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ORIGINAL PAPER

Prevalence of HIV Risk Behaviors among Undocumented Central American Immigrant Women in Houston, Texas

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Abstract Undocumented Central American immigrants in the United States are disproportionately affected by HIV infection. However, epidemiological data on sexual behaviors among undocumented women are sparse and the extent to which behaviors vary by duration of residence in the U.S.is largely unknown. In 2010, we used respondent driven sampling to conduct an HIV behavioral survey among Central American immigrant women residing in Houston, Texas without a valid U.S. visa or residency papers. Here we describe the prevalence of sexual risk behaviors and compare recent (5 years or less in the U.S.) and established immigrants (over 5 years in the U.S.) to elucidate changes in sexual risk behaviors over time. Our data suggest that recent immigrants have less stable sexual partnerships than established immigrants, as they are more likely to have multiple and concurrent sexual partnerships, as well as partnerships of shorter duration.

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Resumen Los imigrantes indocumentados de orígen centroamericano que residen en los Estados Unidos son una población desproporcionadamente afectada por la infección con el VIH. Sin embargo, los datos epidemiológicos acerca de los comportamientos sexuales de las mujeres indocumentadas son escasos y se desconoce la medida en que estos comportamientos varían conforme al número de años de residencia en EEUU. En el 2010, utilizamos una metodología llamada "respondent driven sampling" para llevar acabo un sesgo epidemiológico sobre las mujeres imigrantes centroamericanas que residen en Houston, Texas sin visa o papeles de residencia. En este artículo, describimos la prevalencia de los comportamientos sexuales de riesgo y comparamos las imigrantes recientes (que han residido en EEUU durante cinco años o menos) y las imigrantes establecidas (que han residido en EEUU durante más de cinco años) para explorar cambios en los compartamientos sexuales de riesgo a través del tiempo. Nuestros datos sugieren que las imigrantes recientes tienen relaciones menos estables que las imigrantes establecidas, ya que son más proponsas a tener múltiples parejas sexuales, parejas sexuales concurrentes, y relaciones de una duración más corta.

Introduction

Latino immigrants in the United States are disproportionately affected by HIV infection. While immigrants make up only 37% of the Latino population [1], they represent over half of new HIV cases among Latinos [2]. There are

numerous social and structural factors that increase vulnerability to HIV infection among Latino immigrants, especially those who are undocumented (i.e., living in the U.S. without a valid visa or residency papers). Vulnerability factors include low levels of education and English proficiency, low income, unemployment, unstable living conditions, inadequate access to healthcare, and discrimination [3–8]. Additionally, immigration frequently disrupts sexual, familial, and social relationships, which may lead to isolation, decreased community- and family-based controls, and increased frequency of risky sexual behaviors [3, 5, 8–10].

Latino immigrants of culturally and sociopolitically distinct regions (i.e., Mexico, Central America, South America, and the Caribbean) are often aggregated into a homogenous group in health surveys [11, 12]. However, their HIV risk profiles are distinct. For example, among South American immigrants, the HIV epidemic is primarily driven by male-to-male sex [2] and the number of incident cases has remained relatively stable over the past few years [11]. In contrast, among Mexican immigrants, heterosexual transmission plays a larger role [2] and there has been an increase in the annual number of HIV diagnoses in recent years [11]. Aggregation by national and regional origin may thus obscure important differences in HIV behavioral risk factors, knowledge and risk perceptions, and use of preventive health services [11, 12].

One of the subgroups of Latino immigrants disproportionately affected by HIV infection is Central American immigrants [12]. Central Americans account for 11% of HIV cases among Latinos in the U.S. [2] but they represent less than 8% of the Latino immigrant population [13]. Additionally, while the incidence of HIV has largely stabilized for Latino immigrants in general, it has increased among Central Americans. This is especially true for women, who had a 25% increase in the annual number of HIV diagnoses between 2003 and 2006 [11], a period of time in which the Central American population in the U.S. grew at a disproportionately slower rate of 14% per year [13].

