two direct sharing partners, suggesting considerable heterogeneity in network-related risk (Azim et al., 2009). It is now recognized that prevention of injection sharing among PWID will require a concerted effort utilising peer-focused interventions, primary health care, and mental health services in Dhaka city and beyond (Latkin et al., 2008).

### Harm reduction intervention

Harm reduction interventions for PWID have been operating in Bangladesh since 1998. Following a comprehensive approach of harm reduction (WHO, UNODC, UNAIDS, 2012), free distribution of sterile needles/syringes and condoms, peer education using Information, Education and Communication (IEC)/Behaviour Change Communication (BCC), HIV testing and counselling, STI management (ASP, 2016), ART for HIV positive PWID and referral for TB are all presently being deployed (Azim et al., 2008). The Needle Syringe Program (NSP) is a major part of the comprehensive approach of the harm reduction program currently providing services to approximately 9,000 PWID (out of an estimated total 33,066) across the country via 21 Drop-in Centres (DICs) (Harm Reduction International, 2018). The services are delivered primarily through outreach workers (OW) assigned at the DICs and they are recruited mainly from the PWID community. In Dhaka city, service coverage of NSP is above 80% as per the size estimation of PWID (NASP, 2016) but in other cities coverage is either very low or fully unavailable. Given HIV has increased sharply in Dhaka city among PWID the intervention program has subsequently been intensified. Currently, each PWID receives more than 300 needle/syringes/year (personal communication with CARE Bangladesh), which is consistent with earlier period (Des Jarlais et al., 2013). As of 2016, only 12 countries around the globe provided at least 200 clean needles to each PWID as recommended by the World Health Organization (WHO) (Needle and syringe programmes (NSPs) for HIV prevention, 2019).

Another important component of a comprehensive approach is medication-assisted substance use treatment, which is known as Opioid Substitution Therapy (OST). This initiative started in Bangladesh in 2010 under a pilot study as part of a UNODC regional project (Reid et al., 2014). After the successful implementation of the pilot phase, in 2012, the OST service was scaled-up with funding support from the Global Fund and Government of Bangladesh in Dhaka city. Currently, only seven Global Fund supported OST clinics are available for 1350 PWID but in 2019 it will be increased to 1700 (5% of the total estimated PWID) with the establishment of another two clinics. According to WHO, 40% OST



**Figure 4.** The photo depicts a professional shooter, locally known as 'pusher,' injecting an intravenous drug user (known as 'people who inject drugs', PWID). The child of the pusher tragically watches this daily occurrence while his mother looks on. Note the "pusher" is also an injecting drug user.

coverage is standard in order to have an impact on HIV prevalence. This indicates that Bangladesh is far behind the recommended level of OST coverage (WHO, UNODC, UNAIDS, 2012).

Although HCV prevalence is consistently high among PWID in the capital city and other focal areas, there is no specific strategy to address this issue (Chowdhury et al., 2009). Despite having HIV interventions in place for PWID, the HIV prevalence is rising sharply which indicates the urgent need to revise the standard of care and prevention based on evidence-based solutions (ASP, 2017b). One of the drawbacks of the ongoing harm reduction programme is the 'one size fits for all' approach, where social and behavioural characteristics have not been extensively studied and reflected in the current interventions. Programmatic experience shows that there is considerable variation in the socio-demographic profile of PWID in different areas of Dhaka city and in the country. More PWID in 'Old Dhaka' live on the street versus the rest of the city (41% vs. 14.5%) (ASP, 2017b). To date a detailed network analysis study had not been conducted to find the key 'core transmitters' residing within PWID scale-free networks.

