



# Hepatitis C Infection Among HIV-Positive Injection Drug Users and Non-Injection-Drug Users in Tajikistan

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## Abstract

**Background:** HIV and Hepatitis C (HCV) infections are increasing in Tajikistan. While injection drug use (IDU) is a known risk factor for coinfection, little is known about non-injection drug users (NIDU).

**Objectives:** The aim of this study was to identify factors associated with HIV-HCV coinfection and HIV infection alone among IDU and NIDU.

**Methods:** Data from Tajikistan's national HIV/AIDS registry data for all adults aged 18 years and older who had received a HCV test from 2006 to 2016 were obtained. Chi-square analyses identified factors associated with coinfection and injection drug use.

**Results:** Of the 1849 people living with HIV who received a Hepatitis C test, 36.2% were positive for HCV and 63.8% were negative. Coinfection occurred among 74.4% of IDU and 18.5% of NIDU. In bivariate analyses, among both IDU and NIDU, coinfection was associated with urbanness of living location, having partner with a positive HIV test, marital status, region, and being imprisoned. Among IDU, coinfection was also associated with migrant status. Among NIDU, coinfection was also associated with gender, age at diagnosis, and AIDS stage at first diagnosis.

**Conclusions:** This study shows that coinfection occurs most frequently among IDU in general, but that NIDU represent an important population deserving of additional study and tailored HIV and HCV prevention programs. Additional research to identify best practices for targeting NIDU and people living in at-risk regions for screening and are required to effectively prevent and then appropriately manage coinfection.

**Keywords:** HIV, HCV, IDU, NIDU, Tajikistan

## 1. Background

In Central Asia, HCV and HIV coinfection is increasing as it decreases in other parts of the world (1). The ministry of health of Tajikistan reports that HIV cases have increased by more than 25% in the past 10 years, with a 8,892 people living with HIV (PLWH) in 2017 (2). Of people living with HIV, 33% are also infected with HCV, although this proportion may be inaccurate because of infrequent HCV testing (3).

Injection drug use (IDU) is an established risk factor for both HIV and HCV transmission, and users are a key population (4-6). Other key populations are vulnerable to coinfection because they engage in IDU, including prisoners and migrants (7).

Recently, research has focused on non-IDU (NIDU) transmission of HIV and HCV, such as through unprotected sexual intercourse, to complement IDU-focused analysis

(8). Commercial sex workers (9), migrants, and prisoners engage in this risky behavior (10). Additionally, transmission can occur from husband to wife through unprotected intercourse if the husband uses drugs, is a migrant, or has a prison history (1). An estimated 39% of HIV cases are transmitted to women through in this way (9).

Because of the international community's interest in NIDU transmission of HIV and HCV, this paper explores factors associated with HIV-HCV coinfection and HIV infection alone among IDUs and NIDUs. This research serves as the first presentation of sociodemographic and risk factors associated with HIV-HCV coinfection compared to HIV infection alone in Tajikistan.

## 2. Methods

The Tajikistan National AIDS Program provided data that included all new HIV cases aged 18 or older when en-

tered into the national HIV registry from January 1, 2006 to January 30, 2016 who had also completed a Hepatitis C test ( $n = 1,849$ ).

HIV-positive patients were informed about the HIV registry surveillance questionnaire and patients who agreed to participate provided informed oral consent. The questionnaire was conducted through in-person interviews. Responses were linked with confidential electronic HIV medical records. De-identification of the dataset was conducted to ensure confidentiality.

Factors in the analysis included age at diagnosis; region (Dushanbe, Sughd, Republican Subordination, Gorno-Badakhshan); urbanness of living location (urban vs. rural), marital status; education level; migrant status (if person had ever left Tajikistan for employment outside of Tajikistan or not); employment status; prior HIV test history; partner HIV status; AIDS stage at first visit (Stage 1, 2, 3, and 4); IDU status; drug treatment status; prison history; and AIDS death status.

### 2.1. Analysis

Descriptive statistics were calculated for all variables using SAS 9.4 (SAS Institute, Cary, NC). Chi-square tests assessed bivariate associations for categorical data.

### 2.2. Ethical Considerations

The University at Albany institutional review board determined that this study was exempt from review because the study used de-identified secondary data.

