

Mortality Among Homeless Shelter Residents in New York City

ABSTRACT

Objectives. This study examined the rates and predictors of mortality among sheltered homeless men and women in New York City.

Methods. Identifying data on a representative sample of shelter residents surveyed in 1987 were matched against national mortality records for 1987 through 1994. Standardized mortality ratios were computed to compare death rates among homeless people with those of the general US and New York City populations. Logistic regression analysis was used to examine predictors of mortality within the homeless sample.

Results. Age-adjusted death rates of homeless men and women were 4 times those of the general US population and 2 to 3 times those of the general population of New York City. Among homeless men, prior use of injectable drugs, incarceration, and chronic homelessness increased the likelihood of death.

Conclusions. For homeless shelter users, chronic homelessness itself compounds the high risk of death associated with disease/disability and intravenous drug use. Interventions must address not only the health conditions of the homeless but also the societal conditions that perpetuate homelessness. (*Am J Public Health.* 1999;89: 529-534)

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Homelessness poses serious threats to the health and well-being of the men and women who endure its deprivations. In addition to such obvious risks as exposure to the elements and inadequate nutrition, homelessness entails high levels of illness and disease, insufficient access to health care, and excessive exposure to injury and accidents.¹⁻⁵ Moreover, the burdens of homelessness have fallen disproportionately on minority communities,⁶ afflicting their most vulnerable members—those whose life chances (and life expectancies) are already reduced by poverty, discrimination, mental illness, substance abuse, and other disabilities.⁷⁻¹⁴

Despite the convergence within the homeless population of so many factors associated with heightened risk of death, mortality among homeless persons has received only limited research attention, and findings have been inconsistent. Investigators in Atlanta,^{15,16} San Francisco,^{17,18} and Fulton County, Ga,¹⁹ who calculated crude homeless death rates based on estimates of the size of the homeless population in each area found slightly lower rates in the homeless than the nonhomeless populations. However, homeless population estimates are notoriously unreliable,²⁰⁻²³ making them a problematic basis for assessing mortality rates.²⁴

In contrast, studies comparing mortality within homeless samples with rates from the general population have found elevated death rates among the homeless. Mortality among clients served by Health Care for the Homeless projects in 19 cities was estimated as 3.1 times that of the general US population.⁵ Among clients of Health Care for the Homeless in Boston, both the ratio of homeless to nonhomeless deaths and the causes of homeless deaths varied with age; the leading cause was homicide for 18- to 24-year-olds, AIDS for 25- to 44-year-olds, and heart disease and cancer for 45- to 64-year-olds.²⁵ How these

findings pertain to the general homeless population, whose contact with health care providers cannot be assumed, remains unclear.

Studies matching well-defined cohorts of homeless individuals against death records avoid both the selection biases involved in samples of convenience and the use of problematic homeless population estimates. Alstrom and colleagues found that age-adjusted mortality among 6000 men registered at Stockholm's Bureau of Homeless Men between 1969 and 1971 exceeded rates in the general Swedish population by a factor of 4.²⁶ Deaths from accidents and other violent means occurred significantly more often in the homeless cohort. Although death certificates listed alcohol-related causes for only 20% of the homeless deaths, 97% of the homeless men had been registered for offenses under the Temperance Act. A recent study in Philadelphia²⁷ found that from 1985 to 1988, mortality among homeless adults was almost 4 times that of the general population. Injury, heart disease, liver disease, poisoning, and ill-defined causes accounted for nearly three quarters of homeless deaths.

The present study takes a similar approach to establishing mortality rates for a homeless population but goes beyond earlier work to investigate life and health conditions that increase risk of death among the homeless. With data from the National Death Index

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(NDI), we examined mortality in representative samples of 949 homeless men and 311 homeless women who resided in New York City's shelters for single adults in 1987. Interviews conducted in 1987 provide a comprehensive baseline profile of the population and their health status and life circumstances, and they permit us to identify predictors of mortality over the subsequent 8 years. This report focuses on rates and predictors of mortality. Since the study was conducted, NDI has added information on cause of death to its database. This will facilitate obtaining data for future analyses of how the predictors identified here relate to causes of death.

Methods

Shelter Sample

The characteristics and needs of residents of New York City's municipal shelters for single adults (i.e., adults unaccompanied by family members) were surveyed in the summer of 1987. At that time, New York City sheltered around 9300 single adults each night in the nation's largest public shelter system. This total does not include approximately 6000 adult members of homeless families, served by a separate municipal system of family shelters. It also excludes individuals who did not seek shelter in the public system, who make up a partially distinct subgroup of the homeless population.^{28,29} Recent studies have reported that annual shelter use is almost 4 times the system's capacity on a given night,³⁰ with 73000 individuals using city shelters for single adults during the 3-year period from 1988 to 1991.^{31,32} The samples of sheltered adults, then, while not representative of all of New York's homeless individuals, reflect a population of substantial size.