## Conclusions

The AIDS & STD Program (ASP) of the Government of Bangladesh seeks to understand why and how HIV (and HCV) is spreading so rapidly among PWID in the country in the presence of existing HIV prevention services. PWID HIV/HCV networks are the hypothesized reservoirs for the next generation of future genotypic subtypes and drug-resistant strains in Bangladesh. Identifying genotypic sub-clusters within injecting and sexual partners of PWID will allow us to document the micro-evolution of the virus modified by different host immune responses. Characterization of the nature of transmission within the PWID network is needed to help develop clinical services aimed at this vulnerable subpopulation and to halt the epidemic. Additional information on injecting, condom use, and psychological health among PWID in the country is needed. Moreover, evidenced-based research will demonstrate the feasibility of an enhanced screening for HIV and HCV and prevention program for PWID that will be extremely valuable in shaping future national policy. As depicted in Figure 4, many lives are affected by PWID including the very young. We must do our utmost to protect the next generation and to bring an end to the epidemic.

## Conflict of interest

We declare no conflict of interest.

## Funding

No funding was required.

## Ethical approval

No ethical approval was sought.

## References

- Alam MS, Sarker MS, Rahman M, Reza M, Chowdhury EI, Faruque MO, et al. A continuing epidemic of HIV among PWID in one neighbourhood of Dhaka with high prevalence of HIV-HCV co-infection and risk behaviours among HIV positive PWID. Dhaka, Bangladesh: ICAAP12; 2015.
- Amon J, Brown T, Hogle J, MacNeil J, Magnani R, Mills S. Guidelines for repeated behavioral surveys in populations at risk for HIV. FHI; 2001.
- ASP. 4th National strategic plan for HIV and AIDS response 2018-2022. National AIDS/STD Program (NASP). Directorate General of Health Services, Ministry of Health and Family Welfare, Government of Bangladesh; 2016.
- ASP. Facts and figures on HIV: Bangladesh 2017. National AIDS/STD program (NASP). Directorate General of Health Services, Ministry of Health and Family Welfare, Government of Bangladesh; 2017.
- ASP. Behavioural and serological surveillance amongst key populations at risk of HIV in Selected Areas of Bangladesh, 2016. National AIDS/STD Program (NASP). Directorate General of Health Services, Ministry of Health and Family Welfare, Government of Bangladesh; 2017.
- Azim T, Reid G. In depth review of the PWID Intervention to identify strategies for quality HIV/AIDS services and increased coverage. Save the Children Bangladesh; 2018.
- Azim T, Chowdhury EI, Reza M, Faruque MO, Ahmed G, Khan R, et al. Prevalence of infections, HIV risk behaviors and factors associated with HIV infection among male injecting drug users attending a needle/syringe exchange program in Dhaka. Bangladesh Subst Use Misuse 2008;43(14):2124–44.
- Azim T, Khan SI, Nahar Q, Reza M, Alam N, Saifi R, et al. 20 years of HIV in Bangladesh: experiences and way forward. Washington, DC: World Bank; 2009.
- Chowdhury EI, Reza MM, Hasan MZ, Ahmed M, Alam S, Roy CN, et al. Correlation of hepatitis C virus infection among male injecting drug users in Dhaka, Bangladesh. 20th International Harm Reduction Conference 2009;.
- Des Jarlais DC, Feelemyer JP, Modi SN, Abdul-Quader A, Hagan H. High coverage needle/syringe programs for people who inject drugs in low and middle income countries: a systematic review. BMC Public Health 2013;13(53).
- Foss AM, Watts CH, Vickerman P, Azim T, Guinness L, Ahmed M, et al. Could the CARE-SHAKTI intervention for injecting drug users be maintaining the low HIV prevalence in Dhaka, Bangladesh?. Addiction 2007;102(1):114–25.
- Harm Reduction International. Global state of harm reduction. 6th Edition 2018.
- Latkin CA, Buchanan AS, Metsch LR, Knight K, Latka MH, Mizuno Y, et al. Predictors of sharing injection equipment by HIV-seropositive injection drug users. J Acquir Immune Defici Syndr 2008;49(4):447–50.

