

HIV/AIDS

Mortality Among Hispanic Drug Users In Puerto Rico

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This paper assesses mortality rate for a cohort of drug users in Puerto Rico compared with that of the Island's general population, examining causes of death and estimating relative risk of death. Date and cause of death were obtained from death certificates during 1998. Vital status was confirmed through contact with subjects, family, and friends. HIV/AIDS was the major cause of death (47.7%), followed by homicide (14.6%), and accidental poisoning (6.3%). Females had higher relative risk of death than males in all age categories.

Not living with a sex partner and not receiving drug treatment were related to higher mortality due to HIV/AIDS. Drug injection was the only variable explaining relative risk of death due to overdose. Puerto Rico needs to continue developing programs to prevent HIV/AIDS among drug users. Special attention should be given to young women, who appear to be in greatest need of programs to prevent early mortality.

Key words: Drug users, Mortality, HIV/AIDS, Puerto Rico

The association between drug use and premature mortality has been previously documented (1-5). The specific mechanisms that link drug use to mortality are numerous and complex. Risky drug practices such as the use of unsterile syringes, used cottons and water, and drug preparation paraphernalia, as well as the use of multiple and possibly adulterated drugs, may lead to multiple infections, other diseases, and overdose. The search for money to buy drugs and maintain drug use patterns steers drug injectors into unstable and violent neighborhoods where they are at risk of stressful or traumatic events and violent death (6-11). Neighborhoods where drug users live and/or spend time buying and injecting drugs are most likely to be poor. There is a rich sociological literature on the role of poverty in inducing social chaos by disrupting families, undermining social institutions, eroding social capital in terms of social relations and social trust, and breeding conflict, anger, and crime (12-15). In addition, injection drug use is associated with severe depression, a mental disorder characterized by self-destructive and suicidal tendencies (16).

Since HIV/AIDS was initially detected, a large excess in mortality among drug users has been recorded, especially in areas of high HIV/AIDS prevalence. Even before receiving a clinical diagnosis of AIDS, HIV seropositive injection drug users (IDUs) exhibit significantly higher rates of morbidity and mortality (17, 18) than seronegative IDUs. According to recent studies, the impact of deaths due to AIDS among IDUs appears to be in addition to a persistent increase in mortality for all other causes, especially overdose (19, 20). Recent studies have reported marked reductions in morbidity and mortality associated with AIDS, attributable to more intense antiretroviral therapies (21, 22). However, research evidence suggests that many groups in need of antiretroviral therapies, including drug users, the homeless, and poor ethnic minorities, have been underrepresented among patients receiving these therapies (23, 24). This is especially true for women within these groups (25-27).

Hispanics residing in Puerto Rico have been one of the groups most severely affected by the drug injection and HIV/AIDS epidemics. Since the AIDS epidemic was detected on the Island in 1981, Puerto Rico has been one of the HIV/AIDS epicenters of the U.S. Presently the Island is second to Washington, D.C. in AIDS incidence, with 37.0 cases per 100,000 population (28). Drug injection is the main HIV/AIDS transmission category in Puerto Rico, and IDUs have the highest incidence of AIDS in the Island. This appears to be the group that is sustaining the Island's HIV/AIDS epidemic. In other studies we have shown that drug injectors in the Island inject more frequently (4 to 8 times daily) than IDUs of any other ethnic group in the

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United States, including Puerto Ricans residing in New York City (29). Moreover, drug injectors residing in the Island are less likely to enter and complete drug treatment or to utilize methadone maintenance treatment than their New York City peers. In addition, HIV seropositive drug users residing in the Island are also less likely to utilize HIV/AIDS treatment than their peers in New York City (30). Drug users residing in Puerto Rico continually practice multiple health risk behaviors and are exposed to an unhealthy social environment with a high incidence of AIDS, all factors associated with early mortality.

The causes of mortality and morbidity among drug users have been addressed in numerous studies, carried out mainly in the United States and Europe. However, little information is available about the causes of mortality and morbidity among Hispanic drug users, especially those residing in Puerto Rico. In the present study we assessed the mortality rate for a cohort of drug users residing in Puerto Rico compared with that of the general population of the Island, examining causes of death, determining factors associated with causes of death, and estimating the probability of survival over a 6-year period. By examining causes of death in a specific Hispanic group of drug users residing in Puerto Rico, the study provides information that is critically needed for designing prevention programs and policy initiatives to reduce the risk of early death among drug users.

