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## Original Contribution

# Longitudinal Trends in Hazardous Alcohol Consumption Among Women With Human Immunodeficiency Virus Infection, 1995–2006

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Hazardous alcohol consumption among women with human immunodeficiency virus (HIV) infection is associated with several adverse health and behavioral outcomes, but the proportion of HIV-positive women who engage in hazardous drinking over time is unclear. The authors sought to determine rates of hazardous alcohol consumption among these women over time and to identify factors associated with this behavior. Subjects were 2,770 HIV-positive women recruited from 6 US cities who participated in semiannual follow-up visits in the Women's Interagency HIV Study from 1995 to 2006. Hazardous alcohol consumption was defined as exceeding daily ($\geq$4 drinks) or weekly ($>$7 drinks) consumption recommendations. Over the 11-year follow-up period, 14%–24% of the women reported past-year hazardous drinking, with a slight decrease in hazardous drinking over time. Women were significantly more likely to report hazardous drinking if they were unemployed, were not high school graduates, had been enrolled in the original cohort (1994–1995), had a CD4 cell count of 200–500 cells/mL, were hepatitis C-seropositive, or had symptoms of depression. Approximately 1 in 5 of the women met criteria for hazardous drinking. Interventions to identify and address hazardous drinking among HIV-positive women are urgently needed.

alcohol drinking; HIV; longitudinal studies; women

Abbreviations: HAART, highly active antiretroviral therapy; HCV, hepatitis C virus; HIV, human immunodeficiency virus; WIHS, Women's Interagency HIV Study.

Between 1990 and 2000, the US human immunodeficiency virus (HIV) epidemic expanded to increasingly include women. Today, women account for more than one-quarter of all new diagnoses of HIV infection and acquired immunodeficiency syndrome in the United States (1). As a growing number of women become infected with HIV, the need to identify and address modifiable factors that affect disease progression or survival becomes more urgent.

Hazardous alcohol use is one such modifiable behavior. Hazardous alcohol use is defined as a pattern of alcohol consumption that is associated with an increase in alcohol-related or other health problems but may not necessarily be classified as alcoholism (2). The National Institute on Alcohol Abuse and Alcoholism defines hazardous alcohol use for women as an average consumption of $>$7 drinks per week or $\geq$4 drinks at 1 sitting at least weekly. It is important to distinguish hazardous alcohol use from nonhazardous use, since low-to-moderate levels of alcohol consumption are often associated with improved health outcomes and survival, whereas hazardous consumption is associated with poorer outcomes (3, 4).

Although studies carried out before the era of highly active antiretroviral therapy (HAART) did not find alcohol consumption to be associated with disease progression (5), more recent studies have demonstrated a significant association between hazardous alcohol consumption and several adverse health outcomes and behaviors in HIV-positive women. These include increased HIV viral load, lower

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medication adherence, increased risky sexual behavior, and more rapid disease progression (6–12). Women who are coinfected with HIV and hepatitis C virus (HCV) are at even greater risk of alcohol-associated health problems.

Previous studies have suggested that 6%–54% of HIV-positive women meet criteria for hazardous drinking in different settings, depending on the specific measure of hazardous drinking used (6, 13–16). These studies were limited by assessment at only 1 time point or recruitment from a single setting. Longitudinal assessment of alcohol consumption is important, because drinking behavior may change with increasing age or with HIV disease progression. Drinking patterns may also be influenced by period effects (factors common to all age groups at a particular time point) or cohort effects (factors common to all women enrolled in a study in a given year) (17). Furthermore, many drinkers do not show consistent behavior, varying their drinking pattern and volume over time (17).

Here we describe longitudinal patterns of alcohol consumption in HIV-positive women. Identification of demographic, clinical, or behavioral characteristics of women at increased risk for hazardous drinking might help clinicians recognize those women, so that increased screening, prevention, and therapeutic services could be provided. Our objectives in this study were to determine the proportion of HIV-positive women with hazardous alcohol consumption over 11 years of follow-up and to identify factors associated with hazardous drinking in these women.

