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ESTIMATING FEMALE SEX WORKERS'  
EARLY HIV AND HEPATITIS C RISK IN  
DNIPRO, UKRAINE: IMPLICATIONS FOR  
EPIDEMIC CONTROL

(*TRANSITIONS* STUDY)

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SUMMARY REPORT OF EARLY FINDINGS

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## ABBREVIATIONS & ACRONYMS

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ABBREVIATION OR ACRONYM	TERM
<i>AIDS</i>	Acquired Immunodeficiency Syndrome
<i>DBS</i>	Dried blood spots
<i>HCV</i>	Hepatitis C virus
<i>HIV</i>	Human Immunodeficiency Virus
<i>STBBIs</i>	Sexually transmitted and blood-borne infections

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## 1 INTRODUCTION

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Structural, behavioural, and biological factors contribute to risk and vulnerability for HIV, hepatitis C virus (HCV), and other sexually transmitted and blood-borne infections (STBBIs) among women engaged in sex work. It is important to determine the extent to which these factors contribute to increased risk and vulnerability, and how these factors interact to potentially magnify or mitigate risk. A full characterization of this risk environment is important to inform the design and implementation of comprehensive HIV interventions for female sex workers.

The purpose of this report is to provide an overview of early findings from the *Transitions* study, which was conducted in Dnipro, Ukraine from 2013-2015. The report presents results from epidemiological mapping exercises and bio-behavioural surveys carried out among young women, aged 14-24 years.

### 1.1 HIV AND HEPATITIS C EPIDEMICS IN UKRAINE

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After sub-Saharan African and the Asia and Pacific regions, the UNAIDS Eastern European and Central Asian Region, and Ukraine specifically, experience among the highest annual rates of new HIV infections, globally.<sup>1</sup> For the past decade, Ukraine's annual HIV incidence per 100,000 population has been consistently higher compared to all other reporting countries in the Eastern European and Central Asian Region.<sup>2</sup> Most recent data from Ukraine estimated 30.4 new HIV infections per 100,000 adult population (15-49 years)<sup>2</sup> and 0.9% adult HIV prevalence.<sup>3</sup>

Ukraine's HIV epidemic is heterogeneous and disproportionately affects particular geographic regions and sub-populations. Odessa, Mykolaiv, Kherson, and Dnipropetrovsk oblasts, as well as cities with high populations density (e.g. Kyiv, Odessa, and Dnipro) experience relatively high HIV prevalence compared to other regions of the country.<sup>1</sup> Young women (14-24 years) in Ukraine are more vulnerable to HIV infection than men of the same age, with overall HIV prevalence of 0.6% and 0.2%, respectively.<sup>3</sup>

In 2015, the World Health Organization estimated that 71-million people were living with HCV worldwide, with the European and Eastern Mediterranean regions being most affected.<sup>4</sup> Limited information is available about rates of HCV among adults in Ukraine, but prevalence within the general populations has been estimated to range from 2%-7%,<sup>5-7</sup> while estimates of the absolute number of people living with HCV range from 1.2 million<sup>6</sup> to 3.5 million.<sup>5</sup>

HCV also disproportionately affects certain sub-populations.<sup>7</sup> Among people who inject drugs, HCV prevalence has been estimated to range from 51.7%-62.7%.<sup>8</sup> Over the past half-decade, reported incidence of HCV has consistently increased among adults in Ukraine—from 11.6 infections per 100,000 population in 2010 to 16.8 infections per 100,000 population in 2015.<sup>9</sup> Furthermore, co-infections with HIV and HCV are relatively common among some key population members in Ukraine.<sup>1</sup> In 2015, 75.4% of all individuals newly diagnosed with HIV were also tested for HCV, and among them, 36.3% were found to have evidence of HCV infection.<sup>1</sup>

It is important to note that limited epidemiological data are available from the temporarily occupied territories that have been experiencing military conflict (i.e. Sevastopol and AR Crimea) as well as regions in which counterinsurgency activities have been operating (i.e. Donetsk and Luhansk).<sup>1</sup> As such, estimates for the Ukrainian HIV and HCV epidemics should be interpreted with caution.

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## 1.2 KEY POPULATIONS

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“Key populations” refer to sub-populations that are disproportionately vulnerable to HIV, HCV, and other STBBIs. In Ukraine, key populations include female sex workers, people who inject drugs, and men who have sex with men.<sup>1</sup> Earlier in Ukraine’s HIV epidemic, transmission was primarily attributed to unsafe injection practices among people who inject drugs.<sup>2</sup> Over the past decade, an increasing number of new HIV infections have been observed among different sub-populations, and condom-less heterosexual sex is now the most commonly reported mode of HIV acquisition.<sup>2</sup> At the same time, transmission through condom-less sex between men has also become increasingly recognised as an important mode of HIV acquisition in the country.<sup>1,2</sup>

Given the increasing epidemiological importance of heterosexual transmission in Ukraine, women involved in sex work and their sexual partners (both clients and non-paying intimate partners) are sub-populations that must be prioritised within HIV prevention strategies.<sup>1</sup> While, estimates of the average HIV prevalence among female sex workers in Ukraine have decreased from 12.9% in 2009 to 7.0% in 2015,<sup>1,10</sup> variation exists across geographic regions.<sup>1</sup> In 2015, HIV prevalence was estimated to be as high as 18.6% in Cherkasy oblast and as low as 0.7% in Zhytomyr oblast.<sup>1</sup>

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### 1.2.1 MOST AT-RISK ADOLESCENTS

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While not formally recognized as a key population for the HIV, HCV, and other STBBI epidemics in Ukraine, certain sub-groups of adolescents—referred to as most at-risk adolescents—have also been identified as a priority group for HIV prevention programming.<sup>11,12</sup> Beginning in 2007, UNICEF implemented a multi-country project aimed at developing an evidence base to better understand the epidemiology of HIV among adolescents in Ukraine and southeastern Europe. The project also described HIV transmission dynamics among most at-risk adolescents, identified existing HIV prevention programs in the region, and provided an overview of existing advocacy efforts that represent adolescents’ interest at the national and regional levels.<sup>13</sup> Specifically because of these efforts, most at-risk adolescents were successfully integrated into the National Targeted Social Programme on HIV/AIDS for 2014-2018.<sup>14</sup>

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## 2 THE TRANSITIONS STUDY

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Interventions tailored to female sex workers are often key components of national HIV prevention strategies, particularly in regions where sexual networks involving female sex workers, their clients, and their intimate partners are found to contribute to heterosexual HIV epidemics.<sup>15</sup> However, HIV prevention programs for female sex workers generally provide services to women who self-identify as sex workers. Thus, programs aimed at female sex workers may not reach women who exchange sex for money or other resources, but who do not identify as sex workers. The *Transitions* study aimed to better understand vulnerabilities to HIV, HCV, and other STBBIs among young women in Dnipro prior to, and in the very early period after entry into sex work.

The *Transitions* study conceptualised the period of time between a woman’s first sex and self-identification as a sex worker as the “transition period”, and the period after formal entry into sex work,

but prior to accessing health services from sex worker-specific programs, as the “access gap” (Figure 2.1).

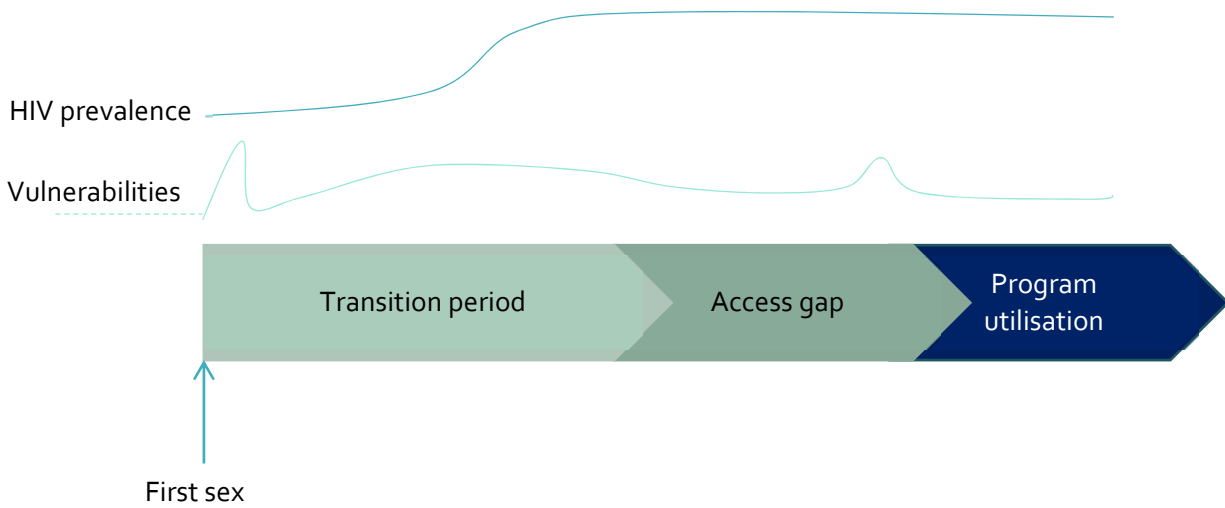


FIGURE 2.1 SCHEMATIC CONCEPTUALISATION OF THE TRANSITION PERIOD AND ACCESS GAP IN RELATION TO TIMING AND TRAJECTORY OF HIV PREVALENCE AND VULNERABILITIES OVER TIME.