Methods

The study sample consisted of 1,728 drug users recruited from inner city neighborhoods in the San Juan metropolitan area between March 1992 and May 1995. This study is part of a larger project designed to evaluate an intervention model for reducing HIV risk behaviors and arresting the spread of HIV among drug users not-in-treatment. The sample was selected based on a targeted sampling strategy using copping areas (places where drug users buy drugs) as recruitment sites. A brief summary of sampling and recruitment procedures follows; a detailed description has been published elsewhere (31). The sampling frame consisted of all drug copping areas identified in the catchment area using ethnographic mapping procedures. The recruitment plan utilized random visits to each of the identified copping areas. Eligible subjects were individuals 18 years or older who reported either drug injection or crack smoking during the previous 30 days and tested positive to morphine or cocaine urinalysis. In order to reduce selection bias and broaden access to the study population, a three-stage random selection process was implemented. In the first stage, ethnographic mapping was conducted to locate drug

copping areas. The list of copping areas was updated by outreach workers every three months, as some areas closed down and new ones emerged. This list comprised the sampling frame of copping areas from which four areas were randomly selected each month. In the second stage, a list of all two-hour time blocks covering the working days of the month was used to randomly assign 22 recruitment time slots to each of the four copping areas. Recruitment time blocks covered only the period from 8:00 a.m. to 6:00 p.m. to ensure the security of personnel. In the third stage, project field personnel observed the activity at the selected copping area, counted the number of buyers in the area, and selected one buyer using a Kish table (32).

Trained interviewers used the Risk Behavior Assessment Questionnaire (RBA) developed by the National Institute on Drug Abuse and culturally adapted for Hispanics in Puerto Rico (33). This instrument was used to gather data on demographics, lifestyle, drug use patterns, injection practices, and sexual behavior. During the initial visit to the assessment facility a blood sample was drawn from consenting subjects for HIV antibody testing. Serum samples were analyzed at a licensed community laboratory using the ELISA test. Positive samples were corroborated with the Western Blot test. HIV test results for 23 subjects were categorized as "missing" due to indeterminate results or subjects' refusal to be tested. For participants testing HIV-negative, testing was repeated six and twelve months after the initial assessment.

During 1998, death certificates for all subjects in the initial cohort were sought in the Puerto Rico Demographic Registry. In addition, interviewers attempted to relocate all subjects during the same year to collect information about their vital status directly from the subjects or indirectly through relatives or friends. Death certificates were identified for 302 of the 1,728 subjects in the cohort. Of the 1,426 subjects for whom no death certificates could be identified, 1,205 were confirmed as living by direct contact with the subject or from a close relative or friend.

Demographic and behavioral variables, including age, gender, living arrangements, marital status, incarceration history, drug use, and drug treatment utilization patterns, were obtained from the assessment questionnaire administered at recruitment. HIV status was determined by testing conducted during recruitment. Seven subjects seroconverted as of the final testing, and these individuals were treated in the analysis as HIV seropositive. Date and cause of death were obtained from the death certificates. Nosologists at the Puerto Rico Demography Registry classified the cause of death according to the International Classification of Diseases—Ninth Revision (ICD-9).

Age- and gender-specific mortality rates were calculated

as the total number of deaths divided by the number of person-years in each group. The relative risk of death for each group, as compared with that for the general Island population, was determined by dividing the mortality rate of the group in question by the mortality rate of the general population. The mortality experience of the general population was obtained from the Puerto Rico Department of Health Vital Statistics Annual Report (34). Confidence limits for the relative risks of death among IDUs were calculated by assuming a Poisson distribution and a constant mortality rate for the general population. To calculate adjusted relative risks of death for several different prognostic variables, Cox's proportional hazards regression (35) was used. The independent variables included in the model were: age, gender, education, living with a sex partner, incarceration history, drug treatment during the last year, HIV status, and injection drug use. All analyses were performed using SPSS Advanced Statistics 10.0 module (36).

Results

The sociodemographic and health characteristics of the 1,728 subjects in the study group are shown in Table 1.

Table 1. Sociodemographic and health characteristics of 1,728 drug users in San Juan, Puerto Rico

Characteristics	n	%
Gender		
Female	387	22.4
Male	1341	77.6
Education		
Less than high school	1095	63.4
High school	346	20.0
More than high school	287	16.6
Age*		
30 years or less	441	25.6
31-39 years	776	45.0
40 years or more	507	29.4
Living with a sex partner		
No	1270	73.5
Yes	458	26.5
Injection drug user		
No	547	31.7
Yes	1181	68.3
Incarceration history		
No	633	36.6
Yes	1095	63.4
HIV status**		
Seronegative	1089	64.1
Seropositive	611	35.9

*Missing information on 4 cases.