The survey sample was selected from the 26 municipally run congregate shelters, which included 17 facilities for men and 9 for women. Participants were randomly selected from bed rosters in 22 shelters and systematically selected (every Nth person, with N determined by the proportion of residents targeted for inclusion at a given shelter) from food and clothing lines in 4 shelters where lists were not available. Across all shelters, 32 individuals (2.4% of those targeted for interviews) were not approached because of extremely bizarre or withdrawn behavior that would prevent an interview.

The targeted sample size for each shelter was proportionate to that shelter's share of beds in the system as a whole. Of 1326 residents approached, 54 (4.1%) declined to participate, 12 (0.9%) began the interview

but were unable or unwilling to continue, and 1260—949 men and 311 women—completed interviews. Since only 15% of shelter residents were women, we oversampled women's shelters (by drawing a 26% sample, compared with 13% in the men's facilities) to ensure adequate numbers for subgroup analyses. The present study examines mortality rates separately for men and women and therefore uses the full unweighted samples.

Table 1 describes the sample. Most (57%) were younger than 35 years, approximately three quarters were African American, and over half (57% of men, 52% of women) were high school graduates. One fifth reported a disease, injury, or handicap that restricted their functioning. Mental health and substance abuse problems were common: 37% of the men and 46% of the women had indicators of mental health problems, either alone (13% of men, 25% of women) or combined with substance abuse (24% of men, 21% of women). An additional 30% of men and 17% of women had no mental health indicators but did have substance abuse problems; thus, in total, 54% of the men and 38% of the women had substance abuse problems. The remainder (33% of men, 37% of women) had neither of these problems. Many had extensive histories of homelessness, and 18% of men and 19% of women had been homeless for more than half of the previous 5 years.

A culturally diverse team of 22 interviewers carried out the survey after receiving 6 weeks of training. All had previous research and/or service experience with homeless adults, the elderly, and persons with psychiatric and substance abuse problems. They

administered an interview protocol that elicited comprehensive descriptions of respondents' sociodemographic characteristics, homelessness and residence histories, work histories, health and mental health status, service utilization, hospitalizations, substance abuse, family contact, and social support. Interviews lasted 80 minutes on average.

Measures of Sample Characteristics and Status at Baseline

Extensive prior analysis has demonstrated the reliability and validity of our measures of health, mental health, drug and alcohol use, service utilization, and history of homelessness.^{3,33-37} For this study, respondents' self-ratings were used to characterize health status (excellent/good vs fair/poor) and having a disability that restricted functioning (yes/no). Indicators of mental health status included the following: ever hospitalized for psychiatric problems (yes/no); psychotic symptoms in the past year (Psychiatric Epidemiology Research Interview³⁸ psychoticism score ≥ 3); high level of depressive symptoms in the past week (score ≥ 21 on the Center for Epidemiological Depression Scale [CES-D], modified³⁹). Substance abuse problems were measured by hospitalization for drug or alcohol problems (ever/never), heavy alcohol use (Short Michigan Alcohol Screening Test⁴⁰ score ≥ 3), and heavy drug use (heroin, crack, or cocaine use ≥ 100 times). To summarize combinations of alcohol, drug, and mental health problems, these measures were combined for a 4-category typology: no problem; mental health problem only (ever hospitalized

TABLE 1—Characteristics of Male and Female Homeless Shelter Residents: New York City, 1987

	Men, % (n = 949)	Women, % (n = 311)
Age in 1987		
18-34	57	57
35-54	35	31
≥ 55	8	12
Ethnicity		
African American	76	74
Hispanic	17	9
White non-Hispanic	6	15
Other	2	2
High school graduate	57	52
Disease or disability that restricts functioning	21	22
Problem typology		
Mental health problem only	13	25
Substance abuse problem only	30	17
Mental health and substance abuse problem	24	21
Neither mental health nor substance abuse problem	33	37
Homeless at least half the time during prior 5 years	18	10

TABLE 2—Mortality Among New York City Homeless Shelter Residents Compared With US and New York City Population: 1987–1994