Prior to formally identifying as a sex worker, a woman may engage in transactional sex—defined by the *Transitions* study as an instance in which sex is exchanged between a man and a woman—with the expectation that she would receive money, gifts, or other resources in return. In the case of a transactional exchange, the price of sex is typically not negotiated upfront, but an implicit understanding about the exchange exists. In contrast, *Transitions* defined sex work as an explicit transaction between a man and a woman in which money, gifts, or other resources are exchanged for sex. In the context of sex work, the price of a sex act is negotiated up front, both parties typically agree upon the price before the event takes place, and payment is made before or immediately after the sex act. It is important to note that self-identification as a sex worker is a distinguishing feature between transactional sex and formal sex work. Participants in the *Transitions* study were not classified as sex workers for analyses if they had not self-identified as a female sex worker, regardless of whether reported behaviours matched the study’s definition used to define female sex workers.

## 2.1 STUDY PURPOSE AND OBJECTIVES

The purpose of the *Transitions* study was to characterize factors that influence HIV risk and vulnerability during the transition period and access gap among young, sexually active women between the ages of 14 and 24 years in Dnipro, Ukraine. Based on the idea that access to sexual health services may be limited among young women who engage in behaviours that place them at disproportionate risk of acquiring HIV, HCV, or other STBIs, *Transitions* set out to examine the importance of these early periods of potential vulnerability for epidemic control. Furthermore, a better understanding of the transition period and access gap could be important for informing the implementation of, and configuration of services offered by HIV prevention programs.

To gain a better understanding of events that occur during and around the transition period and access gap, the *Transitions* study focused on three specific groups of young women who visit female sex



worker hotspots. The three study groups included young women who: (1) have had sex, but have not engaged in transactional sex or formal sex work; (2) have engaged in transactional sex, but do not identify as female sex workers; and (3) formally identify as female sex workers (Figure 2.2). In this context, “hotspots” refer to physical locations where female sex workers meet or have sex with clients.

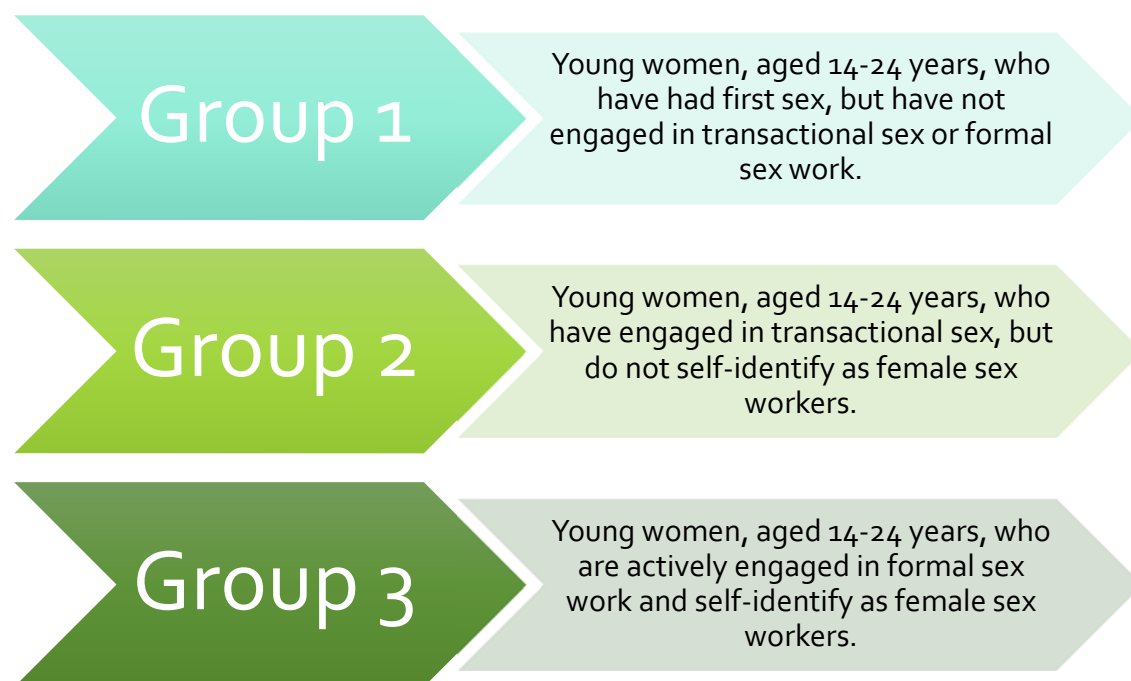


FIGURE 2.2 DEFINITIONS USED FOR STUDY GROUP MEMBERSHIP IN THE *TRANSITIONS* STUDY.

The objectives of the *Transitions* study were to describe how the characteristics and length of the transition period and access gap varies across epidemiologic contexts and in turn how HIV prevalence varies. The study also aimed to assess the extent to which HIV infections acquired during the transition period and access gap (before women are reached by existing programs), could mitigate the population level impact of HIV prevention interventions for women who self-identify as female sex workers, and to explore the potential marginal benefit of expanding programs to reach women during the transition period and access gap.

This report focuses on select components of the larger *Transitions* study, and has four aims:

1. Identify and characterise locations in which study group members (i.e., young women seeking casual and transactional sex partners and young female sex workers) congregate/reside in Dnipro, Ukraine;
2. Estimate the population sizes of the three study groups in Dnipro;
3. Examine how vulnerabilities to HIV and HCV overlap among study group members; and Characterize and estimate the duration of the transition period and access gap.

### 3 METHODS

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The *Transitions* study used two core methods for primary data collection. The first step was geographic mapping to locate and enumerate the study population. These data were used to develop the sampling

frame for the cross-sectional biological and behavioural survey, the second step of the study. These steps are described in further detail below (Figure 3.1).

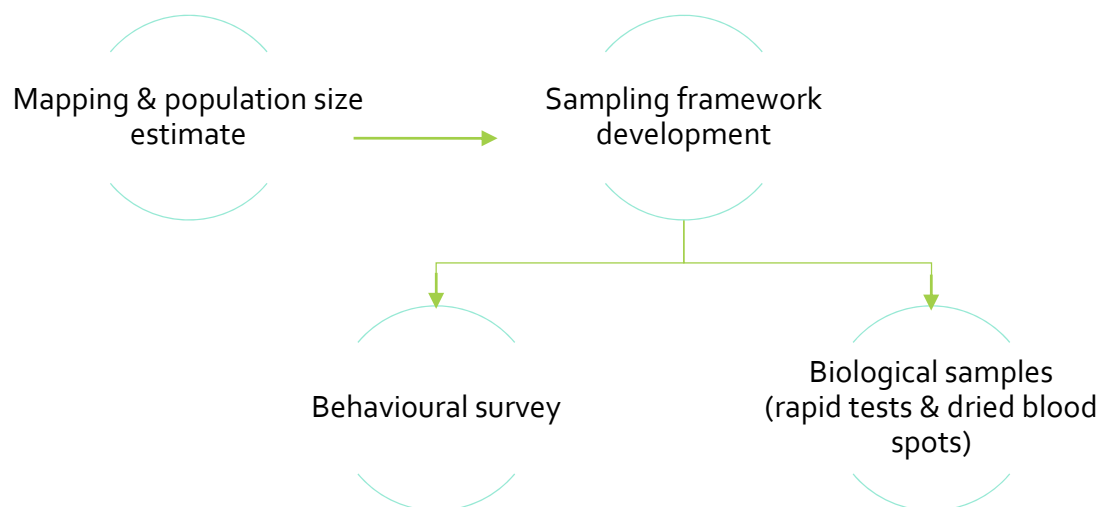


FIGURE 3.1 TRANSITIONS STUDY DESIGN.

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### 3.1 MAPPING

The *Transitions* study used a geographic mapping approach to locate and estimate population sizes of female sex workers (all ages, as well as the sub-population of female sex workers aged 14-24 years) and young women (14-24 years) seeking transactional and casual sex partners in Dnipro. These population estimates and locations where female sex workers and young women congregate to seek clients and sex partners formed the sampling frame for the study.

