# Perception of Unmet Basic Needs as a Predictor of Mortality Among Community-Dwelling Older Adults

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In community-based studies of older adults, self-perceptions of well-being are strong predictors of mortality. Perceptions of poor health and inadequate social networks have been associated with increased mortality.[1–5] For example, Idler and colleagues[2] found that self-rated good health was associated with a significantly reduced risk of mortality for men (odds ratio=0.52, 95% confidence interval [CI]=0.36, 0.73) but not for women, using data from the National Health and Nutrition Examination Survey Epidemiologic Follow-up. Schoenfeld and colleagues[3] found a significantly increased risk of mortality among even the healthiest elderly members of the community who rated their health as poor. Blazer[6] found that perception of inadequate social support was a stronger predictor of mortality among adults older than 65 years than the size of the social network and social interactions. Levy and colleagues found that older people with more positive perceptions of aging were found to live longer.[7]

Perceptions across several domains have been found to predict health outcomes in the elderly. To date, perceived health and social support have been studied most frequently.[7] Other perceptions, however, such as those pertaining to economic security and well-being, may also be important predictors of health. In this regard, one of the most consistent findings in epidemiological studies is the association between indexes of socioeconomic status (SES) and health outcomes.[8] Moreover, substantial evidence exists that socioeconomic conditions are powerful explanatory variables for racial disparities in health.[9]

Beyond health and social support, perhaps the most important basic needs of older adults are economic security, adequate housing, and a safe environment. SES, for example, is a strong predictor of mortality.[10,11] This association may in part stem from the association between low SES and living in neigh-

*Objectives.* We sought to determine whether, among older adults (>65 years), a perception that their basic needs are not being met increased mortality risk and whether this risk varied by race/ethnicity.

*Methods.* We used Cox proportional hazards modeling to estimate the effect of perceived inadequacy in having one's basic needs (adequacy of income, quality of housing, and neighborhood safety) met on 10-year mortality rates.

*Results.* After control for age, gender, race/ethnicity, marital status, education, income, and cognitive and functional status at baseline, perceived inadequacy in having one's basic needs met was shown to be a significant predictor of mortality (*P*<.0001), but no significant differences by race/ethnicity were observed.

*Conclusions.* Perceived inadequacy in having one's basic needs met predicted mortality during a 10-year follow-up among community-dwelling elderly persons. (*Am J Public Health.* 2005;95:299–304. doi: 10.2105/AJPH.2003.035576)

borhoods that have fewer resources and more crime than do affluent neighborhoods. In fact, causal relationships may exist between crime and the appearance and design of buildings and streets.[12] In one study, for example, older people who reported insecure neighborhood environments had a greater risk of functional deterioration over 1 year compared with those who reported living in secure neighborhoods.[13]

Local neighborhood resources are likely to be more relevant for people with lower income because high-income people have greater mobility, allowing them to travel farther to obtain needed services and healthful products and to participate in extended social support networks.[14] Moreover, neighborhood crime has been found to affect the health of older adults.[15] For example, more than 33 000 emergency department visits are made each year by older adults for injuries caused by assault. A substantial proportion of such assaults are related to the SES of the individual and living in a low-income neighborhood. The mistreatment of elderly persons, in turn, is associated with reduced survival. The disparity in mortality between socioeconomic groups in the United States is widening; according to the National Morbidity Followback Study, persons of

lower SES are increasingly at higher risk for death compared with persons of higher SES.[16] Despite an overall decline in death rates in United States, this disparity in mortality by SES has increased among men and women (women having lower SES than men) as well as among Whites and African Americans (African Americans having lower SES than Whites).[15] Given the very real risk to the health of older adults from lack of economic resources, there is reason to believe that a perception of economic hardship, beyond actual low income, places a burden on the elderly and contributes to the disparity in mortality.