## 3. Results

Of the 1849 PLWH who received a Hepatitis C test, 36.2% were positive for HCV. [Table 1](#) shows the characteristics of the entire cohort. Roughly half lived in a rural area most (66%) were married, 10.2% were migrants, and most (85.6%) had at least a secondary-level education.

### 3.1. Factors Associated with HCV-HIV Coinfection

Coinfection status was significantly associated with gender, age at diagnosis, urbanness of living location, region, marital status, migrant status, employment status, having a prior HIV test, having an HIV-positive partner, AIDS stage, IDU status, and prison history ([Table 1](#)).

### 3.2. Factors Associated with Coinfection Among IDU

Among IDU, coinfection status was significantly associated with urbanness of living location, region, marital status, migrant status, having a HIV-positive partner, and prison history ([Table 2](#)).

### 3.3. Factors Associated with Coinfection Among NIDU

Among NIDU, coinfection status was significantly associated with gender, age at diagnosis, urbanness of living location, region, marital status, having a HIV-positive partner, AIDS stage at first diagnosis, and prison history ([Table 2](#)).

## 4. Discussion

This paper presents the first analysis of a) people coinfecting with HCV and HIV compared to HIV alone and b) HIV-HCV coinfection status by IDU status in Tajikistan. Results show that 36.2% were coinfecting. This rate is similar to from other global studies including in Canada where half of PLWH were coinfecting ([11](#)), and in Gabon where 76% were coinfecting ([12](#)). Coinfection occurred among 74.4% of IDU and 18.5% of NIDU, confirming IDU as an important factor for coinfection ([8,11](#)).

Stratification by IDU status resulted in no significant difference in rate of coinfection by region and urbanness of living location, with coinfection occurring more frequently among urban dwellers. Coinfection occurred most frequently among people in Dushanbe and least frequently among people in Sughd. Because of this, PLWH living in Dushanbe and urban areas should be prioritized for HCV testing. Additional exploration of knowledge, attitudes, and beliefs surrounding coinfection is suggested to understand why people in Sughd are protected from coinfection compared to people living in other regions.

Coinfection rates among migrants and past prisoners also differed by IDU status. Migrants were more likely to be coinfecting if they were IDU, but not if they were NIDU. It is hypothesized that our results confirm migrants engage in IDU more often than non-migrants ([1](#)). Prison history was associated with coinfection among NIDU, but not among IDU, indicating that unprotected sex could be responsible for the coinfection ([7](#)). Prisoners are known to engage in unprotected sex with multiple partners. These results suggest that each key population requires its own prevention and intervention plan.

Finally, while no difference in coinfection status was identified by AIDS stage among IDU, coinfection was positively associated with an increase in AIDS stage among NIDU. We hypothesize that this is because of a delay in HIV testing among NIDU, which results in people being older people at diagnosis. While it is essential for IDU be targeted for early and often for HIV and HCV testing, our study findings demonstrate the need for testing among other key populations. Health interventions must be adapted to meet the needs of NIDU to receive HIV testing and services.

#### 4.1. Conclusions

This study shows that coinfection occurs most frequently among IDU in general, but that NIDU represent an important population deserving of additional study and tailored HIV and HCV prevention programs. Additional research to identify best practices for targeting NIDU and people living in at-risk regions for screening and are required to effectively prevent and then appropriately manage coinfection.

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#### Footnote

**Declarations of Interests:** The authors declare no personal interests in relation to this paper. No funding was used for this paper.

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**Table 1.** Factors Associated with Being Coinfected with HIV and HCV vs. Infected with HIV in Tajikistan<sup>a</sup>