The mapping methods followed an approach that has been implemented in many countries globally,<sup>16,17</sup> and is based on the understanding that most female sex workers will congregate and/or meet clients in geographically defined areas (“hotspots”). A comprehensive description of this mapping methodology is described elsewhere.<sup>16</sup> Briefly, the mapping methodology includes four main steps: i) a pre-mapping exercise; ii) level 1 key informant interviews to generate an exhaustive list of places where women congregate to seek clients and partners for transactional and/or casual sex; iii) level 2 interviews with female sex workers to validate and characterize sex worker hotspots; and iv) data triangulation and compilation. The methods employed by the *Transitions* study were modified to include enhanced venue profiling that would: i) capture information about young women seeking transactional and casual sex partners within validated hotspots; and ii) estimate the population sizes of young women, aged 14-24 years, belonging to the three study groups (Figure 2.2).

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### 3.2 SAMPLING FRAMEWORK

Participants for the *Transitions* study were recruited using a multi-stage cluster sampling approach with probability proportional to size of the enumerated population in the hotspots. From the selected hotspots, participants were recruited and screened for eligibility with the support of outreach workers.

Young women were eligible to participate in the *Transitions* study if they: (i) were 14 – 24 years of age, inclusive; (ii) had ever had sex; and (iii) were residing/working within a hotspot that had been identified and validated through preliminary mapping exercises.

Figure 3.2 outlines the sampling framework used for the *Transitions* study, with a target sample of 900 young women seeking casual sex partners (i.e. Group 1), 450 young women seeking transactional sex partners (i.e. Group 2), and 450 female sex workers (i.e. Group 3).

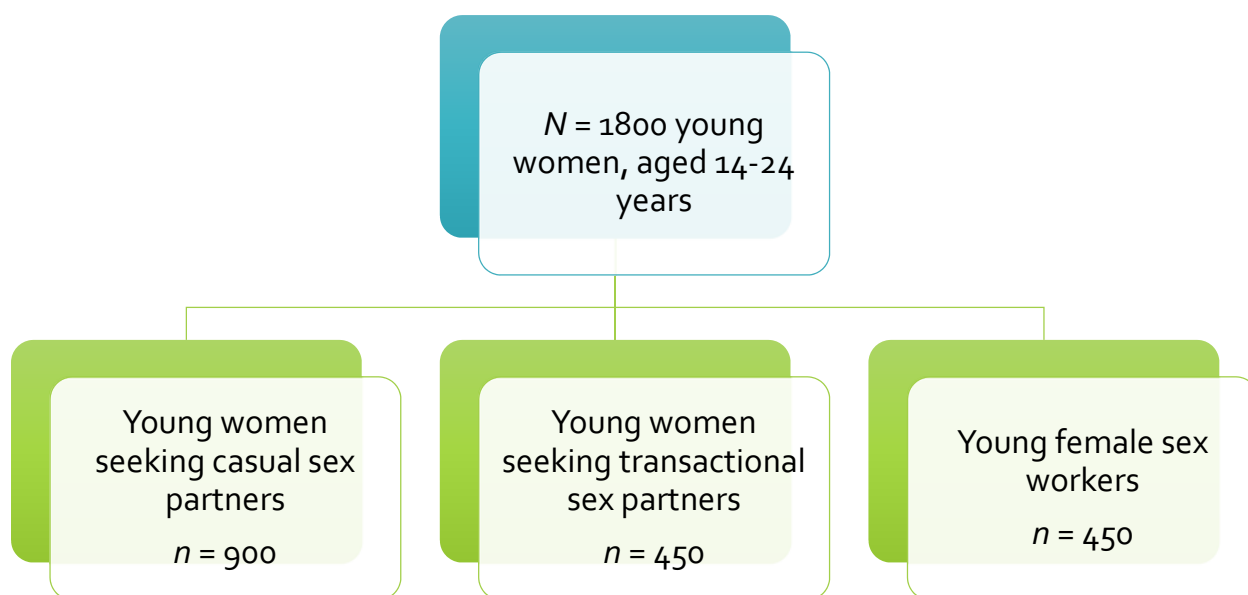


FIGURE 3.2 SAMPLING FRAMEWORK AND TARGET SAMPLE SIZES FOR STUDY GROUPS IN THE *TRANSITIONS* STUDY.

### 3.3 BEHAVIOURAL SURVEY

The first component of the *Transitions* study was a cross sectional survey that collected information about young women's sociodemographic characteristics; timing of specific transition and access gap events (first sex, first transactional sex, self-identification as commercial sex workers, access to prevention program services); current sexual behaviours and partnerships; sexual behaviours and partnerships during the transition period and access gap; condom-use; alcohol use; injecting and non-injecting drug use; experiences of violence; HIV prevention program access; STBBI and HIV testing practices; and reproductive health. Behavioural survey questions were largely based on previously established guidelines, methodologies, and validated tools.<sup>18-20</sup>

Women who met the eligibility criteria outlined above participated in the survey, after providing written informed consent. Trained interviewers administered the face-to-face surveys in Russian.

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### 3.4 BIOLOGICAL SAMPLES

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Following informed consent and completion of the behavioural survey, finger-prick blood samples were collected from consenting participants and tested with PROFITEST, a combination rapid test for HIV, HCV, hepatitis B, and syphilis. Pre- and post-test counseling was provided to the participants as per national guidelines. If a participant tested positive for HIV, she was referred to the Dnipropetrovsk Oblast AIDS Center for confirmatory testing and appropriate follow-up care and treatment. If a participant tested positive for syphilis, HCV, or hepatitis B, she was referred to the local government clinic for confirmatory testing and treatment. Regardless of test results, all participants referred to local HIV/STBBI prevention services in Dnipro and encouraged to continue with regular HIV testing on a semi-annual basis. Additionally, dried blood spot (DBS) samples were transferred to the National HIV and Retrovirology Laboratories of the Public Health Agency of Canada in Winnipeg, Canada and were tested for confirmatory HIV serology using the Avioq HIV-1 Microelisa System (Avioq Inc., North Carolina, USA) and HCV serology using ORTHO® Hepatitis C Elisa Test System (Ortho-Clinical Diagnostic Inc., New Jersey, USA). All biological procedures were performed by certified medical workers from the Dnipro Oblast AIDS Centre in a mobile clinic (provided by ICF “International HIV/AIDS Alliance in Ukraine” and CF “Virtus”) or in local government polyclinics (outpatient clinics).

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### 3.5 ETHICAL CONSIDERATIONS

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The *Transitions* study received ethical approval from the Health Research Ethics Board at the University of Manitoba, (Winnipeg, Canada), the Ethical Committee at the Sociological Association of Ukraine (Kyiv, Ukraine) and Committee on Medical Ethics of the State Institution – L. Gromashevsky Institute of Epidemiology and Infectious Diseases, National Academy of Medical Sciences of Ukraine (Kyiv, Ukraine). Informed consent was obtained from study participants separately for the behavioural survey and biological sampling components of the *Transitions* study. No identifying information was collected, but each participant was assigned an alphanumeric participant identification number that was used to link the behavioural and biological data to accommodate individual-level data analyses.

Importantly, all young women invited to participate in the *Transitions* study were referred to local HIV prevention programs if they were not already accessing services and information regarding local health facilities where further testing could be obtained, independent of their decision to participate.

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## 4 FINDINGS

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In total, 1,818 women were recruited: 899 young women seeking casual sex partners/engaging in casual sex, 466 in young women seeking transactional sex partners/engaging in transactional sex, and 453 young female sex workers.

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### 4.1 MAPPING

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During level 1 mapping activities, 891 hotspots were identified in Dnipro, with approximately 50% previously known to local prevention programs. Through level 2 mapping activities, 778 (87.3%) were validated to be active hotspots at which young women sought clients for sex work, and/or partners for transactional and casual sex.

Of all 778 active hotspots, 279 (35.9%) were used by women who self-identified as sex workers and 526 (67.6%) were spots in which young women met casual or transactional sex partners, suggesting that some hotspots were used by all three study groups. Among the 279 validated female sex worker hotspots, only 15.0% were also used by young women seeking transactional and/or casual sex partners, with 6.1% valid hotspots being used by all three study groups (Figure 4.1).