We do not know the reasons for this disparity in mortality among socioeconomic groups in the United States, although investigators have suggested that perceptions of well-being—perceptions formed when people compare themselves with others—may be an important predictor of mortality. For example, Wilkinson[17,18] noted that many socioeconomic determinants of health reveal their effects through psychosocial pathways. The association between SES and health could reflect a correlation between relative rather than absolute income and health indicators. For example, based on measures of self-perceived health status, individuals living in

states with the greatest inequalities in incomes are more likely to report their health as fair or poor compared with individuals living in states with the smallest inequalities, even after personal characteristics and an individual's income were accounted for in the analyses.[19,20] Researchers have demonstrated that life expectancy increases as distribution of income becomes more egalitarian, whereas life expectancy is relatively unrelated to average income.[18]

In the United States, clear racial differences in economic well-being exist. People of minority racial/ethnic groups face a range of negative experiences compared with White Americans. These negative experiences include decreased opportunities for employment and education, higher rates of poverty, increased risk of physical ailments such as hypertension, and prejudice and discrimination.[21] Racial discrimination has been documented across an array of domains, including housing[22] and access to medical treatment.[23] Such discriminatory events are stressful.[24] As a result of these stressful and demoralizing experiences, people from ethnic or racial minority groups might be expected to be at increased risk for adverse health-related outcomes. It is probable that these chronic stressors have long-term effects on health.

Although African American health status is slowly improving, the rate of improvement since 1980 has in general been lower than that of Whites.[25] Several community studies have documented that in the United States, African Americans have substantially more health problems than do Whites, regardless of age. For example, in a longitudinal study of the elderly, Peek and colleagues[26] found that African Americans were more likely than Whites to report a decline in their health, regardless of the health measure used, and that racial differences in the decline of health appear to be a consequence of economic and educational discrepancies between the 2 groups.

We therefore sought to determine whether the perception of inadequately met basic needs (insufficient income, inadequate housing, and unsafe neighborhoods) among older adults was a significant predictor of mortality and whether this perception varied by race in a community sample of elderly

persons, the Duke University Established Populations for Epidemiologic Studies of the Elderly (EPESE).[27,28] Many variables are associated with mortality in older people, including older age, male gender, functional impairment, and cognitive impairment.[29] Therefore, any association between perceived inadequacy in fulfillment of basic needs and mortality must be adjusted for these covariates. We hypothesized, using a proportional hazards model controlling for known causes of mortality in older adults, including actual income, that perceived inadequacy in fulfillment of basic needs would predict 10-year mortality among both White and African Americans. We also predicted that perceived inadequacy of fulfillment of basic needs in African Americans would be less predictive of mortality than that in Whites, because other factors, such as actual lower income, would buffer the impact of perceived inadequacy of fulfillment of basic needs.

## METHODS

### Participants

Data for this study were derived from the Duke University EPESE.[27,28] This population survey was part of a multicenter, collaborative epidemiological investigation of physical, psychological, and social functioning of people aged 65 years and older living in (1) Boston, Mass, (2) Iowa and Washington counties, Iowa, (3) New Haven, Conn, and (4) the Piedmont area, NC. The Duke University EPESE (North Carolina) sample consisted of community residents selected from 5 contiguous Piedmont counties (of which 1 was predominantly urban and the other 4 were predominantly rural). The Duke University EPESE was a 10-year prospective cohort study. Our study focused on data from the baseline interview, 1986 through 1987, and mortality data through 1996. The sampling design has previously been described in detail.[28] Briefly, the study used a 4-stage probability sample of 4162 people aged 65 years and older (4132 were White or African American). Participants who designated their race as other than White or African American (n=27) were combined with White participants for statistical purposes.

### Measures

The National Health and Nutrition Examination Survey Epidemiologic Follow-up assessed age, gender, race/ethnicity, education, and family income of participants. Three demographic variables were dichotomized as follows: gender (male, female), race (White/other, African American), and marital status (married/not married, regardless of whether the participant was currently living with a spouse). Age and education (years of school completed) were entered as continuous variables. Participants were asked to select the category that best represented their income during the past year from 11 categories as follows: 1 ($0–$1999), 2 ($2000–$2999), 3 ($3000–$3999), 4 ($4000–$4999), 5 ($5000–$6999), 6 ($7000–$9999), 7 ($10 000–$14 999), and so on, to 11 (≥$40 000). Each participant was then assigned a yearly income based on the midpoint of each of the categories (e.g., category 1 income was $900.50). Income was entered as an ordinal variable (1–11) and reverse coded so that higher values were equivalent to lower income (e.g., category 1 was recoded as category 11). We also reverse coded years of education for the proportional hazards modeling.

Of the sample, 1.6% lacked data on years of education, and 18.9% of the nonproxy respondents were missing data on income. We used stochastic regression imputation methods to impute values, with age, gender, race, employment status, housing conditions, financial status, urban residence, marital status, occupational prestige, income, education, and a dummy variable for being a homemaker as predictors.