## MATERIALS AND METHODS

### Study population

Data were obtained from women participating in the Women's Interagency HIV Study (WIHS), the largest ongoing longitudinal cohort study of HIV-positive women in the United States. The WIHS is a multicenter, prospective study that was established in 1994 to carry out comprehensive investigations of the impact of HIV infection among women aged $\geq$18 years. In a second recruitment phase, new members were enrolled in the study during 2000–2001. Women are seen at semiannual study visits. Our analyses were limited to 2,770 women who were confirmed by serologic analysis to be HIV-positive at study entry.

Participating study sites are centered in the Bronx and Brooklyn, New York; Washington, DC; Los Angeles and San Francisco, California; and Chicago, Illinois. WIHS participants were recruited from a variety of sources, including HIV primary care clinics, hospital-based programs, research programs, community outreach sites, women's support groups, drug rehabilitation programs, HIV testing sites, and referrals from enrolled participants. The study design has been described previously (18, 19), and additional information is available at the study's Web site (https://statepiaps.jhsph.edu/wihs/).

The WIHS participants undergo semiannual physical examinations, complete study questionnaires, and provide blood for biomarker measurements. The semiannual questionnaire data are obtained face to face by interviewers who receive extensive standardized training regarding how to ask questions on sensitive issues and how to minimize social desirability bias. Participants who report heavy alcohol consumption or drug use during the interviews are referred to substance abuse treatment programs in the community with established linkages to the WIHS sites. The number of women who pursue such referrals is not known.

Institutional review boards at each of the study centers and their community affiliates approved the WIHS protocols, and informed written consent was obtained from all participants.

### Measures

*Alcohol consumption.* The WIHS has collected data on quantity and frequency of alcohol consumption since its inception. At each visit, WIHS participants are asked to report the average number of days per week on which they have consumed an alcoholic drink since their previous assessment 6 months earlier. A drink is defined as "1 can, bottle, or glass of beer, a glass of wine, a shot of liquor, a mixed drink with that amount of liquor, or any other kind of alcoholic beverage." Response options are every day, 5–6 days per week, 3–4 days per week, 1–2 days per week, less than once per week, and none. Next, participants are asked about the usual number of drinks they have consumed per day since their previous assessment. Open-ended responses were elicited between 1996 and 2002, and choices were categorized for visits taking place after October 2002 (0, 1–2, 3–4, 5–6, or $\geq$7 drinks per day). Open-ended responses such as "a pint of vodka" (0.5 L) are converted to numbers of standard drinks. At baseline, women also provided information on whether they had ever received treatment for problematic alcohol consumption, and if so, which type of treatment (e.g., inpatient alcohol detoxification, outpatient alcohol detoxification, attendance at Alcoholics Anonymous).

Using the WIHS data from visits 1–23 (1995–2006), we created 2 types of alcohol consumption measures based on the 2 questions relating to hazardous drinking and based the cutpoint for these analyses on guidelines issued by the National Institute on Alcohol Abuse and Alcoholism (2). First, we calculated the average quantity of drinks per week by multiplying quantity by frequency. For response items that involved a range, we used the midpoint of the range. Weekly consumption was also categorized as $>$7 drinks per week (excessive weekly consumption) or $\leq$7 drinks per week. Second, we used the average number of drinks consumed per day to categorize women into those who consumed $\geq$4 drinks per day (excessive daily consumption) and those who consumed $<$4 drinks per day. Then, using these cutpoints at each visit, we categorized a woman's alcohol consumption into 1 of 3 groups: hazardous drinking ($>$7 drinks per week or $\geq$4 drinks per day), moderate drinking (any drinking that did not qualify as hazardous drinking), or nondrinking. We also created a dichotomous variable for any hazardous drinking in the past year (i.e., current visit or previous visit).

*Additional measures.* Women provided information about their age, race, educational attainment, marital status, and employment status at the time of study enrollment. We categorized the women according to their geographic site of enrollment and study enrollment time (original cohort,

recruited in 1994–1995, or second cohort, recruited in 2001–2002). Illicit drug use was assessed at each visit by asking participants to indicate the quantity and frequency of use of the following substances since their previous visit: tobacco, marijuana, cocaine, ''crack'' or freebase cocaine, heroin, and methadone. Current drug use was defined as taking the drug at least once per month. Participants also reported whether they had ever injected any drugs and whether they were currently injecting drugs.