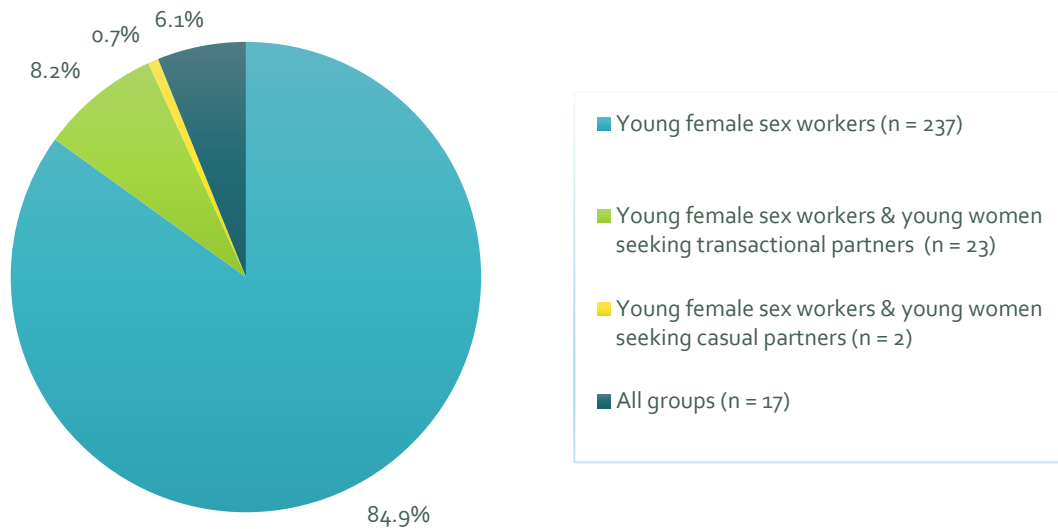


FIGURE 4.1 OVERLAP AMONG STUDY GROUPS WITHIN VALIDATED FEMALE SEX WORKER HOTSPOTS IN DNIPRO.

Seven hotspot typologies were identified among the 279 female sex worker hotspots in Dnipro (Table 4.1). Overlap between study groups existed within each hotspot typology; young women seeking transactional and/or casual sex partners were identified within each hotspot typology (Table 4.1).

TABLE 4.1 TYPOLOGIES OF FEMALE SEX WORKER HOTSPOTS IN DNIPRO.

HOTSPOT TYPOLOGY	N	%
Brothel	89	31.9
Apartment	48	17.2
Street/public place/road/highway	43	15.4
Massage parlour/sauna/beauty salon	29	10.4
Night club/casino/disco/art club/strip bar	15	5.4
Café/restaurant/bar	44	15.8
Other (e.g. student dormitories, gyms)	11	3.9
<b>TOTAL</b>	<b>279</b>	<b>100.0</b>

Overlap between female sex workers and young women seeking transactional and/or casual sex partners was primarily observed within public establishments, such as cafés, restaurants, bars, and nightclubs (Figure 4.2). As expected, brothels, apartments, streets and highways, or massage parlours were predominantly places where only female sex workers sought clients.

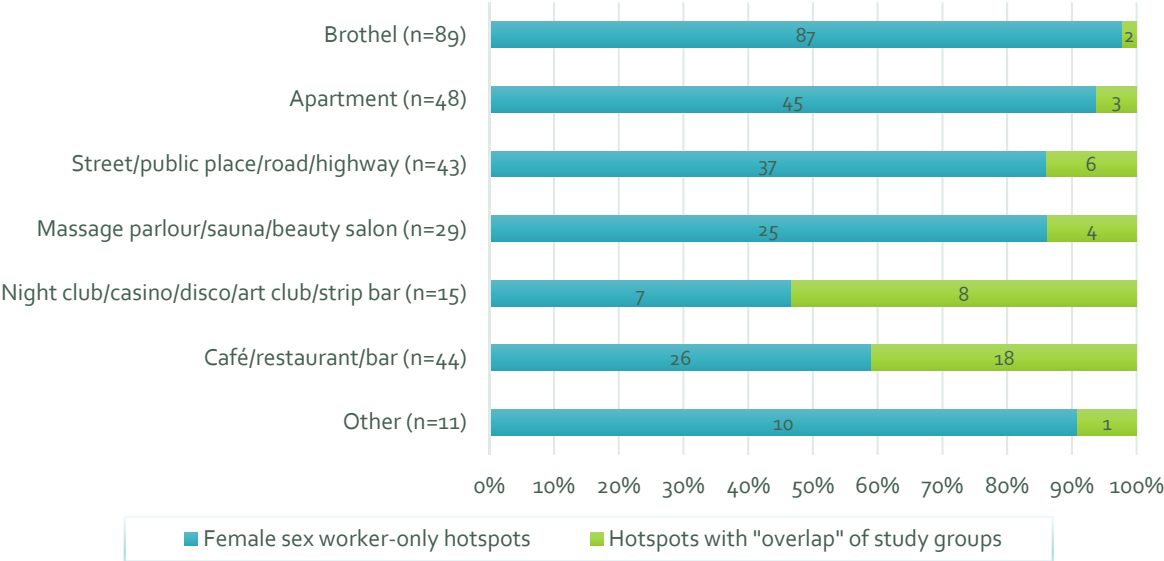


FIGURE 4.2 OVERLAP AMONG STUDY GROUPS ACROSS FEMALE SEX WORKER HOTSPOT TYPOLOGIES IN DNIPRO.

### 4.1.1 POPULATION SIZE ESTIMATES

Mapping estimated a total female sex worker population in Dnipro of 1,087 individuals (range: 817-1,357), and 67.4% ( $n = 733$ ; range: 563-903) of all sex workers were 14-24 years old. It was estimated that a further 244 (range: 161-331) and 524 (range: 346-712) young women, aged 14-24 years, engaging in transactional or casual sex, respectively (Table 4.2).

TABLE 4.2 POPULATION SIZE ESTIMATES FOR STUDY GROUPS IN DNIPRO.

STUDY GROUP	POPULATION SIZE ESTIMATES		
	Mean	Minimum	Maximum
<b>Group 1: Young women seeking casual sex partners</b>	524	346	712
<b>Group 2: Young women seeking transactional sex partners</b>	244	161	331
<b>Group 3: Young female sex workers</b>	733	563	903
<b>Female sex workers (all ages)</b>	1087	817	1357

There was unequal distribution of study groups across different hotspot typologies in Dnipro (Figure 4.3). Young female sex workers were most commonly identified at brothels, apartments, massage parlours/saunas/beauty salons, and along streets or highways, while cafés/restaurants/bars and nightclubs/discos were more commonly used as meeting places among young women seeking casual sex partners. Overall, hotspots characterized as nightclubs/discos and cafés/restaurants/bars were found to have the highest density of all study groups at any given time.

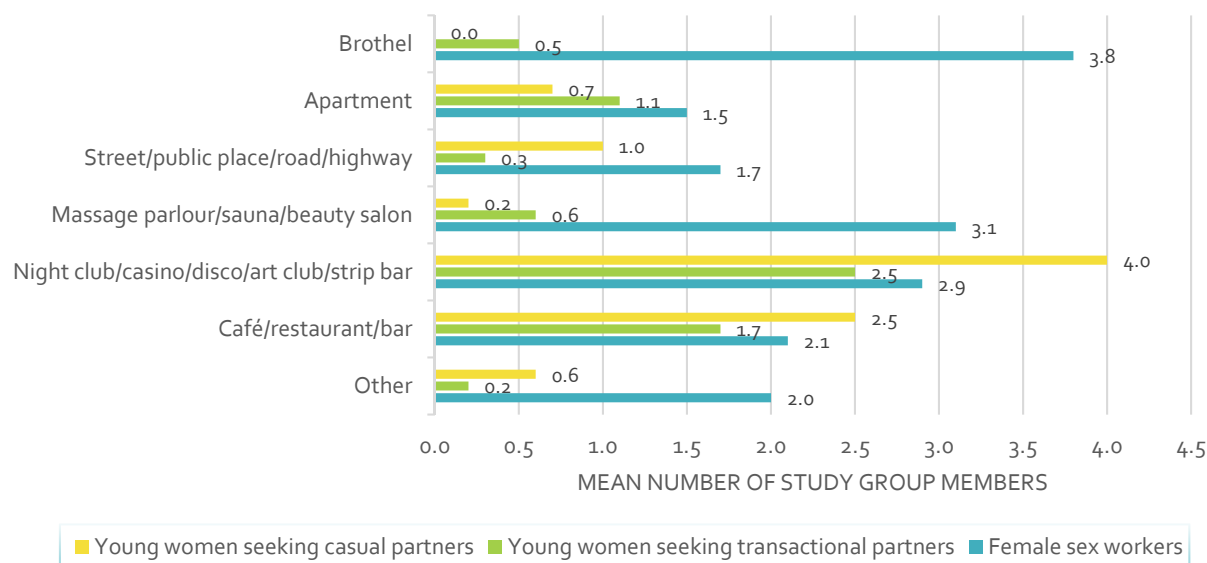


FIGURE 4.3 MEAN NUMBER OF STUDY GROUP MEMBERS PER FEMALE SEX WORKER HOTSPOT, BY HOTSPOT TYPOLOGY.

## 4.2 SOCIODEMOGRAPHIC CHARACTERISTICS OF *TRANSITIONS* STUDY PARTICIPANTS

The median age of study participants was 20 years (interquartile range 18- 22 years), and the majority (88.4%) were never married (Table 4.3).