	New York City Shelter Residents			US Population		New York City Population	
	No. of Observed Deaths	Person-Years of Observation	Mortality Rate per 100 000	SMR ^a	95% CI	SMR ^a	95% CI
Age of men, y							
20–24	2	292	685	4.2	0.4, 11.9	2.7	0.3, 7.8
25–34	21	2961	709	3.5	2.2, 5.1	1.7	1.0, 2.5
35–44	41	2119	1935	6.2	4.4, 8.2	2.4	1.7, 3.2
45–54	23	1080	2130	3.5	2.2, 5.0	2.0	1.3, 3.0
55–64	33	640	5156	3.3	2.3, 4.6	2.9	2.0, 4.0
65–74	7	122	5738	2.1	0.8, 3.9	1.7	0.7, 3.1
Total	127	7214	1761	3.9	3.2, 4.5	2.2	1.9, 2.6
Age of women, y							
20–24	0	179
25–34	10	934	1071	14.3	6.8, 24.5	7.5	3.6, 12.9
35–44	13	602	2160	15.3	8.1, 24.8	8.1	4.3, 13.1
45–54	2	262	763	2.2	0.2, 6.4	1.7	0.2, 4.9
55–64	2	212	943	1.1	0.1, 3.1	1.0	0.1, 2.8
65–74	7	143	4895	2.4	1.0, 4.6	2.4	0.9, 4.5
Total	34	2332	1458	4.7	3.4, 6.5	3.7	2.6, 5.2

Note. SMR = Standardized Mortality Ratio; CI = confidence interval.

^aBased on "CDC WONDER/PC Data File" from the data set "Mortality." Available at: <http://wonder.cdc.gov/DataSets>. Accessed November 10, 1997.

and/or severe psychotic symptoms and/or severe depressive symptoms); substance abuse problem only (hospitalized for drug or alcohol problem and/or heavy alcohol use and/or heavy drug use); mental health and substance abuse problem (psychiatric hospitalization, psychotic symptoms, or high depressive symptoms and hospitalized for drug or alcohol problem, heavy alcohol use, or heavy drug use).

An additional measure of injectable drug use (ever injected drugs since 1980) also provides a partial assessment of risk of HIV infection. Chronicity of homelessness was measured by self-reports of time homeless during the last 5 years (more than half the time vs half the time or less). Incarceration was measured with a single item, ever in jail or prison (yes/no).

Mortality Data on the Homeless Sample

We obtained data on mortality from the NDI database maintained by the National Center for Health Statistics. The database contains information on deaths reported since 1979 in all US states, Puerto Rico, and the Virgin Islands; it has been widely used to establish fact of death and death rates in a variety of research and population samples^{41–45} by computerized matching of identifying data on sample members against comparable data in the NDI database. The ability to use this source of information fruitfully depends on the quality of the identifying data. While homeless populations present particular difficulties in this respect,⁴⁶ extensive analysis of our baseline data provides strong evidence for the validity of the mea-

asures and the general quality of the data. Moreover, a follow-up study of the shelter sample verified identifying information obtained in 1987.

To assess mortality in the sample, baseline identifying data on the 1260 shelter residents were submitted to NDI, where a computerized database search identified matches based on first and last name, plus social security number and/or month and year of birth. For cases that matched on these criteria, NDI provided information on date of death and state of death as well as additional items that were used to evaluate the initial matches: middle initial, father's surname, sex, race, marital status, state of birth, and state of residence. In some instances, this procedure produced a list of several possible matches. Four members of the research team independently reviewed all possible matches and judged whether to accept, consider further, or reject each one. All cases classified by one or more judges for further consideration were reexamined by 2 team members, who used additional information from the original survey and the follow-up interviews to reject or accept cases that were indeterminate in the first review.

While the initial pool of possible matches was constructed from a fixed algorithm, subsequent stages of the process involved the research team's judgments on the weighting of various pieces of information. Thus, for example, a common name that matched on month and year but not day of birth, in the absence of information on social security number, was rejected. A highly unusual name with a similar configuration of discrepancies could be accepted as a match if

there were additional supporting evidence. Cases remaining undetermined after the second review were classified as nonmatching.

A conservative bias in our matching procedures may have resulted in an underestimate of the true death rate in the sheltered homeless population. Because we required greater evidence to accept than reject a match, cases with limited information were more likely to be erroneously rejected than erroneously accepted. Thus, our determination that 164 sample members indeed matched NDI death records probably excluded some true matches because of insufficient data for verification.