At each visit, a CD4 cell count was determined, with the results categorized as <200 cells/mL, 200–500 cells/mL, and >500 cells/mL. Hepatitis C infection was determined by antibody testing from blood collected at study enrollment (actual testing was done several years after enrollment). Symptoms of depression were measured at each visit with the 20-item Center for Epidemiologic Studies Depression Scale (20); women were classified as having symptoms of depression if they had a score of ≥16.

### Statistical analyses

We compared characteristics of HIV-positive women with and without hazardous drinking behavior at baseline or the first follow-up visit. We used the *t* test to compare mean values and the chi-squared test to compare categorical variables (SAS, version 9.1; SAS Institute Inc., Cary, North Carolina). Next, we used multivariable logistic regression to assess the effect of sociodemographic and clinical variables on the risk of hazardous drinking at each visit. We used a generalized estimating equations approach, allowing participants to contribute data from each time point, with adjustment for repeated measures within subjects. All sociodemographic factors and clinical variables were selected for the initial model, with the exception of drug use, which was left out of the model because of significant collinearity with the alcohol measure. Using stepwise elimination, the least significant variable was dropped from the current model until all of the variables left in the model were significant ($P < 0.05$). The corresponding estimates were compared with the initial estimates from the full model, and the changes were negligible. These analyses were repeated in a stratified manner according to WIHS enrollment cohort date (1995–1996 or 2001–2002); since the results were similar, we present the combined data as representative of the entire sample.

We plotted the proportion of women with hazardous drinking or moderate drinking in the past year, overall and stratified by HCV status at baseline. To assess whether the proportion of women who were hazardous drinkers might be affected by study loss to follow-up or differential survival rates, we repeated these analyses using only data from women who completed 1 of the last 2 visits. The observed trends were similar; therefore, we present results from the entire cohort.

## RESULTS

Baseline characteristics of the 2,770 HIV-infected women, overall and stratified by baseline hazardous drinking behavior pattern, are shown in Table 1. Women reporting hazardous drinking at baseline were significantly more likely to be older than 40 years, to be African-American, to be unemployed, to have not completed high school, or to be part of the original (1994–1995) cohort. Women with hazardous drinking patterns were also significantly more likely to be HCV-seropositive and to have high levels of depressive symptoms. They were also more likely to smoke cigarettes, to use other drugs, and to report current or past injection drug use.

Among women who did not engage in hazardous drinking at baseline, 981 (45%) were drinking at moderate levels, 380 (17%) were current nondrinkers with a history of hazardous drinking, and 825 (37%) were current nondrinkers with no history of hazardous drinking. Among women who did engage in hazardous drinking at baseline, 138 (25%) exceeded weekly consumption levels only, 142 (25%) exceeded daily consumption levels only, and 282 (50%) exceeded both weekly and daily consumption levels. Overall, 17% of the women had received 1 or more types of treatment for alcohol problems in the past, with the most common being inpatient alcohol detoxification (13%), Alcoholics Anonymous attendance (12%), and outpatient alcohol detoxification (8%).

Figure 1 shows the proportion of women who had consumed alcohol in the previous year during the period 1995–2006. Over this interval, 14%–24% of women met the criteria for hazardous drinking, and 32%–48% of women met the criteria for moderate drinking. There was a gradual decline in the proportion of women who met the criteria for hazardous drinking over time, with a corresponding increase in the proportion of women who met the criteria for moderate drinking during follow-up.

Figure 2 shows the proportion of HIV-positive women who reported hazardous drinking in the previous year according to their HCV serostatus at study enrollment. In the mid-to-late 1990s, HCV-seropositive women were much more likely to be hazardous drinkers than HCV-seronegative women. However, this difference decreased over time, and there was no significant difference in hazardous drinking behavior according to HCV status at the most recent time points.

In multivariable analysis, women were slightly but statistically significantly less likely to engage in hazardous drinking with each follow-up visit, a finding that was independent of age (Table 2). Women were also significantly less likely to be hazardous drinkers if they were employed at baseline or if they had completed high school. In contrast, women were significantly more likely to be hazardous drinkers if they had CD4 cell counts of 200–500 cells/mL, were HCV-seropositive, or had high levels of depressive symptoms. There was no significant association of hazardous drinking with age, race, or enrollment cohort.