Although epidemiological data on risk behaviors among Central American and Latina immigrant women in general are sparse, the limited data suggest that social isolation and impaired sexual negotiation may lead to risky sexual behaviors among immigrant women. Specifically, immigrant women may be at risk of having exchange or survival sex (i.e., sex that is traded for money, food, shelter, or other needs) [14, 15], sex with male partners who engage in HIV risk behaviors [9, 10, 14–16], and sex without a condom [15, 17, 18]. These risk behaviors are thought to be most prevalent among recently arrived immigrants [6, 16, 19, 20]. However, while research among immigrant men has documented an increased prevalence of HIV risk behaviors among recent immigrants compared to those with more established residency [20], we are not aware of any studies that have evaluated changes in HIV risk behaviors by duration of residence in the U.S. among immigrant women.

In 2010, we conducted a survey to describe HIV risk and testing behaviors among undocumented Central American immigrant women in Houston, Texas. In this paper, we describe the prevalence of sexual risk behaviors and compare recent (5 years or less in the U.S.) and established immigrants (over 5 years in the U.S.) to elucidate changes in sexual risk behaviors over time.

Methods

Study Setting

Houston, Texas is the fourth largest city in the U.S., with a population of over four million [21]. Due to its proximity with the U.S.-Mexico border, Houston has a long history of Latino immigration and continues to be a major receiving community for Central American immigrants [22], who represent about 15% of its foreign-born population [23]. Salvadorans (estimated population: 93,000), Hondurans (43,000) and Guatemalans (28,000) make up almost 95% of Houston's Central American population [23].

Participants

Women were eligible to participate in the study if they were from El Salvador, Honduras, or Guatemala; between the ages of 18 and 50 years; and currently residing in Houston without a valid U.S. visa or residency papers. The target sample size of 180 women was designed to detect a 20% difference in the prevalence of sex with a main partner between recent and established immigrant women, with 80% power, an alpha level of 0.1, and a design effect of 1.25. Recent immigrants were defined as those who had lived in the U.S. 5 years or less and established immigrants were defined as those who had lived in the U.S. for over 5 years. The five-year cut-off was based on a review of published literature [6, 24, 25] and the distribution of our data.

Sampling and Data Collection

Participants were recruited using respondent driven sampling (RDS), a chain referral method that is used to access members of "hidden" populations that lack a sampling frame [26]. RDS mitigates the biases associated with other chain referral methods by incorporating social network theories in its design and analysis, allowing it to produce valid population-based estimates [26–28]. Briefly, a

respondent driven sample is initiated by a small number of non-randomly selected "seed" participants, who are each asked to use serially numbered study coupons to recruit a set number of peers to participate in the survey. Eligible recruits who redeem their coupon and participate in the survey become the first wave of participants. First wave participants are then asked to recruit their peers (who constitute second wave participants) and so on until the target sample size is met. Recruitment is promoted by giving participants a primary incentive for completing the survey and a secondary incentive for recruiting peers [26]. In our study, recruitment was initiated by three seeds who were identified through an immigrant service organization. Seeds and recruits were given three study coupons to recruit peers and received $20 for participating in the survey and $5 for each recruit. We safeguarded against repeat participants by recording a brief description of each participant's physical appearance and by limiting the number of interviewers to two.

The survey instrument was a handheld computer-assisted structured interview administered in Spanish by a trained interviewer. The primary survey domains were demographics, migration-related characteristics, access to and utilization of healthcare services, sexual behaviors, HIV testing, and social support. Sexual behavior items were adapted from the Centers for Disease Control and Prevention's National HIV Behavioral Surveillance (NHBS) survey [29]. Participation was anonymous and, due to the RDS coupon system, only individuals who wished to participate in the survey arrived at the study site. The study protocol was reviewed and approved by The University of Texas Health Science Center Committee for the Protection of Human Subjects. All participants provided verbal informed consent.

Measures

The outcome variables of interest in these analyses are condom use, multiple sexual partnerships, partner type, concurrent sexual partnerships, perceived partner concurrency, and perceptions of partner's history of sex with a commercial sex worker. Condom use was assessed for the past 12 months ("During the past 12 months did you have [vaginal, anal] sex without using a condom?") and the last sexual encounter ("The last time you had [vaginal, anal] sex, did you use a condom?"). Multiple sexual partnerships were defined as having two or more sexual partners in the past 12 months.