TABLE 4.3 SOCIODEMOGRAPHIC CHARACTERISTICS OF *TRANSITIONS* PARTICIPANTS, BY STUDY GROUP.

CHARACTERISTIC	ALL STUDY GROUPS (N = 1,818)		YOUNG WOMEN ENGAGING IN CASUAL SEX (N = 899)		YOUNG WOMEN ENGAGING IN TRANSACTIONAL SEX (N = 466)		YOUNG FEMALE SEX WORKERS (N = 453)	
	n	%	n	%	n	%	n	%
<b>Median age (years)</b>	20		19		21		20	
<b>MARITAL STATUS</b>								
Never been married	1413	77.9	700	77.9	337	72.6	376	83.2
Married, living with husband	116	6.4	84	9.3	23	5.0	9	2.0
Married, not living with husband	44	2.4	8	0.9	22	4.7	14	3.1
Unmarried, living with partner	192	10.6	92	10.2	69	14.8	31	6.9
Divorced/separated	44	2.4	14	1.6	11	2.4	19	4.2
Widowed	6	0.3	1	0.1	2	0.4	3	0.7

Over one-half of participants who engaged in casual sex indicated that they were currently students (57.8%;  $n=520$ ), and just under one-half of young women engaging in transactional sex were current students (42.5%;  $n=198$ ). A much smaller proportion (14.1%;  $n=64$ ) of young female sex worker participants reported being a student at the time of the survey.

Table 4.4 outlines the highest levels of education attained by young women in each study group. Among all participants, approximately two-thirds (67.6%) reported having a complete secondary or vocational education. While 8.4% and 11.4% of young women engaging in casual and transactional sex, respectively, had attained higher education at the post-graduate level, only 1.3% of young female sex workers reported the same. A very small proportion (0.2%,  $n=18$ ) of young women engaging in casual sex reported having no completed formal education; however, this may be due to the fact that nearly 60% still students at the time of survey.

TABLE 4.4 HIGHEST LEVEL OF EDUCATION ATTAINED AMONG *TRANSITIONS* STUDY PARTICIPANTS, BY STUDY GROUP MEMBERSHIP.

CHARACTERISTIC	ALL STUDY GROUPS (N = 1,818)		YOUNG WOMEN ENGAGING IN CASUAL SEX (N = 899)		YOUNG WOMEN ENGAGING IN TRANSACTIONAL SEX (N = 466)		YOUNG FEMALE SEX WORKERS (N = 453)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
<b>HIGHEST COMPLETED LEVEL OF EDUCATION</b>								
Never received formal education	2	0.1	2	0.2	0	0	0	0
Below secondary education	450	24.9	202	22.6	65	14.0	183	40.5
Full secondary education	542	29.9	263	29.5	143	30.8	136	30.1
Vocational education	682	37.7	351	39.3	204	43.9	127	28.1
Higher education, post-graduate	134	7.4	75	8.4	53	11.4	6	1.3

## 4.3 HIV AND HEPATITIS C RISKS AND VULNERABILITIES

### 4.3.1 FIRST SEXUAL EXPERIENCES

According to the 2012 Ukraine Multiple Indicator Cluster Survey,<sup>21</sup> the average reported age at first sex was 18 years—substantially higher than the average age at first sex reported among *Transitions* participants in all study groups (Table 4.5). Approximately 40% of young female sex workers participating in the *Transitions* study were younger than 15 years when they first had sex, while 19.2% and 18.5% of participants engaging in casual and transactional sex, respectively, were younger than 15 years at first sex. Among all participants, nearly 14% had their first sex with a man  $\geq 10$  years older than them. For most first sex acts, a condom was not used (Table 4.5).



TABLE 4.5 CHARACTERISTICS OF FIRST SEXUAL EXPERIENCES AMONG *TRANSITIONS* STUDY PARTICIPANTS.

CHARACTERISTIC	ALL STUDY GROUPS (N=1,818)		YOUNG WOMEN ENGAGING IN CASUAL SEX (N=899)		YOUNG WOMEN ENGAGING IN TRANSACTIONAL SEX (N=466)		YOUNG FEMALE SEX WORKERS (N=453)	
	N	%	N	%	n	%	n	%
Median age at first sex (years)	16		16		16		15	
First sex at age ≤14 years	434	23.9	173	19.2	86	18.5	175	38.6
First sex partner older by ≥10 years	121	13.8	99	11.3	76	17.0	68	15.5
No condom used	968	53.5	450	50.3	224	48.4	294	65.2

Nearly one-fifth of all participants reported receiving some resource in exchange for their first sex; among whom 5% of young women reported receiving money in exchange for sex during their first sexual encounter (Figure 4.4). Among all study groups, a greater proportion of young female sex workers and young women engaging in transactional sex reported receiving money at their first sex (8.9% and 8.8%, respectively), while less than 2% of women engaging in casual sex received money in exchange for their first sex.

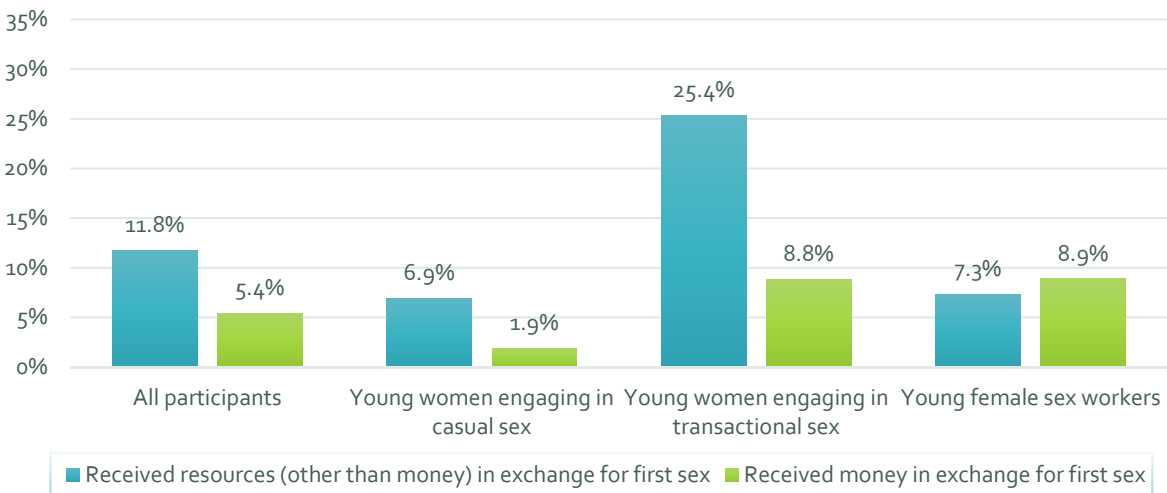


FIGURE 4.4 REPORTED RECEIPT OF RESOURCES OTHER THAN MONEY IN EXCHANGE FOR FIRST SEX, BY STUDY GROUP.

The most commonly reported resources received in exchange for sex were clothes (38%), food (37%), alcohol (31%), money (31%), and a place to stay (28%) while only 1% of study group members reported receiving drugs in exchange for first sex.

### 4.3.2 EXPERIENCES OF PHYSICAL AND SEXUAL VIOLENCE

Participants from all study groups reported experiences of physical and sexual violence at the hands of sex partners (Figure 4.5). In general, a greater proportion of young women reported experiencing physical violence than sexual violence. Nearly one-third of female sex workers reported ever experiencing physical violence, while sexual violence was reported by 14.9% of female sex workers and 12.2% of young women engaging in transactional sex.

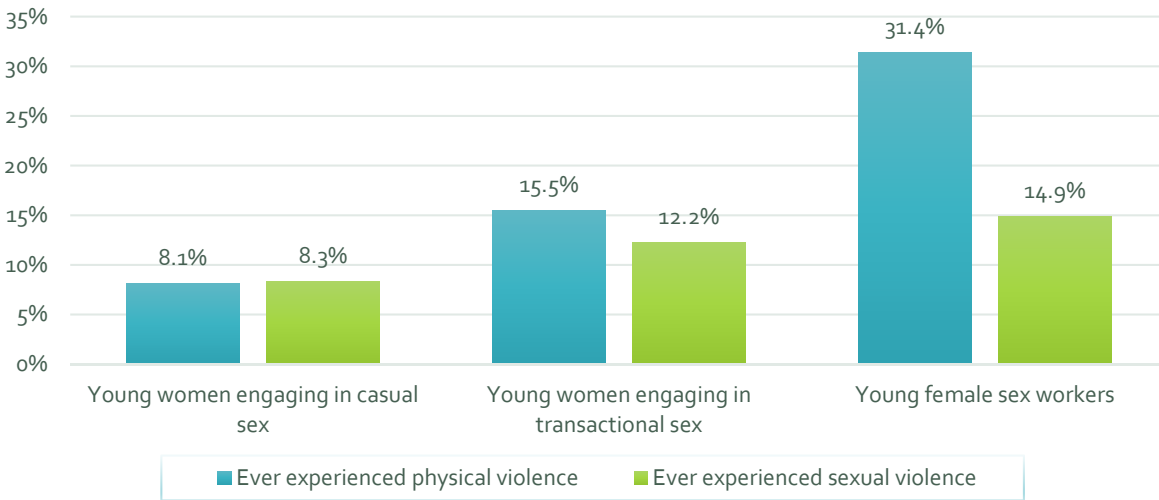


FIGURE 4.5 EXPERIENCES OF PHYSICAL AND SEXUAL VIOLENCE REPORTED AMONG STUDY GROUP MEMBERS.