## DISCUSSION

In this paper, we report patterns of alcohol consumption between 1995 and 2006 over time in a geographically diverse sample of 2,770 HIV-positive women from the WIHS cohort. We found that at any time point, 14%–24% of

**Table 1.** Baseline Characteristics of HIV-Positive Women According to Self-reported Alcohol Consumption Status During the Past Year, Women's Interagency HIV Study, 1995–2006

| | Total ($n$ = 2,770) | | Alcohol Consumption Status[a] | | | | *P* Value |
|---|---|---|---|---|---|---|---|
| | | | Hazardous Drinking ($n$ = 562) | | Nonhazardous Drinking (Moderate/None) ($n$ = 2,208) | | |
| | No. | % | No. | % | No. | % | |
| Sociodemographic factors | | | | | | | |
| Mean age,[b] years | 36 (7.8)[c] | | 37 (7.3) | | 36 (7.9) | | 0.06 |
| Age group,[b] years | | | | | | | |
| <30 | 642 | 23.2 | 102 | 18.2 | 540 | 24.5 | |
| 30–40 | 1,334 | 48.2 | 257 | 45.7 | 1,077 | 48.8 | |
| >40 | 791 | 28.6 | 203 | 36.1 | 588 | 26.7 | <0.0001 |
| Race | | | | | | | |
| White (non-Hispanic) | 422 | 15.2 | 79 | 14.1 | 343 | 15.5 | |
| African-American (non-Hispanic) | 1,606 | 58.0 | 366 | 65.1 | 1,240 | 56.2 | |
| Hispanic | 654 | 23.6 | 104 | 18.5 | 550 | 24.9 | |
| Other | 88 | 3.2 | 13 | 2.3 | 75 | 3.4 | 0.001 |
| Marital status[b] | | | | | | | |
| Single (never married) | 910 | 33.4 | 200 | 36.0 | 710 | 32.7 | |
| Married | 1,010 | 37.0 | 192 | 34.6 | 818 | 37.7 | |
| Separated/divorced/widowed | 807 | 29.6 | 163 | 29.4 | 644 | 29.7 | 0.27 |
| Employed[b] | 671 | 24.3 | 84 | 15.0 | 587 | 26.6 | <0.0001 |
| More than a high school education[b] | 878 | 31.8 | 141 | 25.1 | 737 | 33.5 | 0.0002 |
| Study site | | | | | | | |
| Bronx, New York | 545 | 19.7 | 103 | 18.3 | 442 | 20.0 | |
| Brooklyn, New York | 454 | 16.4 | 77 | 13.7 | 377 | 17.1 | |
| Washington, DC | 411 | 14.8 | 79 | 14.1 | 332 | 15.0 | |
| Los Angeles, California | 569 | 20.5 | 99 | 17.6 | 470 | 21.3 | |
| San Francisco, California | 419 | 15.1 | 109 | 19.4 | 310 | 14.0 | |
| Chicago, Illinois | 372 | 13.4 | 95 | 16.9 | 277 | 12.5 | 0.0006 |
| Enrollment cohort | | | | | | | |
| 1994–1995 | 2,041 | 73.7 | 493 | 87.7 | 1,548 | 70.1 | |
| 2001–2002 | 729 | 26.3 | 69 | 12.3 | 660 | 29.9 | <0.0001 |
| Clinical characteristics | | | | | | | |
| CD4 cell count,[b] cells/mL | | | | | | | |
| <200 | 660 | 24.6 | 119 | 22.0 | 541 | 25.2 | |
| 200–500 | 1,164 | 43.4 | 254 | 47.0 | 910 | 42.4 | |
| >500 | 860 | 32.0 | 167 | 30.9 | 693 | 32.3 | 0.13 |
| Hepatitis C-seropositive[b] | 948 | 35.3 | 290 | 53.0 | 658 | 30.7 | <0.0001 |
| Depressive symptoms (CES-D score ≥16)[b] | 1,467 | 54.1 | 366 | 66.7 | 1,101 | 50.9 | <0.0001 |
| Drug use[b] | | | | | | | |
| Current use | | | | | | | |
| Cocaine | 321 | 11.6 | 170 | 30.2 | 151 | 6.8 | <0.0001 |
| Heroin | 282 | 10.2 | 121 | 21.5 | 161 | 7.3 | <0.0001 |
| Crack/freebase cocaine | 437 | 15.8 | 222 | 39.5 | 215 | 9.7 | <0.0001 |
| (Illicit) methadone | 38 | 1.4 | 19 | 3.4 | 19 | 0.9 | <0.0001 |
| Marijuana/hashish | 591 | 21.4 | 236 | 42.1 | 355 | 16.1 | <0.0001 |
| Tobacco | 1,415 | 51.1 | 437 | 77.8 | 978 | 44.4 | <0.0001 |
| Ever use of injected drugs | 914 | 33.0 | 292 | 52.0 | 622 | 28.2 | <0.0001 |