**Missing information on 28 cases.

The majority of the participants were male (77.6%), nearly two-thirds (63.4%) had less than a high school diploma, and nearly half (45.0%) were between ages 31-39. Close to one fourth (26.5%) of the sample reported living with a sex partner. Injection drug use was reported by over two-thirds (68.3%) and slightly less than two-thirds (63.4%) had an incarceration history. A prevalence rate of 35.9% for HIV seropositivity was observed in this sample. Table 2 displays the frequency distribution of the causes of death for the 302 subjects classified as deceased. HIV/AIDS was the major cause of death with 144 (47.7%) cases.

Table 2. Causes of death, from death certificates, of 302 drug users in San Juan, Puerto Rico

Cause of death (ICD-9 code)	n	%
Infectious and parasitic diseases (001-139)		
HIV infection (042-044)	144	47.7
Other infectious and parasitic diseases	14	4.6
Neoplasm (140-239)	2	0.7
Endocrine, nutritional, and metabolic diseases and immunity disorders (240-279)		
Diseases of the blood and blood-forming organs (280-289)	2	0.7
Mental disorders (290-319)	8	2.6
Diseases of the nervous system and sense organs (320-389)	2	0.7
Diseases of the circulatory system (390-459)	9	3.0
Diseases of the respiratory system (460-519)	18	6.0
Diseases of the digestive system (520-579)	5	1.7
Diseases of the genitourinary system (580-629)	4	1.3
Diseases of the skin and the subcutaneous tissue (680-709)	1	0.3
Congenital anomalies (740-759)		
External causes of injury and poisoning (E800-E999)		
Accidental poisoning (overdose) (E850-E869)	19	6.3
Homicide (E960-E969)	44	14.6
Other external causes of injury and poisoning	18	5.9
Unknown or unspecified (799.9)	2	0.7

Homicide, with 44 deaths (14.6%) and accidental poisoning, including overdose, with 19 deaths (6.3%) were the second and third major causes of mortality in this group.

The total person-time recorded was 6,842 person-years: 1,600 for females and 5,242 for males. Table 3 shows age- and gender-specific mortality rates and relative risks of death among drug users compared with the observed mortality rate for the general population of Puerto Rico. The mortality rate for the overall sample of drug users was adjusted according to the age and gender distribution of the population of Puerto Rico, 15 to 74 years old. The gender-specific mortality rates were similarly adjusted for the age distribution of each gender group in the general population. Among female drug users the overall age-

Table 3. Mortality among 1,728 drug users in San Juan, Puerto Rico, compared with the general population

Age	San Juan Drug Users			General Population		Relative Risk of Death	
	No. of deaths	Number of person-years	Mortality rate *	Mortality rate *	RR	95% CI	
Total	302	6842.0	44.1	5.3	8.3	7.4 - 9.3	
Females							
15-24	5	111.5	44.9	0.5	99.5	32.3 - 232.1	
25-34	25	748.5	33.4	1.2	28.0	18.1 - 41.3	
35-44	14	642.5	21.8	2.0	10.8	5.9 - 18.1	
45-54	4	93.9	42.6	3.4	12.7	3.5 - 32.4	
55-64	0	4.1	0	7.7	0	0.0 - 116.2	
65-74**	-	-	-	18.7	-	-	
All females	48	1600.5	30.0	3.3	9.1	6.7 - 12.1	
Males							
15-24	9	229.4	39.2	2.1	18.4	8.4 - 35.0	
25-34	81	2078.9	39.0	4.4	8.9	7.0 - 11.0	
35-44	106	2168.2	48.9	7.0	7.0	5.7 - 8.5	
45-54	50	648.3	77.1	9.2	8.4	6.2 - 11.0	
55-64	6	109.5	54.9	16.3	3.4	1.2 - 7.3	
65-74	2	7.3	272.5	32.6	8.4	1.0 - 30.2	
All males	254	5241.6	48.5	7.5	6.4	5.7 - 7.3	

Note: CI = confidence interval; RR = relative risk.
*100,000 person years
**No cases reported in this category.

adjusted mortality rate was 30.0 deaths per 100,000 persons per year (ppy). The highest rate (44.9 ppy) was observed among 15 to 24 year olds, followed by those in the 45 to 54 age group (42.6 deaths ppy). The lowest rate (21.8 ppy) was observed in the 35 to 44 age group. The relative risk of death declined dramatically from younger to older age groups, from a rate of 99.5 ppy (CI= 32.3-234.1) among those 15 to 24 years old to a rate of 12.7 ppy (CI= 3.5-32.4) among those 45 to 54 years old. For male drug users, the overall and by age group mortality rates were higher than for females except in the youngest group. However, females showed higher relative risks of death than males in all age categories.