Experiences of physical violence were common among young women <18 years old. Among self-identified female sex workers <18 years, 40.9% had experienced physical violence at the hands of a sex partner at least once. At the same time, 5.3% and 10.3% of participants <18 years who engaged in casual and transactional sex, respectively, had ever experienced physical violence by sex partners.

Furthermore, 7.5% of young women engaging in casual sex and 8.4% of participants engaging in transactional sex indicated that their first sex was forced. Among young female sex workers, 5.3% reported the same. Non-paying intimate partners were the most commonly reported perpetrators of sexual violence among young women engaging in casual sex. For self-identified female sex workers, regular paying clients and non-paying intimate partners were the most frequent perpetrators of sexual violence. For participants who engaged in transactional sex, regular transactional sex partners and non-paying intimate partners were the most common perpetrators of sexual violence.

### 4.3.3 ALCOHOL AND OTHER DRUG USE

While over 60% of all participants indicated that they consumed alcohol at least once a month, daily alcohol consumption was uncommon (Table 4.6). Nearly half (43.6%) of young female sex worker participants reported ever using illicit drugs other than alcohol, while 15.7% and 20.6% of participants engaging in casual and transactional sex, respectively, reported the same. Similarly, compared to the other two groups, a greater proportion of young female sex workers reporting ever injecting drugs (Table 4.6).

TABLE 4.6 ALCOHOL AND DRUG USE REPORTED AMONG STUDY GROUP MEMBERS.

CHARACTERISTIC	ALL STUDY GROUPS (N=1,818)		YOUNG WOMEN ENGAGING IN CASUAL SEX (N=899)		YOUNG WOMEN ENGAGING IN TRANSACTIONAL SEX (N=466)		YOUNG FEMALE SEX WORKERS (N=453)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
<b>ALCOHOL USE</b>								
Never	221	12.2	135	15.0	55	11.8	31	6.9
Less than once a month	476	26.2	260	28.9	113	24.2	103	22.9
At least once a month	1,088	59.9	501	55.7	292	62.7	295	65.7
Daily	30	1.7	3	0.3	6	1.3	21	4.7
<b>OTHER DRUG USE</b>								
Ever used	433	23.9	141	15.7	96	20.6	196	43.6
Ever injected	84	4.6	28	3.1	10	2.2	46	10.3

It was relatively common for participants to report sexual encounters while under the influence of alcohol or other drugs. Among those reporting alcohol use at least once a month, 49.4% of young women engaging in casual sex, 49.0% of those engaging in transactional sex, and 60.0% of self-identified sex workers also reported having sex while drunk during the same period.

#### 4.4 TRANSITION PERIOD AND ACCESS GAP

For participants who self-identified as female sex workers at the time of the survey, the median length of time from first sex to self-identification as a sex worker (the transition period) was 2 years (IQR 1-3 years). Meanwhile, the length of the access gap—defined as the period of time from self-identification as sex worker until first point of contact with an HIV prevention program—was significant. Among young female sex workers, the rate of first contact with a program providing STBBI prevention services was 0.3 per person years in sex work. Nearly three-quarters (70.6%) of young female sex workers reported no contact with an HIV prevention program.

#### 4.5 BIOLOGICAL SAMPLING

In total, 1,810 individuals agreed to provide blood samples for STBBI testing via point-of-care rapid tests and DBS assays. Nearly all participants who completed the behavioural survey agreed to provide blood samples: 99.4% of young women engaging in casual sex, 99.6% of young women engaging in transactional sex, and 99.8% of young female sex worker participants.

#### 4.6 HIV PREVALENCE

Overall, HIV prevalence among *Transitions* study participants was 4.9%, with notable heterogeneity across groups—10.0% of young female sex workers had positive HIV tests, while 3.2% and 3.0% of young women engaging in casual and transactional sex, respectively (Figure 4.6).

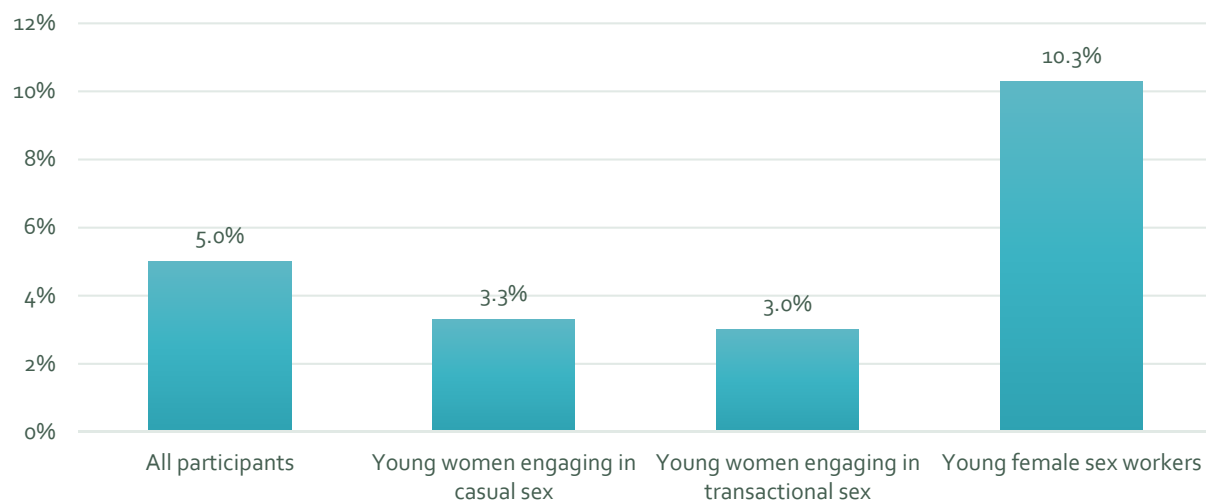


FIGURE 4.6 HIV PREVALENCE AMONG *TRANSITIONS* PARTICIPANTS, BY STUDY GROUP.

HIV prevalence was higher among participants who ever injected drugs, compared to those who had never injected (Table 4.7).

TABLE 4.7 HIV PREVALENCE AMONG STUDY GROUP MEMBERS, BY HISTORY OF INJECTION DRUG USE.

CHARACTERISTIC	ALL STUDY GROUPS		YOUNG WOMEN ENGAGING IN CASUAL SEX		YOUNG WOMEN ENGAGING IN TRANSACTIONAL SEX		YOUNG FEMALE SEX WORKERS	
	n/N	%	n/N	%	n/N	%	n/N	%
Ever injected drugs	15/84	17.9	4/28	14.3	1/10	10.0	10/46	21.7
Ever used, never injected drugs	21/34	6.2	5/113	4.4	2/82	2.4	14/146	9.6
Never used drugs	51/1376	3.7	20/753	2.7	10/369	2.7	21/254	8.3

HIV prevalence also varied across age groups (Figure 4.7). Among all study participants together, and among female sex workers specifically, HIV prevalence plateaued in the 18-19-year age group at 6.0% and 11.7%, respectively. Among the youngest age group (14-17 years), there were no HIV-positive tests among young women who engaged in transactional sex, but prevalence among those engaging in casual sex was 3.7%, while among female sex workers it was 8.3%.