Abbreviations: CES-D, Center for Epidemiologic Studies Depression [Scale]; HIV, human immunodeficiency virus.

[a] Hazardous drinking was defined as excessive weekly consumption (>7 drinks per week) or excessive daily consumption (≥4 drinks per occasion). Information on drinking status for the first 2 visits was missing for 45 women.

[b] Information on this measure was missing for some women.

[c] Numbers in parentheses, standard deviation.

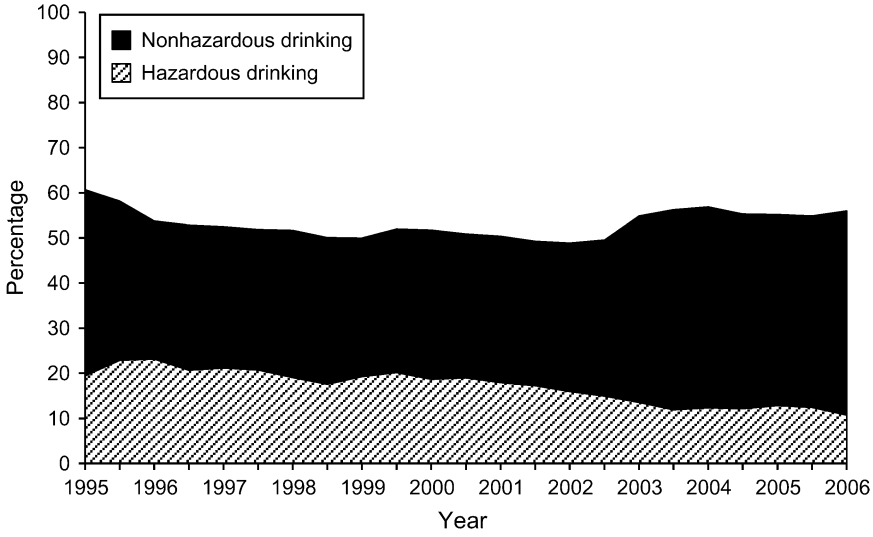


**Figure 1.** Proportions of 2,770 human immunodeficiency virus (HIV)-positive women reporting having engaged in hazardous drinking and nonhazardous drinking during the past year, Women's Interagency HIV Study, 1995–2006. The alcohol measurement items were modified slightly in 2002.

women reported consumption of alcohol at hazardous levels in the past year, while over 50% of women had consumed any alcohol.

The proportion of women with hazardous drinking at any time point in our study was similar to or greater than the proportion in other cross-sectional studies that evaluated hazardous alcohol consumption among HIV-positive women (6%–54%) (6–12). However, it is difficult to directly compare proportions of women with hazardous drinking across these studies because of differences in the measurement of hazardous drinking. The proportions in our sample were also similar to a recent (2001–2002) general population estimate for US women aged 18 years or older, which found that 22% of US adult women engage in hazardous drinking (21).