Partner type and concurrent sexual partnerships refer to the most recent heterosexual partner. Partner type was assessed by asking the participant if her most recent sexual partner was a main partner ("a man you have sex with and feel committed to"), casual partner ("a man you have sex with but don't feel committed to or don't know too well"), or convenience partner ("a man you have sex with specifically for things he gives you or things he helps you out with, such as money, rent, food, bills"). The term "convenience partner" ("*pareja de conveniencia*") was used instead of "exchange partner" ("*pareja de intercambio*") because formative research indicated that the term "exchange" was offensive and misinterpreted. Unlike the term "exchange", "convenience" does not imply that an overt resource transaction took place.

Sexual concurrency was assessed by asking the participant if she had sex with someone other than her partner during their sexual partnership (for partnerships of less than 12 months of duration) or during the past 12 months (for partnerships of 12 months or more). Perceived partner concurrency was assessed by asking the participant whether she believed her partner "definitely did", "probably did", "probably did not", or "definitely did not" have sex with someone else during their sexual partnership or the past 12 months, and was coded as "partner did" or "partner did not" have sex with another in the analysis. Partner's history of sex with a commercial sex worker was assessed by asking the participant if her partner ever had vaginal or anal sex with a prostitute or sex worker.

Statistical Analyses

Analysis of RDS data requires information about each participant's social network size and who recruited whom in order to adjust for participants' differential probabilities of inclusion [26, 27]. Social network size was assessed by asking participants how many women they knew who met the study's inclusion criteria and who they had seen in the past 30 days. Recruitment dynamics were monitored using a spreadsheet that linked each participant to her recruiter. Weighted prevalence estimates and 90% confidence intervals were calculated using the Respondent Driven Sampling Analysis Tool (RDSAT) version 6.0 (Cornell University, Ithaca, NY). Weights were trimmed to minimize the effect of extreme social network size outliers (upper and lower 1%). Prevalence ratios and 90% confidence intervals were used to compare demographic characteristics and sexual behaviors among recent and established immigrant women.

Results

Between February and May 2010, a total of 226 women were recruited over 26 recruitment waves. Of these, 210 were eligible, consented, and provided data for the variables included in these analyses. Of the 210 participants, 90 (43%) were recent immigrants who had lived in the U.S.

for 5 years or less and 120 (57%) were established immigrants who had lived in the U.S. over 5 years. There were significant demographic differences between recent and established immigrants (see Table 1). Compared to those with established residency, recent immigrants were predominantly from Guatemala and Honduras and significantly younger, being almost twice as likely to be 30 years of age or less. Recent immigrants were also more likely to be never married and to live with their extended family, friends, or roommates, more often without children. Recent immigrants were significantly less educated than established immigrants, had a lower household income, and were more insecure about that income. However, there were no statistically significant differences in employment status or remittance-sending. Over 40% of all participants were unemployed at the time of the survey and only about one in ten had full-time employment, yet 70% reported sending remittances to family in their country of origin.

Of the 210 participants in the analysis, 187 (89%) were sexually active in the past 12 months (see Table 2). Participants of both recent and established residency primarily reported that their last sexual encounter was with a main partner and there were no statistically significant differences in the prevalence of casual or convenience sexual partnerships among recent and established immigrants. However, recent immigrants were significantly more likely to have multiple and concurrent sexual partnerships, and their partnerships were more likely to be shorter-term and formed outside of the U.S. Women's perceptions of their partners' risk behaviors were similar among recent and established immigrants. Approximately 30% of women overall perceived that their partner had sex with someone else during the past 12 months and about 12% believed that their partner had a lifetime history of sex with a commercial sex worker. There were no statistically significant differences in the 12 month prevalence of anal sex or of vaginal sex without a condom, although recent immigrants were slightly less likely than established immigrants to report not using a condom at their last sexual encounter.

Discussion

While the overall prevalence of sexual risk behaviors among the undocumented Central American immigrant women in our study was relatively low, our data suggest that recent immigrants have less stable sexual partnerships than established immigrants. Compared to established immigrants, recent immigrants were significantly more likely to have multiple and concurrent sexual partnerships, as well as partnerships of shorter duration. These behaviors have been shown to increase risk for HIV and sexually transmitted infections (STI) in other populations [30–33]. Interestingly, recent immigrants were also more likely to use condoms, but this may be a reflection of their increased likelihood of being non-married and being involved in shorter-term relationships.