### Cognitive Status

Cognitive status was assessed with the 10-item Short Portable Mental Status Questionnaire.[30] This scale assesses mental status by asking simple questions about day of week, date, current and previous president, mother's maiden name, and current address or telephone number and includes a serial subtraction task. Errors across items are summed to produce a scale score on the measure. Higher scores on the scale indicate greater cognitive difficulty.

## Functional Status

Functional status was measured with 3 items from the Rosow–Breslau Functional Health Scale.[31] These items assess ability to do heavy housework unaided, walk up and down a flight of stairs unaided, and walk one half mile unaided. Respondents indicate whether they can perform each of the tasks unaided, and responses are coded 0 (no) or 1 (yes). Responses across the 3 items are summed and coding is reversed so that higher scores indicate poorer physical functioning, resulting in a possible range of 0 to 3. Values were imputed for participants with missing data (4.3% of the sample) on the basis of responses to other measures of functional status obtained in the interview.

## Basic Needs

Five items were used to assess participants' perception of difficulty in meeting basic needs such as safety, financial resources, and adequate housing. To assess perception of safety, participants were asked, "How safe from crime is your neighborhood?" To assess perception of financial resources, participants were asked, "How well does the amount of money you have take care of your needs?" and "Do you have enough financial resources to meet emergencies?" To assess perception of adequacy of housing, participants were asked whether their housing was adequate and whether their housing had adequate heat. Responses were summed and recoded so that the possible range of scores was 1 (no perception of inadequately met basic needs) to 11 (all basic needs were perceived to be unmet), with higher scores indicating that more basic needs were perceived as unmet. The mean score was 3.85 (mode=4) with a standard deviation of 1.7. Twenty-eight percent of participants had a score of 5 or more. The resulting scale score was used as a continuous variable in our analyses. If a participant did not answer any of the items, the scale score was coded as missing.

## Ascertainment of Death

For all participants, survival status through calendar year 1996 was determined by a search of National Death Index records. In earlier years, death certificates were obtained and coded by a nosologist, and data were entered. In later years, we took advantage of the availability of National Death Index Plus, which provides accurate information on date and cause of death.[32] Number of days from the initial interview to the date of death was calculated for each participant, and those missing or remaining alive in 1996 were censored.

## Data Analysis

Bivariate distributions were calculated for the total sample and by race, as shown in Table 1. We conducted bivariate analyses with Cox proportional hazards modeling to examine the risk of mortality for each unit increase on the perceived basic needs scale and for each covariate included in the model (Table 2), both for the total sample and separately by race.[33] We used multivariate Cox proportional hazards models to predict days to death over the 10 years of follow-up[33] (Table 3). Because we controlled for the key variables used in sample design and selection and had hypothesized a difference by race/ethnicity, we elected to perform unweighted analyses.[34] We entered all variables simultaneously into the model. We entered a squared term in separate analyses for each of the continuous and ordinal variables. Only the squared terms for education and income were significant. No other quadratic variable was significant. Cubed terms for these 2 variables were not significant. In our final model, therefore, we retained the squared terms for education and income. To test the hypothesis that the predictive value of perceived unmet basic needs varied by race, we entered an interaction term for basic needs × race. We report survival analysis results as conditional hazard ratios with 95% confidence intervals.

## RESULTS

At the baseline interview, 4162 participants were interviewed. Sixty-one percent were younger than 75 years, 65% were female, 54% were African American, 53% has less than 9 years of education, 40% were married, and 13.7% had some cognitive impairment. As has been found in previous analyses, African Americans had lower education levels, were less likely to be married, and were more likely to have some cognitive impairment (all $P$ values <.01 in $\chi^2$ analyses).[27]

Fifteen percent of the sample had died by 1989, 31% by 1992, and 51% by 1996. Forty-nine percent survived the 10-year follow-up period and were censored in the