Our analysis differs from previous studies of hazardous drinking in HIV-positive women by documenting trends over time. This allowed us to see, for example, that the proportion of women with hazardous drinking behavior declined gradually during the time period of 1995–2006, whereas the overall proportion of women with any alcohol consumption remained stable. Several other studies have demonstrated a gradual decrease in hazardous drinking with increasing age (17, 22). However, there is also evidence of

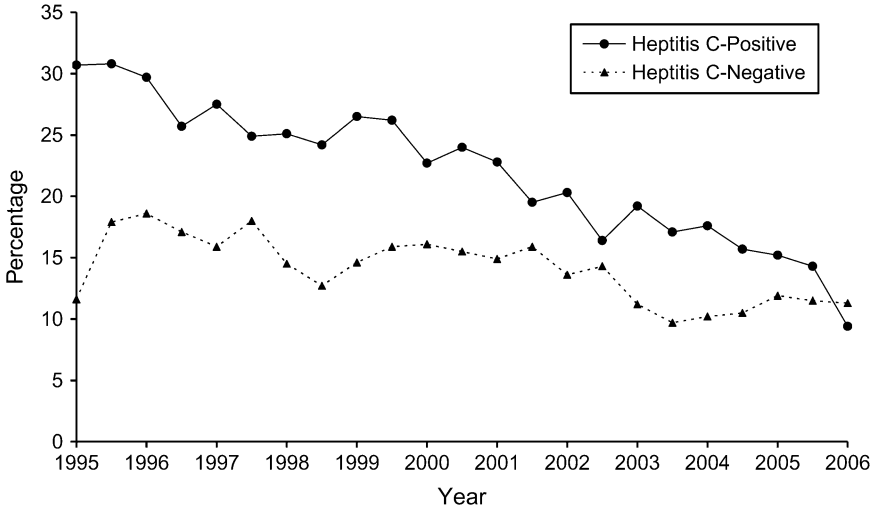


**Figure 2.** Proportion of 2,770 human immunodeficiency virus (HIV)-positive women reporting having engaged in hazardous drinking during the past year, according to their hepatitis C virus status at baseline, Women's Interagency HIV Study, 1995–2006.

**Table 2.** Significant Predictors of Hazardous Alcohol Consumption[a] at Each Time Point in HIV-Positive Women (Multivariate Analyses), Women's Interagency HIV Study, 1995–2006[b]

| Parameter | Odds Ratio | 95% Confidence Interval | *P* Value |
|---|---|---|---|
| Current visit (vs. previous visit) | 0.96 | 0.96, 0.97 | <0.0001 |
| Employment (yes vs. no) | 0.80 | 0.72, 0.90 | 0.0002 |
| More than a high school education (vs. high school or less) | 0.72 | 0.59, 0.87 | 0.0009 |
| Study site | | | |
| Brooklyn, New York | 1 | Referent | |
| Bronx, New York | 1.15 | 0.87, 1.52 | 0.33 |
| Washington, DC | 1.65 | 1.23, 2.21 | 0.0009 |
| Los Angeles, California | 1.18 | 0.87, 1.59 | 0.28 |
| San Francisco, California | 1.49 | 1.12, 1.99 | 0.007 |
| Chicago, Illinois | 1.31 | 0.96, 1.77 | 0.09 |
| CD4 cell count, cells/mL | | | |
| >500 | 1 | Referent | |
| 200–500 | 1.10 | 1.00, 1.21 | 0.05 |
| <200 | 1.06 | 0.95, 1.24 | 0.22 |
| Hepatitis C-seropositive (yes vs. no) | 1.62 | 1.35, 1.95 | <0.0001 |
| Depressive symptoms (CES-D score ≥16) (yes vs. no) | 1.31 | 1.21, 1.43 | <0.0001 |

Abbreviations: CES-D, Center for Epidemiologic Studies Depression [Scale]; HIV, human immunodeficiency virus.

[a] Hazardous drinking was defined as excessive weekly consumption (>7 drinks per week) or excessive daily consumption (≥4 drinks per occasion).

[b] Other variables in the model that were not statistically significant included age, race, and enrollment cohort (1994–1995 or 2001–2002).

mixed longitudinal patterns, with a significant proportion of older women initiating hazardous drinking in middle to late life (22). Our finding that the decrease in hazardous drinking over time was independent of age or study cohort suggests that the trend may represent a period effect, which refers to general changes in the population related to year of data collection (23). We also considered whether the gradual decrease in hazardous drinking could be related to differential loss to follow-up or shorter survival among women with hazardous drinking, but additional analyses did not support this explanation. Although researchers in prior analyses of retention rates among women enrolled in the original cohort did not find a difference between heavier drinkers and those who drank less (24), further investigation of the relation between hazardous drinking and survival is warranted.