The association between duration of residence in the U.S. and multiple and concurrent sexual partnerships and condom use may be related to differences in the composition of the recent and established immigrant populations. Recent immigrants were significantly younger than established immigrants and were predominantly from Honduras and Guatemala (a country with an indigenous subpopulation that is culturally distinct from the predominantly mestizo populations of Honduras and El Salvador). Additionally, our data suggest greater levels of socioeconomic marginalization prior to immigration among recent immigrants as compared to immigrants with more established residency. The low educational level among recent immigrants (three-quarters of whom had a sixth grade education or less) suggests abject levels of pre-immigration poverty [34]. Thus differences in age, country of origin, and educational attainment may be indicators of a cohort effect that complicates the association between duration of residence in the U.S. and sexual HIV risk behaviors. Due to our small sample size, we were unable to explore the impact of such demographic differences and suggest that these be addressed in future research.

It is important to note that the low prevalence of individual-level risk behaviors (i.e., multiple, concurrent, casual, and convenience sexual partnerships) among recent and established immigrant women does not preclude vulnerability to HIV infection. Having a sex partner who has concurrent sexual partnerships is a known risk factor for acquisition of HIV and STIs [32, 35–37]; and there is evidence that, for many women, being in a committed relationship and having unprotected sex with a risky male partner is a principal risk factor for HIV infection [38–40]. While the majority of women in our study were monogamous, almost 30% believed that their sex partner had a concurrent sexual partnership during the past 12 months. Furthermore, most of these women (88% of participants overall) reported having sex without a condom. Given the discrepancies between our participants' perceptions of partner fidelity and the prevalence of condom use, our study is limited by the lack of data on sexual negotiation within immigrant women's sexual partnerships. A study conducted among Mexican women suggested that sexual negotiation power is lower among immigrant women than among their non-immigrant counterparts [10].

There are other limitations to our study. First, participants may misreport sexual behaviors, given the stigma associated with condom use and multiple, concurrent, casual, and convenience partnerships [41]. Second, the lack of biological markers of HIV risk (e.g., HIV sero-status or

Table 1 Demographic characteristics of Central American immigrant women, comparing recent (5 years or less in the U.S.) and established immigrants (over 5 years in the U.S.)