The results of the Cox regression analysis (Table 4) show that adjusted relative risks of death were nearly twice as high among those not living with a sex partner (RR=1.65; CI:1.21-2.24) and not in drug treatment during the previous year (RR=1.78; CI:1.17-2.70). Injection drug users were about one-and-a-half times more likely to die (RR=1.45, CI:1.02-2.06). Moreover, HIV-seropositive subjects were five times more likely to die (RR=5.12, CI=3.89-6.74). Separate Cox regression analyses for the three subgroups according to major causes of death were performed (results not shown). For HIV/AIDS as the cause of death, not living with a sex partner and having drug treatment experience were each related to higher mortality. Relative

Table 4. Adjusted Relative Risk (ARR) of mortality using Cox regression

	ARR	95% CI	p value
Gender: Male	1.28	0.92 - 1.77	0.141
Age: less than 30 years	1.00		
30-39 years	0.86	0.61 - 1.22	0.396
40 or more years	1.02	0.71 - 1.47	0.898
Education: < High school	1.06	0.83 - 1.35	0.635
Not living with a sex partner	1.65	1.21 - 2.24	0.002
Injector: Yes	1.45	1.02 - 2.06	0.040
Not in drug treatment: last year	1.78	1.17 - 2.70	0.007
In jail: Yes	1.11	0.85 - 1.45	0.456
HIV status: Positive	5.12	3.89 - 6.74	< 0.001

Note: CI = confidence interval; RR = relative risk.

risk of death due to homicide was observed to be statistically significant for males only (RR=3.02, CI= 1.05-8.71). Drug injection in the last six months was the only variable that explained the relative risk of death due to overdose.

Discussion

The finding of HIV/AIDS as the major cause of death within our drug user cohort is not unanticipated. HIV

infection has been reported as a major cause of death in areas such as Puerto Rico where the virus is highly prevalent (17, 37).

As in previous research (38-40) this study found homicide to be a major cause of death among the cohort of drug users. However, in this study homicide was the second major cause of death, while the vast majority of studies in diverse sites in the U.S. mainland and worldwide report overdose as the second major cause of death among drug users in sites where HIV/AIDS prevalence is high, and the primary cause in sites where HIV/AIDS prevalence is low (41, 42). Studies suggest that fatal opioid overdose is lower in sites where more heroin users smoke or “chase” rather than inject heroin (43, 44). However, the drug users in this study cohort were mainly injectors, and therefore other factors seem to have influenced these behaviors. A recent study across U.S. regions and states, 1988-1997, shows that areas in which household firearm ownership rates were higher a disproportionately large number of people died of homicides, and this association remained significant even when controlling for rates of poverty and unemployment (45). Unlike many sites in the U.S. mainland, Puerto Rico has a strict policy related to gun ownership. While we lack data related to the rate of household firearm ownership in our communities, like others we have found that in areas with strict gun control, young adults engaged in criminal behavior appear to buy firearms in the street via gun runners who purchase weapons in states with more permissive gun laws (45).

The high rate of mortality due to homicides in Puerto Rico may be due in part to differences in participant recruitment strategies. Most studies in other sites have utilized samples recruited from treatment programs and other violence-protected venues (19). The cohort in this study was selected from copping areas and shooting galleries in poor neighborhoods with high-intensity drug marketing and high drug use chronicity among drug users. In Puerto Rico, as in the U.S. mainland, poor communities have become sites with higher concentrations of drug markets and heavy users (31). Moreover, there is significant evidence in the scientific literature on the role of poverty in providing noxious environments characterized by crime, incivility, and harassment (46-49). Augmenting socioeconomic resources, and promoting cohesiveness and empowerment of communities to help in solving their problems, has been recommended as an effective approach to reducing the problem of violence in socioeconomically deprived communities (50). However, more detailed data are needed to understand the high prevalence of homicide deaths among drug users, and the individual and especially contextual/environmental circumstances and gun ownership policy issues under which homicides and other

violent behaviors occur in poor communities.