To date, conclusions about the relative impact of hazardous drinking on major health outcomes such as survival or disease progression in HIV-positive persons have been mixed. In the pre-HAART era, most studies showed no evidence of an effect of alcohol consumption on survival (5, 25). However, in more recent studies, investigators have concluded that hazardous alcohol consumption is correlated with more rapid disease progression (9, 10, 12). One possible hypothesis regarding this shift is that in the HAART era, people with HIV infection are feeling better and therefore continuing or increasing their use of recreational substances such as alcohol. Alternatively, hazardous drinking could directly shorten survival through its effects on the immune system, adverse health behaviors such as nonadherence to medication protocols, or HIV-related comorbid conditions such as hepatitis.

The fact that women with HCV infection drank as much as or more than women without HCV is concerning, although the steeper decline in rates of hazardous drinking among women infected with both HIV and HCV is reassuring. Liver disease, mostly related to HCV, is now the leading cause of non-HIV-related death in women with HIV/acquired immunodeficiency syndrome (26). Hazardous alcohol consumption is also a significant barrier to receiving treatment for HCV infection (27). The more rapid decline among women dually infected with both HIV and HCV could be due to increased awareness and clinical intervention, to decreased survival, or to some combination of these factors. In this study, baseline HCV antibody testing was not conducted for several years. Therefore, many women were not initially aware of their HCV status, and they may have reduced their drinking only after learning they were HCV-seropositive (28).

The overlap of hazardous alcohol consumption with drug use is also important to note. At baseline, over one-third of the women with hazardous drinking also had a history of injection or noninjection drug use. The relative contribution of hazardous alcohol consumption versus other drugs to major health outcomes in HIV infection can be difficult to discern. Noninjection drug use has been associated with HIV progression and all-cause mortality in this cohort (29). In addition, nearly all of the women with HCV infection in this sample had a history of current or past injection drug use, which could party explain the increased prevalence of hazardous drinking among HCV-seropositive women.

Several issues related to self-reported alcohol consumption measures warrant mention. Only a few alcohol consumption measurements were obtained at each semiannual study visit (i.e., quantity and frequency), limiting our ability to examine participants for additional drinking patterns such as periodic binge drinking. Measures of quantity and frequency also occasionally lead to underestimates in comparison with other drinking assessment methods (30). In addition, the definition of a standard drink of alcohol may have been inconsistent across women. Early in the study, women could indicate specific types of beverages and amounts that did not easily translate into numbers of standard drinks (e.g., a pint (0.5 L) of vodka). However, later in the study, we did not obtain this open-ended information, which could account for part of the observed shift from hazardous drinking to moderate drinking during the last few years of follow-up. Hazardous drinking was estimated for some women because of response items that included ranges, and because drinking patterns during the past month could have varied. Social desirability can also result in underestimation of heavy drinking in some women. Although these measurement biases could point in either direction,

they are probably more likely to underestimate drinking, and thus the true rate of hazardous drinking could be higher.

In summary, 14%–24% of HIV-positive women in the WIHS met criteria for past-year hazardous drinking over a decade of follow-up. Although more than half of the HIV-positive women in this study consumed at least some alcohol, interventions should attempt to target those women who are drinking at hazardous or unhealthy levels. In the current era of HAART, hazardous drinking could have a greater impact on health outcomes because of its association with nonadherence to medication protocols. Data collection for the WIHS started at the beginning of the HAART era, and it is possible that some women cut down on their drinking in order to improve their chances of survival. Women with additional risk factors such as depression or HCV coinfection may need even more intensive screening and targeted intervention. Advice on how to screen and intervene is available (2, 31, 32); yet despite the consistent evidence of harm associated with hazardous drinking, in many clinical settings hazardous alcohol consumption is often neither detected nor addressed (33). Although the study design does not allow for formal cause-effect conclusions, these findings suggest that women with identified risk factors such as depression or HCV infection may need additional or more aggressive screening for hazardous drinking. Further research and guidance are needed to translate effective alcohol-related interventions into clinical practice and to determine the impact of such interventions on the health outcomes of women with HIV infection.

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