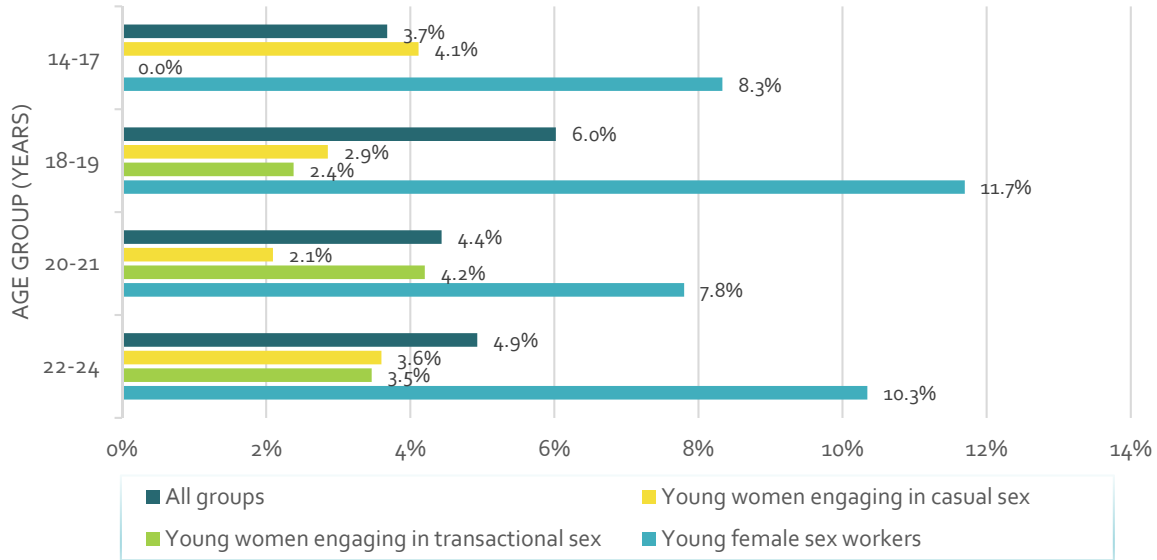


FIGURE 4.7 HIV PREVALENCE AMONG STUDY GROUP MEMBERS, BY AGE GROUP.

#### 4.6.1 HEPATITIS C PREVALENCE

The overall HCV prevalence among all *Transitions* participants was 16.5%. HCV prevalence was highest among female sex workers at 37.6% and lowest among young women engaging in casual sex at 8.9% (Figure 4.8).

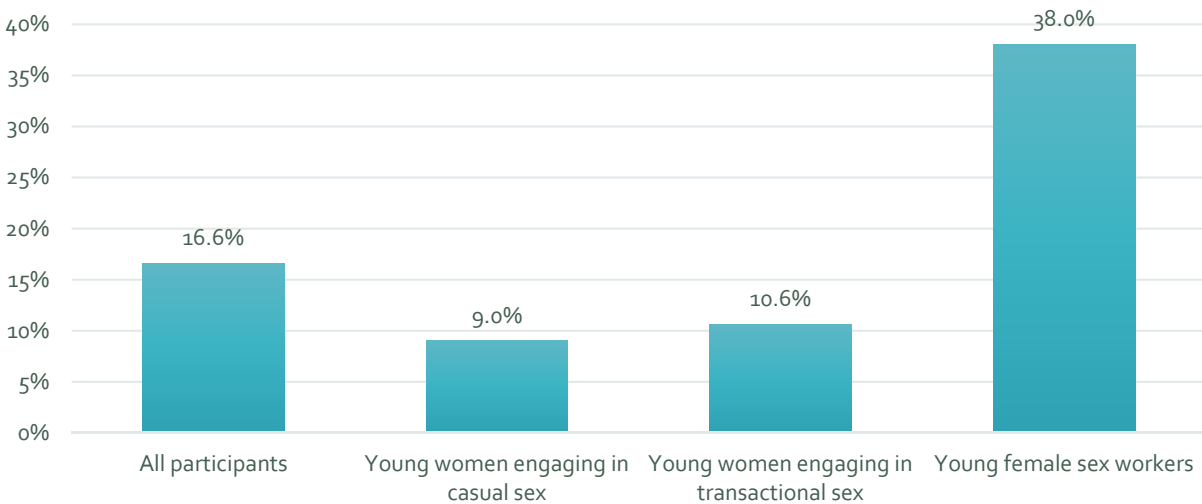


FIGURE 4.8 HEPATITIS C PREVALENCE AMONG *TRANSITIONS* PARTICIPANTS, BY STUDY GROUP.

When considering all participants together, HCV prevalence was considerably higher among those who reported ever injecting drugs (41.4%) than among participants who had never injected drugs (15.3%; Table 4.8). However, the difference in HCV prevalence was less dramatic between female sex workers who had ever injected drugs and those who had never injected (52.2% vs. 36.5%, respectively).

TABLE 4.8 HEPATITIS C PREVALENCE AMONG STUDY GROUP MEMBERS, BY HISTORY OF INJECTION DRUG USE.

CHARACTERISTIC	ALL STUDY GROUPS		YOUNG WOMEN ENGAGING IN CASUAL SEX		YOUNG WOMEN ENGAGING IN TRANSACTIONAL SEX		YOUNG FEMALE SEX WORKERS	
	n/N	%	n/N	%	n/N	%	n/N	%
Ever injected drugs	36/84	42.9	9/28	32.1	3/10	30.0	24/46	52.2
Ever used, never injected drugs	76/340	22.3	8/112	7.1	10/82	12.2	58/146	39.7
Never used drugs	186/1373	13.5	63/751	8.4	36/368	9.8	87/254	34.3

Across all age groups, self-identified female sex workers were found to have the highest HCV prevalence—as high as 44.8% among young women 22-24 years (Figure 4.9). Among young women engaging in transactional sex, prevalence consistently increased with age, but the same was not true for participants engaging in casual sex. HCV prevalence was highest in the 14-17-year and the 20-21-year age groups of young women engaging in casual sex (9.1% and 12.0%, respectively).

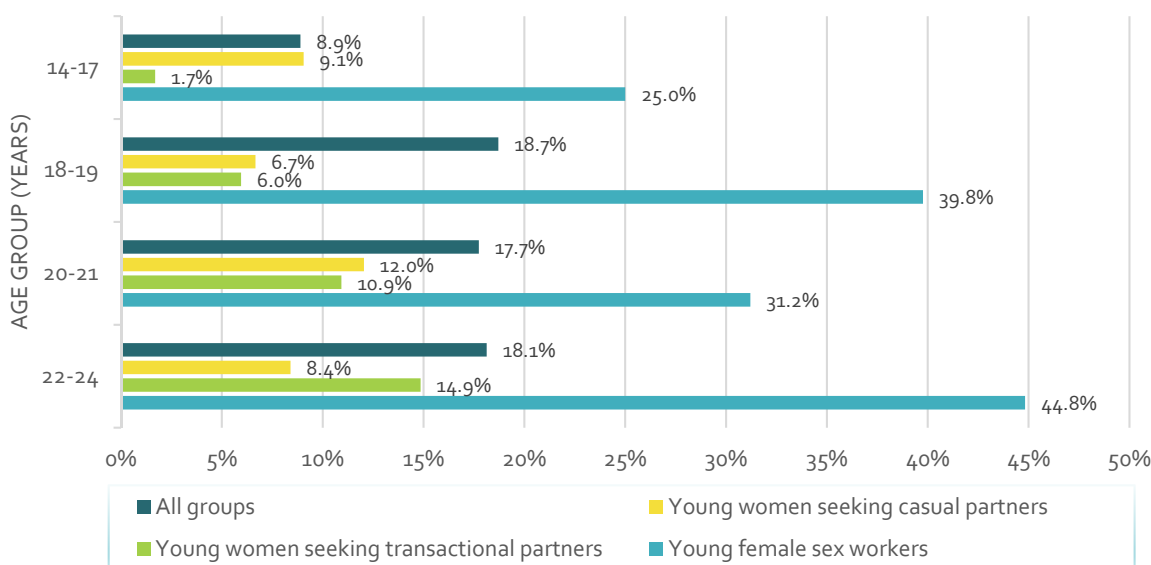


FIGURE 4.9 HEPATITIS C PREVALENCE AMONG STUDY GROUP PARTICIPANTS, BY AGE GROUP.

## 5 KEY FINDINGS, PROGRAMMATIC IMPLICATIONS, AND RECOMMENDATIONS

The *Transitions* study examines the risks and vulnerabilities for HIV in the sexual life course of adolescent girls and young women through a simplified model from first sex to engagement of casual and transactional sex to entry into formal sex work. While this linear model does not fully capture the complexity and fluidity of sexual partnerships, it has highlighted critical periods of HIV vulnerabilities

during young women's lives. This study found that compared to the general female population in Ukraine, *Transitions* participants across all three study groups were younger at the time of their first sex event, had received money and/or other resources at the time of first sex, and had experienced both physical and sexual violence at a young age.