Previous studies report similar findings related to high mortality rates among women with similar characteristics (51). In most of these studies, early mortality among women is explained mainly by women’s health behaviors, such as reduced use of highly active antiretroviral therapy (HAART) despite its wide availability, lack of health care, and lack of a regular source of care (25,52). Also, recent studies demonstrate that, when women did access HAART, they showed poorer adherence to treatment than men (27,50,53,54). However, the high mortality rate among young drug-using women in our cohort also needs to be researched in terms of the role of drug-using women within the Puerto Rican Hispanic culture. As in studies among Hispanics in the U.S. mainland (55), qualitative data on life histories of women from one of our previous studies show that drug-using women have little or no support from their families and friends and are continually exposed to violence, including physical and sexual abuse, from family members, sex partners, and the police. They are highly stigmatized by providers of health care, HIV/AIDS care, and social services, and are frequently in fear of losing their children through placement in foster care by the government. This sociocultural environment in which Hispanic/Latina women live in Puerto Rico keeps them hidden, without drug or health care treatment. Designing comprehensive health and drug treatment programs that address the specific needs of drug-using women is highly important for reducing the stressful life, lack of social support, drug use consequences, and premature death found especially among young drug-using Hispanic women in Puerto Rico. However, for drug-using women residing in Hispanic communities, interventions must address not only the health conditions of the women but also the sociostructural elements and cultural ideologies that perpetuate life conditions that promote disparities in health, socioeconomic position, social support, gender roles and relationships, health care, and drug treatment. Innovative and practical interventions will be required to address the structural and cultural elements that maintain health disparities for Hispanic drug-using women in Puerto Rico.

HIV seropositivity, injection drug use, and “not in drug treatment during the previous year” were associated with adjusted relative risk of death. Drug treatment has been found to be a protective factor related to reduction in HIV/AIDS risk behaviors in previous studies (56). Our findings also support the positive effect on mortality of living with a sex partner/husband, as found in other studies among special populations such as non-drug using women and the elderly (57-60). These studies have found that living with a sex partner, which might mean availability

support from this significant other, is related to well-being and longevity.

Given the persistence of HIV/AIDS risk behaviors practiced by drug users, especially drug injectors, and the lack of drug treatment and HIV/AIDS health facilities for treating infected drug users (29, 30, 61), it is unlikely that this mortality trend in Puerto Rico will be reversed unless multiple preventive strategies are implemented to address drug users' risky behaviors and increase drug treatment and HIV/AIDS care. Improved survival among HIV-infected individuals following antiretroviral therapy has been reported in multiple studies since the mid-1990's (62, 63). However, in Puerto Rico as in the U.S. mainland, where drug use continues to be an important HIV/AIDS risk category, studies show significant disparities in pharmacological HIV/AIDS treatment for drug users (30, 64). Vlahov et al. reported that even at a time when combination therapies had become available, most of their HIV-positive cohort of drug users was initially untreated due to a variety of factors, including limited access to and utilization of health care (65).

Other barriers to preventing premature mortality among drug users include stigma toward drug users, especially women; lack of drug treatment programs such as methadone maintenance; and lack of women-specific drug treatment and HIV/AIDS services. Although the prospects for preventing premature mortality among drug users in Puerto Rico appear gloomy, there is a basis for hope if Puerto Rico can adapt and implement an HIV/AIDS reduction model that has been developed in other sites in the U.S. mainland. In these sites, aggressive programs have been effective in significantly reducing HIV/AIDS incidence and prevalence by instituting multiple methadone programs, needle exchange initiatives, and laws permitting pharmacies to sell syringes without a prescription (66-68).

Resumen

Este manuscrito analiza tasas de mortalidad en un cohorte de usuarios de drogas en Puerto Rico, examina las causas de muerte y estima el riesgo relativo de muerte. Fecha y causa de muerte se obtuvieron de certificados de defunción. El estado vital fue confirmado por contacto con los sujetos, familiares y amigos. VIH/SIDA fue la principal causa de muerte (47.7%), seguido por homicidio (14.6%) y sobredosis (6.3%). Las féminas tuvieron un riesgo relativo de muerte más alto que los varones en todas las categorías de edad. No convivir con una pareja sexual y no recibir tratamiento fueron relacionados con mortalidad por causa del VIH/SIDA. Inyección de drogas fue la única variable explicando el riesgo relativo de muerte

por sobredosis. Puerto Rico necesita continuar desarrollando programas para prevenir el VIH/SIDA. Se debe prestar atención especial a mujeres jóvenes para prevenir la mortalidad temprana.

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