	Total (N = 210)		Residency in the U.S.				Prevalence ratio (recent v. established)	
			Recent (N = 90)		Established (N = 120)			
Demographic characteristics	%	90% CI	%	90% CI	%	90% CI	(90% CI)	*P* value
Country of origin								
Guatemala	31.9	(19.9–42.7)	42.6	(27.8–60.4)	16.5	(7.4–25.0)	2.78 (2.00–3.88)	<0.001
Honduras	31.7	(22.0–41.7)	37.1	(20.2–50.2)	32.1	(21.9–46.0)	1.68 (1.27–2.22)	0.002
El Salvador	36.4	(27.5–47.9)	20.4	(9.4–36.7)	51.5	(38.1–63.9)	1.00	
Age (in years)								
18–30	44.5	(35.9–55.9)	60.3	(45.7–74.7)	31.9	(24.1–45.4)	1.89 (1.46–2.46)	<0.001
31–50	55.5	(44.1–64.1)	39.7	(25.3–54.3)	68.1	(54.6–75.9)	1.00	
Sexual orientation								
Homosexual or bisexual	0.5	(0.2–1.2)	0.8	(0.0–1.8)	0.4	(0.3–1.5)	0.93 (0.86–1.02)	0.404
Heterosexual	99.5	(98.8–99.8)	99.2	(98.2–99.7)	99.6	(98.5–100.0)	1.00	
Marital status								
Never married	20.8	(13.6–26.3)	26.3	(15.3–35.3)	16.1	(7.0–22.4)	1.51 (0.97–2.36)	0.124
Separated, divorced, widowed	8.8	(3.4–14.5)	4.1	(0.4–9.1)	13.2	(4.2–22.8)	0.38 (0.16–0.91)	0.053
Married or living as married	70.4	(64.1–79.4)	69.6	(60.4–81.4)	70.7	(62.8–83.5)	1.00	
Have children	88.7	(82.7–94.2)	85.1	(74.2–94.4)	91.7	(85.0–97.3)	0.93 (0.86–1.01)	0.063
Other individuals at residence								
Extended family, friends, roommates	18.9	(10.9–26.4)	27.9	(11.8–36.5)	12.1	(6.2–23.0)	1.97 (1.24–3.12)	0.013
Sex partner only	14.0	(9.0–20.5)	18.0	(11.3–30.2)	11.9	(6.0–19.9)	1.54 (0.90–2.61)	0.18
Children only	15.5	(9.0–21.6)	7.3	(4.0–13.4)	22.8	(11.3–32.1)	0.48 (0.26–0.91)	0.043
Sex partner and children	51.6	(42.8–62.4)	46.9	(34.0–61.3)	53.2	(39.7–65.4)	1.00	
Educational attainment								
6th grade or less	54.9	(44.6–64.0)	74.7	(59.3–83.2)	35.7	(26.7–48.7)	2.08 (1.66–2.60)	<0.001
Over 6th grade	45.1	(36.0–55.4)	25.3	(16.8–40.7)	64.3	(51.3–73.3)	1.00	
Employment status								
Unemployed	46.5	(36.7–55.5)	49.0	(34.6–63.1)	44.5	(33.1–56.7)	1.02 (0.84–1.24)	0.854
Homemaker	20.7	(14.8–31.7)	19.0	(9.9–34.6)	22.3	(13.1–34.2)	0.89 (0.62–1.30)	0.619
Employed full-time	10.5	(6.1–14.0)	8.8	(4.4–15.2)	10.5	(4.6–16.2)	0.85 (0.46–1.60)	0.662
Employed part-time	22.4	(14.6–28.6)	23.2	(10.2–31.5)	22.8	(13.7–30.5)	1.00	
Monthly household income								
$800 or less	36.4	(25.2–45.9)	44.4	(24.0–54.9)	30.2	(19.2–43.9)	1.48 (1.10–2.00)	0.032
Over $800	63.6	(54.1–74.8)	55.6	(45.1–76.0)	69.8	(56.1–80.8)	1.00	
Insecure about household income	46.3	(35.9–55.0)	55.7	(39.4–66.9)	36.6	(25.0–48.5)	1.54 (1.19–1.97)	0.005
Send remittances home	70.1	(61.8–80.9)	72.9	(59.6–87.4)	67.4	(56.6–80.5)	1.09 (0.94–1.26)	0.361

Houston, Texas, 2010

v versus, *CI* confidence interval

presence of STIs, such as chlamydia and gonorrhea) prevents determination of whether these sexual behaviors are indeed "risky" in the Central American immigrant community [42]. Third, our sample size is small, limiting the precision of our prevalence estimates and our ability to explore the role of age, country of origin, and pre-immigration poverty in the association between HIV risk behaviors and duration of residence in the U.S. Fourth, as respondent driven sampling relies on participants' social networks, it may have excluded women (especially recent arrivals) who have limited social connections. However, the large proportion of recent immigrants in our sample suggests that our recruitment chains were able to reach this sector of the target population. Lastly, our study offers an incomplete description of the HIV risk of undocumented Central American immigrant women, as we lack data on

Table 2 Sexual behaviors among Central American immigrant women, comparing recent (5 years or less in the U.S.) and established immigrants (over 5 years in the U.S.)