HIV and HCV prevalence was also higher than anticipated (compared with prior studies) among *Transitions* participants given their young age. Overall, the HIV prevalence among *Transitions* participants was 4.9%, with 10.0% of female sex workers, 3.0% of young women seeking transactional sex partners and 3.2% of young women seeking casual sex partners testing positive in the study. In the case of HCV, the overall prevalence among *Transitions* participants was 16.5%, with 37.6%, 10.6% and 8.9% of female sex workers, young women seeking transactional, and young women seeking casual sex partners receiving a positive test result for HCV, respectively. These findings contrast strikingly to the female sex worker integrated biological and behavioural assessment survey implemented nationally in 2015, which found 0% HIV and 0% HCV positivity among participants of the same age category in Dnipro. This discrepancy may be partially explained by the sampling strategy employed in *Transitions*. By purposefully anchoring HIV/HCV risk and vulnerability to physical space, and expanding the standard mapping approach to enhance venue profiling of locations where young women congregate to meet sex work clients and transactional and casual sex partners, the *Transitions* study was able to identify young women who are disproportionately vulnerable to STBBIs and who could benefit from HIV/HCV prevention programming efforts. Indeed, *Transitions* has shown that only 29.4% of young female sex workers had ever had contact with a local HIV prevention program, thus illustrating the potential application of this venue-based approach in the delivery of prevention and harm reduction services to target limited program resources to where they are needed most and where they could be the most impactful.

This enhanced mapping approach also identified venues that signal high-risk networks and context for high-risk young women—as seen in the high HCV prevalence among *Transitions* participants—possibly indicating an ongoing outbreak that is affecting even young women who have never used injection drugs. Although a certain level of underreporting of injecting behaviour is to be expected due to social desirability bias, underreporting alone cannot completely explain the high HCV rates affecting young women in our study. An independent investigation is urgently needed to understand the root causes of this outbreak and to stop further onward transmission.

The unexpectedly high HIV prevalence among young female sex workers and young women engaging in transactional and casual sex who participated in the *Transitions* study suggests that the contribution of sex work and other forms of informal exchange for sex to the general HIV epidemic situation in Dnipro has likely been underestimated. As such, this may also hold true for other big cities in the regions with high rates of HIV. This, together with the observation that many HIV vulnerabilities common to female sex workers are also shared by young women engaging in transactional and casual sex, should provide impetus for rethinking the current scope of HIV prevention programming. In addition to strengthening current services for female sex workers to be inclusive of young women who have newly entered into sex work, prevention activities focusing on the needs of at risk young women engaging in other forms of sexual exchange should be urgently implemented. Some examples include strategies to delay sexual debut among adolescents and young adults, education campaigns on personal protection from HIV and HCV, social marketing of condoms and other forms of harm reduction, and social campaigns to eliminate gender-based violence. Not only could integration of HIV

testing, treatment, and care services with sexual and reproductive health services more holistically address the unique needs of adolescents and young women, it could also destigmatize HIV testing by normalizing testing as a routine part of sexual and reproductive health services offered to young people.

A limitation of the *Transitions* study is the underestimates of population sizes generated by the geographic mapping and enumeration approach (Table 4.2). While mapping and enumeration have been used in many cities and countries, this enhanced method was applied for the first time in Dnipro through *Transitions*. In places where mapping had been implemented, a thorough data collection process relied on the connection of key population members (“peers”) with other peers, and with hotspot establishments. In Dnipro, where sex worker mobilization networks are still largely informal—or, in some instances, non-existent—the current population size estimates for the three study groups provide a bare minimum baseline upon which the design of new HIV prevention programs can be based, and upon which future rounds of mapping could improve. Indeed, the fact that the study team was able to meet the sampling targets for women engaging in casual and transactional sex (i.e. Group 1 and Group 2) that were higher than the population size estimates overall, highlights the importance of iterative mapping and enumeration to update these estimates and further refinement of the mapping method for the context of Dnipro.

Like many HIV/STBBI prevention and control programs that are grappling with how the Internet is influencing social and sexual networks, *Transitions* was similarly limited in its capacity to estimate the population size of young female sex workers and other young women seeking casual and transactional sex partners on the Internet and through mobile applications. While we expect that a proportion of individuals identified through mapping of physical hotspots also used virtual hotspots to meet their clients and other sex partners, the extent of this overlap will need further investigation through affiliation network analysis.

The *Transitions* study addresses an important area in HIV prevention research that is not currently well understood. Our findings have the potential to contribute substantially to our scientific understanding of HIV risk and vulnerability among female sex workers prior to their self-identification as commercial sex workers. A better understanding of the characteristics of and HIV risk associated with the transition period and access gap, and the anticipated benefits of strategically expanding existing targeted interventions, will inform program design and delivery to maximize the population-level impact of targeted HIV prevention programs for female sex workers.



## 6 REFERENCES

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1. Ukrainian Centre for Socially Dangerous Disease Control of the Ministry of Health of Ukraine, L.V. Gromashevsky Institute of Epidemiology and Infectious Diseases of the Academy of Medical Sciences of Ukraine. HIV Infection in Ukraine: Information Bulletin no. 45. Kyiv, 2016.
2. European Centre for Disease Prevention and Control/ WHO Regional Office for Europe. HIV/AIDS Surveillance in Europe 2015. Stockholm: ECDC, 2016.
3. UNAIDS. Country factsheets: Ukraine 2016: Joint United Nations Programme on HIV/AIDS, 2016.
4. World Health Organization. Global Hepatitis Report, 2017. Geneva: World Health Organization, 2017.
5. Hope VD, Eramova I, Capurro D, Donoghoe MC. Prevalence and estimation of hepatitis B and C infections in the WHO European Region: a review of data focusing on the countries outside the European Union and the European Free Trade Association. *Epidemiol Infect* 2014; **142**(2): 270-86.
6. Maistat L, Golovin S, Deineka O, Khan T. Hepatitis C in Eastern Europe and Central Asia: Epidemic and Response: International HIV/AIDS Alliance in Ukraine and International Treatment Preparedness Coalition: Eastern Europe and Central Asia, 2015.
7. Maistat L, Kravchenko N, Reddy A. Hepatitis C in Eastern Europe and Central Asia: a survey of epidemiology, treatment access and civil society activity in eleven countries. *Hepatology, Medicine and Policy* 2017; **2**(1): 9.
8. Aceijas C, Rhodes T. Global estimates of prevalence of HCV infection among injecting drug users. *The International journal on drug policy* 2007; **18**(5): 352-8.
9. Ukrainian Centre for Socially Dangerous Disease Control of the Ministry of Health of Ukraine, L.V. Gromashevsky Institute of Epidemiology and Infectious Diseases of the Academy of Medical Sciences of Ukraine. HIV Infection in Ukraine: Information Bulletin no. 47. Kyiv, 2017.
10. Baral S, Beyrer C, Muessig K, et al. Burden of HIV among female sex workers in low-income and middle-income countries: a systematic review and meta-analysis. *The Lancet Infectious diseases* 2012; **12**(7): 538-49.
11. Busza JR, Balakireva OM, Teltschik A, et al. Street-based adolescents at high risk of HIV in Ukraine. *Journal of epidemiology and community health* 2011; **65**(12): 1166-70.
12. UNICEF, Ukrainian Institute for Social Research after Olexander Yaremenko. HIV Prevention among Most-At-Risk Adolescents: Implementation Results of the Targeted Models. Kyiv: UNICEF, UISR, 2011.
13. Teltschik A, Balakireva O, Sereda Y, Bondar T, Sakovych O. Most-at-risk-adolescents: The evidence base for strengthening the HIV response in Ukraine. Kyiv: UNICEF; Ukrainian Institute for Social Research after Oleksandr Yaremenko, 2008.
14. Verkhovna Rada of Ukraine. National Targeted Social Program on HIV/AIDS Response for 2014-2018. Ukraine; 2014.
15. Wilson D, Halperin DT. "Know your epidemic, know your response": a useful approach, if we get it right. *Lancet* 2008; **372**(9637): 423-6.
16. Becker M, Emmanuel F, Isac S, et al. Mapping of Key Populations, Services and an HIV Epidemic Appraisal in Zaporizhzhya, Ukraine: UNICEF Ukraine; Ukrainian Institute for Social Research after Olexandr Yaremenko; International Center for Infectious Diseases, Canada; The Centre for Global Public Health, Canada, 2014.
17. Emmanuel F, Blanchard J, Zaheer HA, Reza T, Holte-McKenzie M, team H. The HIV/AIDS Surveillance Project mapping approach: an innovative approach for mapping and size estimation for groups at a higher risk of HIV in Pakistan. *Aids* 2010; **24** Suppl 2: S77-84.

18. Integrated Behavioural and Biological Assessment (IBBA): Guidelines for surveys of populations at risk of HIV infection. New Delhi: Indian Council of Medical Research and FHI, 2011.
19. UNAIDS. Looking deeper into the HIV epidemic: A questionnaire for tracing sexual networks. Geneva: Joint United Nations Programme on HIV/AIDS, 1998.
20. IHAT. HIV/AIDS situation and response in Karnataka: Epidemiological appraisal using data triangulation. Bangalore: India Health Action Trust, 2010.
21. Ukraine - Multiple Indicator Cluster Survey: UNICEF Ukraine; State Statistics Service of Ukraine; Ukrainian Institute for Social Research; Statinformconsulting, 2012.