- Mamun AI M. Past, present, and future of viral hepatitis in Bangladesh. *Euroasian J Hepatogastroenterol* 2016;6(1):43–4.
- Mercer A, Khanam R, Gurley E, Azim T. Sexual risk behavior of married men and women in Bangladesh associated with husbands' work migration and living apart. *Sex Trans Dis* 2007;34(5):265–73.
- Ministry of Health and Population. Integrated biological and behavioral surveillance (IBBS) survey among people who inject drugs (PWID) in Kathmandu Valley, Round VII. Teku, Kathmandu, Nepal: Ministry of Health and Population, National Centre for AIDS and STD Control; 2017.
- Mohsen AH, Easterbrook PJ, Taylor C, Portmann B, Kulasegaram R, Murad S, et al. Impact of human immunodeficiency virus (HIV) infection on the progression of liver fibrosis in hepatitis C virus infected patients. *Gut* 2003;52(7):1035–40.
- NASP. Behavioural surveillance and survey (BSS) 2006-2007: technical Report. Dhaka, Bangladesh: National AIDS/STD Program (NASP), Directorate General of Health Services. Ministry of Health and Family Welfare, Government of India; 2009.
- NASP. National HIV serological surveillance, 9th round technical report, 2011 Bangladesh. Dhaka, Bangladesh: National AIDS/STD Program (NASP), Directorate General of Health Services. Ministry of Health and Family Welfare, Government of India; 2011.
- NASP. Mapping study and size estimations of key populations in Bangladesh for HIV programs 2015-2016. National AIDS/STD Program (NASP), Directorate General of Health Services. Ministry of Health and Family Welfare, Government of India; 2016.
- National AIDS Control Organization. National Integrated Biological and Behavioural Surveillance (IBBS) 2014-15. Ministry of Health and Family Welfare, Government of India; 2015.
- National AIDS Control Programme (NACP). Integrated biological and behavioural surveillance in Pakistan, Ministry of National Health Services, Regulation and Coordination. Government of Pakistan; 2017.
- Needle and syringe programmes (NSPs) for HIV prevention. AVERT. 2019 February ([https://www.avert.org/professionals/hiv-programming/prevention/needle-syringe-programmes#footnote24\\_c7ccfxg](https://www.avert.org/professionals/hiv-programming/prevention/needle-syringe-programmes#footnote24_c7ccfxg)).
- Exploring challenges of treating Hepatitis C virus infection among People Who use Drugs in Bangladesh. Rahman M, Shafiq TKI, Chowdhury EI, Reza M, Sarker MS, Khan SI, Janjua NZ, Reza MM, Faruque MO, Anis AH, editors. World Hepatitis Summit 2017;1–3.
- Rahman M, Shafiq TKI, Chowdhury EI, Sarker MS, Khan SI, Janjua NZ, et al. HCV treatment among PWUD: Report to the Donor June. 2018.
- Rahman M, Hossain ME, Afrad MH, Hasan R, Rahman M, Sarker MS, et al. Hepatitis C virus infections among clients attending an HIV testing and counseling center in Dhaka, Bangladesh. *J Med Virol* 2018b;90(2):383–7.
- Reid G, Sharma M, Higgs P. Long winding road of opioid substitution therapy implementation in South-East Asia: challenges to scale up. *J Public Health Res* 2014;3(March (1)):204.
- Sarker MS, Rahman M, Yirrell D, Campbell E, Rahman AS, Islam LN, Azim T. Molecular evidence for polyphyletic origin of human immunodeficiency virus type 1 subtype C in Bangladesh. *Virus Res* 2008;135(1):89–94.
- UNAIDS B. High coverage sites. HIV prevention among injecting drug users in transitional and developing countries: case studies. 2006.
- UNICEF. HIV and AIDS in Bangladesh. 2009.
- WHO, UNODC, UNAIDS. Technical guide for countries to set targets for universal access to HIV prevention, treatment and care for injecting drug users 2012. Geneva: World Health Organization; 2012.