Analysis

Mortality rates were calculated separately for men and women within age groups. For each individual in the sample, the period of observation for the mortality analyses began in September 1987 (when the baseline survey was completed) and extended through December 1994 or until death, whichever occurred first. For each subgroup of interest, the death rate was calculated as the number of deaths per 100 000 person-years of observation. This measure, divided by the death rate in a comparable reference group, provides an age-adjusted standardized mortality ratio (SMR). Reference group death rates were obtained from the Centers for Disease Control and Prevention's mortality files. For each SMR, the 95% confidence interval was calculated, using the method described by Vandembroucke.⁴⁷ To examine predictors of mortality, we used logistic regression analysis to calculate the effects of respondents' char-

acteristics and of aspects of the homeless experience on the likelihood of death during the follow-up period.

Results

Rates of Mortality in the Homeless Population

Between September 1987 and December 1994, 128 (13%) of the men and 36 (12%) of the women died. Crude death rates were 1770 per 100 000 for men and 1529 per 100 000 for women. As Table 2 shows, age-adjusted mortality rates for the homeless samples are approximately 4 times those of the general US population, with overall SMRs of 3.9 for men and 4.7 for women. While homeless men in all age groups died at higher rates than US men in general, the SMR rose to 6.2 among 35- to 44-year-olds. Among women, the findings are qualified by smaller numbers and high variability in the SMRs, but here, too, the homeless sample had higher rates in most age groups. The difference was greatest among 25- to 44-year-olds, who died at more than 14 times the rate of women in the general population.

To ensure that these SMRs did not just reflect New York City's high mortality rates, we compared our homeless samples to the city's general population. The SMRs remained high: men in our sample died at more than twice the rate of other New Yorkers; for women the SMR was 3.7, with the largest discrepancy again found among 25- to 44-year-olds.

Predictors of Homeless Mortality

From the literature on homelessness and on mortality, we identified several variables expected to elevate the risk of death among homeless people: poor physical health, high risk of HIV infection, chronic illnesses, psychiatric disabilities and substance abuse, and limited access to health care. We also assumed that the deprivations that homelessness itself entails affect the health and welfare of shelter users in nonspecific ways. Thus, we hypothesized that duration of exposure to the conditions of homelessness would contribute to excess deaths among shelter users.

Univariate comparisons of decedents and survivors revealed that homeless men who subsequently died had poorer health in 1987 than survivors, were more likely to report a disease, injury, or handicap, and were more likely to report serious medical problems such as high blood pressure, heart problems, cancer, pneumonia, or tuberculosis. Neither mental health problems nor heavy

TABLE 3—Multivariate Logistic Regression Model of Predictors of Mortality Among Male and Female Homeless Shelter Residents: New York City, 1987–1994

Variable	Men		Women	
	Adjusted Odds Ratio	95% Confidence Interval	Adjusted Odds Ratio	95% Confidence Interval
Age	1.1***	1.0, 1.1	1.1*	1.0, 1.1
African American	1.1	0.7, 1.7	0.8	0.3, 1.7
Mental health problem	0.6*	0.4, 1.0	0.8	0.4, 1.7
Substance abuse problem	0.9	0.6, 1.5	0.6	0.3, 1.5
Poor health	0.9	0.6, 1.4	1.2	0.6, 2.6
Ever injected drugs	1.8*	1.0, 3.0	3.9*	1.0, 15.7
Ever in jail or prison	2.8***	1.8, 4.4	1.1	0.4, 3.2
Extended homelessness	2.2**	1.4, 3.4	1.1	0.4, 2.7

* $P \leq .05$; ** $P \leq .001$; *** $P \leq .0001$.

drug or alcohol use differentiated decedents from survivors, although the deceased were more likely to have injected drugs. Close to two thirds of male decedents had been incarcerated, and their histories of homelessness were more chronic than those of survivors.

Among women, decedents were more likely than survivors to report disabling conditions and serious medical problems, although, as with the men, psychiatric indicators did not distinguish decedents. More female decedents than survivors had used injectable drugs, but they differed little regarding other indicators of alcohol or drug problems, histories of incarceration, or chronicity of homelessness.

To test the hypothesized effects of these variables on mortality, we employed logistic regression analysis, with fact of death as the dependent variable. Separate analyses for men and women were conducted, with age entered as a control variable in both. Our final model contained 7 independent variables: race/ethnicity (African American/other), mental health problem (which was retained despite nonsignificant findings in the univariate analyses because of strong support in the literature for its hypothesized effect), substance abuse problem, self-rated poor health, ever injected drugs, ever incarcerated, and extended homelessness. The odds ratios, adjusted for all other variables in the model, are presented with 95% confidence intervals in Table 3.