Variable	Overall (n = 1849)	Coinfected with HCV/HIV (n = 669)	Infected with HIV only (n = 1180)	Chi-Square
<b>Injection Drug User</b>				< 0.0001
No	1250 (68.34)	232 (18.56)	1018 (81.44)	
Yes	579 (31.66)	431 (74.44)	148 (25.56)	
<b>Gender</b>				< 0.0001
Male	1105 (59.76)	566 (51.22)	539 (48.78)	
Female	744 (40.24)	103 (13.84)	641 (86.16)	
<b>Age at diagnosis</b>				< 0.0001
18 - 24	233 (12.60)	36 (15.45)	197 (84.55)	
25 - 34	783 (42.35)	237 (30.27)	546 (69.73)	
35 - 44	594 (32.13)	289 (46.65)	305 (51.35)	
44+	239 (12.93)	107 (44.7)	132 (55.23)	
<b>Urbanness of living location</b>				< 0.0001
Rural	982 (53.20)	238 (24.24)	744 (75.76)	
Urban	864 (46.80)	430 (49.77)	434 (50.23)	
<b>Region</b>				< 0.0001
Dushanbe	466 (25.20)	241 (51.72)	225 (48.28)	
Republican Subordination	361 (19.52)	114 (31.58)	247 (68.42)	
Gorno-Badakhshan	200 (10.82)	101 (50.50)	99 (49.50)	
Khatlon	586 (31.69)	148 (25.26)	438 (74.74)	
Sughd	236 (12.76)	65 (27.54)	171 (72.46)	
<b>Marital status</b>				< 0.0001
Married	1213 (66.68)	356 (29.35)	857 (70.65)	
Not married	336 (18.47)	182 (54.17)	154 (45.83)	
Divorced	186 (10.23)	95 (51.08)	91 (48.92)	
Widow	84 (4.62)	22 (26.19)	62 (73.81)	
<b>Migrant</b>				0.05
No	1661 (89.83)	613 (36.91)	1048 (63.09)	
Yes	188 (10.17)	56 (29.79)	132 (70.21)	
<b>Employment status</b>				0.02
No	1642 (91.83)	603 (36.72)	1039 (63.28)	
Yes	146 (8.17)	40 (27.40)	106 (72.60)	
<b>Education level</b>				0.45
None/Primary	33 (1.90)	12 (36.36)	21 (63.64)	
Secondary	1468 (84.56)	525 (35.76)	943 (64.24)	
Tertiary	235 (13.54)	94 (40.00)	141 (60.00)	
<b>Prior HIV Test</b>				0.002
No	1640 (92.08)	602 (36.71)	1038 (63.29)	
Yes	58 (3.26)	16 (19.28)	67 (80.72)	
Unknown	83 (4.66)	15 (25.86)	43 (74.14)	

<b>Partner is HIV-positive</b>				< 0.0001
No	904 (49.70)	432 (47.79)	472 (52.21)	
Yes	915 (50.30)	226 (24.70)	689 (75.30)	
<b>Stage AIDS at first visit</b>				< 0.0001
Stage 1	509 (28.04)	119 (23.38)	390 (76.62)	
Stage 2	501 (27.60)	156 (31.14)	345 (68.86)	
Stage 3	496 (27.33)	204 (41.13)	292 (58.87)	
Stage 4	309 (17.02)	176 (56.96)	133 (43.04)	
<b>Drug Treatment (if used drugs)</b>				0.34
No	264 (46.07)	192 (72.73)	72 (27.27)	
Yes	272 (47.47)	203 (74.63)	69 (25.37)	
Unknown	37 (6.46)	31 (83.78)	6 (16.22)	
<b>Prison history</b>				< 0.0001
No	1717 (94.24)	583 (33.95)	1134 (66.05)	
Yes	105 (5.76%)	75 (71.43)	30 (28.57)	
<b>Sex worker status</b>				0.91
No	1624 (97.60)	582 (35.84)	1042 (64.16)	
Yes	40 (2.40)	14 (35.00)	26 (65.00)	
<b>Death from AIDS (of those who died)</b>				0.16
No	132 (45.67)	83 (62.88)	49 (37.12)	
Yes	157 (54.33)	86 (54.78)	71 (45.22)	

<sup>a</sup>Values are expressed as No. (%).

**Table 2.** Factors Associated with Being Coinfected with HIV and HCV vs. Infected with HIV Among IDU and NIDU in Tajikistan<sup>a</sup>