	Total (N = 187)		Residency in U.S.				Prevalence ratio recent v. established	
			Recent (N = 79)		Established (N = 108)			
Sexual behaviors	%	90% CI	%	90% CI	%	90% CI	PR (90% CI)	*P* value
Partner type[a] at last sexual encounter								
Convenience	4.7	(2.4–7.0)	3.4	(1.2–6.1)	6.5	(2.7–11.3)	0.57 (0.19–1.70)	0.398
Casual	6.8	(1.5–12.6)	5.4	(0.00–16.2)	7.3	(1.3–11.3)	0.66 (0.25–1.75)	0.486
Main	88.5	(82.7–94.3)	91.3	(80.1–97.9)	86.2	(80.8–93.9)	1.00	
Number of sex partners in past 12 months								
Two or three	8.3	(3.1–14.7)	12.7	(2.3–24.5)	4.8	(0.6–10.0)	2.73 (1.19–6.28)	0.046
One	91.7	(85.3–96.9)	87.3	(75.5–97.7)	95.2	(90.1–99.4)	1.00	
Concurrent partnership, past 12 months[b]	7.1	(3.0–15.2)	12.3	(2.2–23.8)	3.4	(0.5–10.6)	3.39 (1.4–8.18)	0.023
Duration of partnership								
5 years or less	50.0	(38.7–58.4)	70.6	(56.1–79.7)	27.2	(16.0–37.1)	2.62 (2.0–3.42)	<0.001
Over 5 years	50.0	(41.6–61.3)	29.4	(20.4–44.0)	72.8	(62.9–84.0)	1.00	
Place of partnership formation								
United States	65.3	(55.2–75.2)	53.5	(39.1–69.2)	74.9	(64.2–83.7)	0.71 (0.59–0.85)	0.002
Country of origin or other	34.7	(24.8–44.9)	46.5	(30.8–60.9)	25.1	(16.3–35.8)	1.00	
Perceived partner concurrency, past 12 months[b]								
Partner did have sex with another	27.9	(19.2–37.8)	26.7	(13.6–41.8)	30.1	(16.4–41.1)	0.89 (0.60–1.32)	0.629
Partner did not have sex with another	72.1	(62.2–80.8)	73.3	(58.2–86.4)	69.9	(58.9–83.6)	1.00	
Partner has had sex with a commercial sex worker								
Yes	11.7	(6.8–18.4)	13.7	(6.0–22.1)	10.0	(3.9–19.3)	1.35 (0.72–2.54)	0.426
Don't know	39.1	(28.5–48.3)	39.1	(27.1–55.6)	40.4	(23.9–48.4)	1.02 (0.76–1.35)	0.930
No	49.2	(39.5–59.0)	47.2	(31.3–60.1)	49.6	(41.1–65.7)	1.00	
Vaginal sex without a condom in past 12 months	88.0	(81.0–94.3)	85.7	(72.1–95.3)	91.6	(84.9–97.2)	0.94 (0.86–1.02)	0.222
Did not use condom at last sex	78.9	(70.5–86.4)	74.4	(60.0–86.4)	85.9	(77.2–92.2)	0.86 (0.77–0.98)	0.048
Anal sex in past 12 months	9.2	(3.6–16.9)	7.8	(0.6–19.3)	10.2	(2.7–18.7)	0.74 (0.33–1.63)	0.526
Of those having anal sex, reported anal sex without a condom	85.8[c]		87.9[c]		49.1[c]		1.93 (1.06–3.47)	0.061

Houston, Texas, 2010 (limited to women who reported having sex in the past 12 months)

v versus, *CI* confidence interval

[a] Partner types: main partner ("a man you have sex with and feel committed to"); casual partner ("a man you have sex with but don't feel committed to or don't know too well"); convenience partner ("a man you have sex with specifically for things he gives you or things he helps you out with, such as money, rent, food, bills")

[b] Concurrent partnership = having ≥2 sexual partnerships that overlap in time

[c] Confidence intervals could not be calculated using Respondent Driven Sampling Analysis Tool (RDSAT)

the sexual behaviors of our participants' partners or the sexual behaviors of Central American immigrant men in Houston.

The principal strength of this study is its use of respondent driven sampling, which allowed us to access an otherwise hidden population and generate valid population-based estimates [26, 27]. Prior studies of undocumented immigrants have relied primarily on convenience samples that are not representative of the larger population [43]. We also used a standardized questionnaire, which allows our data to be compared to that of other populations. This study contributes to the literature on the association between undocumented Central American immigration to the U.S. and HIV vulnerability by providing epidemiological data on the sexual behaviors of women in an established immigrant community. While the prevalence of individual risky sexual behaviors is relatively low, Central American immigrant women may be at risk for HIV infection due to unprotected sex with "risky" male partners. Recent immigrant women may be especially vulnerable to HIV infection due their higher prevalence of unprotected sex with multiple and concurrent sexual partners. The findings

of this study suggest that HIV prevention efforts in the undocumented Central American immigrant community should focus on recently arrived immigrants and address the underlying social issues that increase vulnerability to HIV infection.

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