Among men, measures of clinical status (poor health, mental health problem, substance abuse problem other than injectable drug use) did not predict mortality, but 3 variables related to the social context of homelessness significantly increased the odds of death: ever in jail or prison, ever injected drugs, and extended homelessness. Moreover, the adjusted odds ratio for mental health problems suggests that psychiatric problems had a significant protective effect

for men. In the smaller sample of women, only injectable drug use significantly affected likelihood of death.

Discussion

Homeless men and women die at significantly higher rates than their age-mates in the national or local general population. This finding is not unanticipated and provides empirical support for what advocates for the homeless have long contended.⁴⁸ However, the amount of excess mortality, and in particular the extreme rates of death among younger homeless women, exceeded rates reported for homeless adults in other large cities, surpassing even our direct predictions.

Homeless mortality rates are extreme compared with those of a variety of New York subgroups as well, including Blacks and Whites in high-income neighborhoods in the Bronx and Queens, poor Whites in lower Manhattan, and poor Black women in Harlem. The only group with a mortality rate (1713 per 100 000) comparable to that of our homeless sample was poor Black men in Harlem,¹⁰ where an earlier study documented death rates exceeding those of rural areas in the world's lowest-income countries.¹² Death rates in our samples also matched or exceeded those reported in other studies of homeless populations.^{25,27} Younger homeless men in our sample had mortality rates similar to those found in Boston and Philadelphia. However, older homeless men in New York City died at 1 to 2 times the rate found in those cities. Among homeless women, rates were approximately 3 times greater for 25- to 44-year-olds in New York City than in Boston, while mortality for older women was approximately twice as high in New York City as in Philadelphia. Homeless mortality rates in New York City thus not only greatly surpass death rates in the general US and New York City popula-

tions but are even high when compared with homeless populations elsewhere.

It is improbable that the mortality rates reported here are inflated, since our procedure for matching death records to homeless sample identifiers was more likely to exclude true matches than to include false ones. Thus, the findings offer conservative estimates of mortality in New York's sheltered homeless population. Our focus on sheltered homeless single adults gives the findings wide though limited generalizability. Their magnitude demands a concerted, vigorous effort to identify and address the sources of homeless mortality.

Several characteristics of New York's sheltered homeless have repeatedly been linked to increased mortality: racial/ethnic minority status,¹⁴ mental health problems,⁹ and substance abuse.²⁶ However, within our homeless samples, African Americans did not have higher death rates than others. Nor did our analysis support the hypothesized effects of psychiatric or substance abuse problems other than injectable drug use.

In fact, homeless men with mental health problems were significantly less likely to die than other shelter residents. A recent review of studies on mortality and mental illness⁹ has noted that most of the elevated risk of mortality associated with mental illness disappeared when samples were adjusted for income,¹³ suggesting that mental illness and poverty may have been confounded. In our samples, which were uniformly characterized by extreme poverty, mental health problems did not add to the risk of death. Their apparent protective effect is somewhat baffling but may reflect the recent targeting of housing and services to homeless mentally ill adults. Comparable programs do not exist for other homeless groups.

Although substance abuse other than injectable drug use also did not predict mortality among shelter residents, those who had injected drugs had notably higher rates of mortality. Because injecting drugs is a major risk factor for HIV infection,⁴⁹ its relationship to mortality may be due to HIV/AIDS rather than to drug use per se. The relationship between injectable drug use and mortality, as well as the link between incarceration and mortality, requires further investigation. Future studies examining causes of death will help clarify these relationships as well as the factors underlying the extraordinary mortality rates of younger women.

Conclusion

Although several hypothesized predictors of mortality were not significant in our

analysis, chronicity of homelessness was a strong predictor of mortality among men even after we controlled for age and disability. This finding does not identify which dimensions of the homeless experience lead to mortality, but it is consistent with our understanding of the cumulative effects of the many obstacles to health and welfare that homelessness entails. As public health advocates have urged,^{50,51} in addition to addressing problems of disability and AIDS among homeless shelter residents, interventions in the processes that lead to deaths among the homeless must be broadly based, emphasizing not only specific health risks but also the general phenomenon of homelessness itself and the societal problems of poverty and discrimination that have given rise to it. □

Contributors

E. L. Struening and S. M. Barrow designed the follow-up study of shelter users, and S. M. Barrow and P. Córdova planned and supervised the field study. S. M. Barrow, D. H. Herman, and E. L. Struening designed the analysis of mortality. S. M. Barrow wrote the paper; D. H. Herman analyzed the data; P. Córdova developed and supervised the data matching assessment; E. L. Struening supervised data analysis; and D. H. Herman, P. Córdova, and E. L. Struening contributed to writing the paper. All authors take responsibility for the integrity of the research.

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