Variable	IDU (n = 579)		Chi-Square	NIDU (n = 1250)		Chi-Square
	Coinfected (n = 431)	HIV alone (n = 148)		Coinfected (n = 232)	HIV alone (n = 1018)	
<b>Gender</b>			0.22			< 0.001
Male	415 (74.91)	139 (25.09)		146 (27.14)	392 (72.86)	
Female	16 (64.00)	9 (36.00)		86 (12.08)	626 (87.92)	
<b>Age at diagnosis</b>			0.55			< 0.001
18 - 24	15 (78.95)	4 (21.05)		19 (8.96)	193 (91.04)	
25 - 34	144 (70.94)	59 (29.06)		92 (16.17)	477 (83.83)	
35 - 44	63 (23.77)	202 (76.23)		85 (26.15)	240 (73.85)	
44+	22 (23.91)	70 (76.09)		36 (25.00)	108 (75.00)	
<b>Urbanness of living location</b>			< 0.0001			< 0.001
Rural	125 (63.45)	72 (36.55)		112 (14.43)	664 (85.57)	
Urban	306 (80.10)	76 (19.90)		120 (25.32)	354 (74.68)	
<b>Region</b>			0.0002			0.0002
Dushanbe	165 (81.28)	38 (18.72)		71 (28.17)	181 (71.83)	
Republican Subordination	63 (67.02)	31 (32.98)		50 (19.16)	211 (80.84)	
Gorno-Badakhshan	87 (77.68)	25 (22.32)		14 (16.09)	73 (83.91)	
Khatlon	73 (77.66)	21 (22.34)		75 (15.31)	415 (84.69)	
Sughd	43 (56.58)	33 (43.42)		22 (13.75)	138 (86.25)	
<b>Marital status</b>			0.03			< 0.001
Married	219 (70.65)	91 (29.35)		137 (15.27)	760 (84.73)	
Not married	135 (76.27)	42 (23.73)		47 (29.56)	112 (70.44)	
Divorced	67 (85.90)	11 (14.10)		28 (26.17)	79 (73.83)	
Widow	8 (66.66)	4 (33.33)		14 (19.44)	58 (80.56)	
<b>Migrant</b>			0.04			0.40
No	406 (75.46)	132 (24.54)		201 (18.22)	902 (81.78)	
Yes	25 (60.98)	16 (39.02)		31 (21.09)	116 (78.91)	
<b>Employment status</b>			0.29			0.35
No	393 (74.86)	132 (25.14)		17 (15.18)	95 (84.82)	
Yes	22 (66.67)	11 (33.33)		205 (18.65)	894 (81.35)	
<b>Education level</b>			0.23			0.82
None/Primary	9 (90.00)	1 (10.00)		3 (13.64)	19 (86.36)	
Secondary	335 (72.98)	124 (27.02)		190 (18.89)	816 (81.11)	
Tertiary	66 (79.52)	17 (20.48)		28 (18.67)	122 (81.33)	
<b>Prior HIV Test</b>			0.14			0.10
No	401 (74.26)	139 (35.74)		201 (18.34)	895 (81.66)	
Yes	3 (42.86)	4 (57.14)		12 (23.53)	39 (76.47)	
Unknown	9 (81.82)	2 (18.18)		7 (9.72)	65 (90.28)	
<b>Partner is HIV-positive</b>			0.0005			< 0.001
No	305 (78.81)	82 (21.19)		127 (24.61)	389 (75.39)	

Yes	124 (65.26)	66 (34.74)	102 (14.11)	621 (85.89)
<b>Stage AIDS at first visit</b>			0.44	< 0.001
Stage 1	71 (78.02)	20 (21.98)	47 (11.44)	364 (88.56)
Stage 2	106 (71.62)	42 (23.38)	48 (13.75)	301 (86.25)
Stage 3	138 (73.80)	49 (26.20)	64 (21.19)	238 (78.81)
Stage 4	106 (79.10)	28 (20.90)	69 (39.88)	104 (60.12)
<b>Prison history</b>			0.68	< 0.001
No	363 (74.08)	127 (25.92)	220 (17.96)	1005 (82.04)
Yes	64 (76.19)	20 (23.81)	11 (53.38)	10 (47.62)
<b>Sex worker status</b>			0.65	0.08
No	385 (74.61)	131 (25.39)	197 (17.83)	908 (82.17)
Yes	4 (66.67)	2 (33.33)	10 (29.41)	24 (70.59)
<b>Death from AIDS (of those who died)</b>			0.95	0.33
No	63 (73.26)	23 (26.74)	20 (44.44)	25 (55.56)
Yes	59 (72.84)	22 (27.16)	27 (35.53)	49 (64.47)

<sup>a</sup>Values are expressed as No. (%).