**TABLE 1—Survival and Sample Characteristics, by Race: Duke University Established Populations for Epidemiologic Studies of the Elderly**

| | White/Other (n = 1901) | African American (n = 2261) | Total Sample (N = 4162) |
|---|---|---|---|
| Survival | | | |
| Alive (censored), % | 49.2 | 48.0 | 48.9 |
| Dead, % | 50.8 | 52.0 | 51.4 |
| Independent variables | | | |
| Mean age, y (SD) | 73.5 (6.6) | 73.6 (6.9) | 73.6 (6.7) |
| Male gender, % | 35.2 | 34.9 | 35.0 |
| Unmarried, %[b] | 54.4 | 64.3 | 59.8 |
| Years of school (SD) | 9.9 (3.7) | 7.3 (4.0) | 8.5 (4.1) |
| Annual household income, $ (SD) | 13932 (11 880) | 7063 (6337) | 10 200 (9898) |
| Cognitive impairment, mean score (SD)[c] | 1.4 (1.7) | 2.3 (2.1) | 1.9 (2.0) |
| Functional impairment, mean score (SD)[d] | 0.89 (1.1) | 1.0 (1.2) | 0.98 (1.1) |
| Perceived unmet basic needs, mean score (SD)[e] | 3.30 (1.70) | 4.31 (1.73) | 3.84 (1.79) |

[a] 4050 valid cases (date of death missing in 92 cases).
[b] 3952 valid cases.
[c] 4110 valid cases.
[d] 4137 valid cases.
[e] 3592 valid cases.

**TABLE 2—Unadjusted Hazard Ratios for 10-Year Mortality (1986–1996), by Demographic and Other Characteristics: Duke University Established Populations for Epidemiologic Studies of the Elderly**

| | African American (n = 2261) | | White/Other (n = 1901) | | Total Sample (N = 4162) | |
| | Hazard Ratio (95% Confidence Interval) | P | Odds of Dying (95% Confidence Interval) | P | Hazard Ratio (95% Confidence Interval) | P |
|---|---|---|---|---|---|---|
| Age[a] | 1.06 (1.06, 1.07) | <.001 | 1.09 (1.08, 1.10) | <.001 | 1.08 (1.07, 1.08) | <.001 |
| Male gender[a] | 1.47 (1.31, 1.65) | <.001 | 1.39 (1.22, 1.58) | <.001 | 1.43 (1.31, 1.56) | <.001 |
| Unmarried[b] | 1.29 (1.14, 1.47) | <.001 | 1.25 (1.10, 1.43) | <.001 | 1.27 (1.16, 1.39) | <.001 |
| Years of school[a] | 1.06 (1.05, 1.08) | <.001 | 1.06 (1.04, 1.08) | <.001 | 1.06 (1.04, 1.07) | <.001 |
| Annual household income[a] | 1.09 (1.05, 1.12) | .001 | 1.10 (1.07, 1.13) | <.001 | 1.08 (1.06, 1.11) | <.001 |
| Cognitive impairment[c] | 1.19 (1.16, 1.21) | <.001 | 1.26 (1.23, 1.30) | <.001 | 1.20 (1.18, 1.22) | <.001 |
| Functional impairment[d] | 1.46 (1.39, 1.53) | <.001 | 1.52 (1.44, 1.60) | <.001 | 1.48 (1.43, 1.54) | <.001 |
| Perceived deficit in basic needs[e] | 1.08 (1.04, 1.12) | <.001 | 1.12 (1.07, 1.16) | <.001 | 1.09 (1.07, 1.12) | <.001 |

[a]4050 Valid cases (date of death missing in 92 cases).
[b]3952 Valid cases.
[c]4110 Valid cases.
[d]4137 Valid cases.
[e]3592 Valid cases.

**TABLE 3—Results of Cox Regression Analysis Predicting 10-Year Mortality (1986-1996), by Perceived Unmet Basic Needs at Baseline: Duke University Established Populations for Epidemiologic Studies of the Elderly (n = 3328)**

| | β Coefficient | Conditional Hazard Ratio (95.0% Confidence Interval) | P |
|---|---|---|---|
| Age | 0.056 | 1.06 (1.05, 1.07) | .000 |
| Male gender | 0.784 | 2.19 (1.95, 2.46) | .000 |
| African American race | −0.185 | 0.83 (0.75, 0.93) | .001 |
| Unmarried | 0.173 | 1.19 (1.05, 1.35) | .006 |
| Years of school | 0.058 | 1.06 (1.01, 1.11) | .016 |
| Annual household income | 0.075 | 1.08 (0.99, 1.18) | .101 |
| Cognitive impairment | 0.103 | 1.11 (1.07, 1.15) | .000 |
| Functional impairment | 0.295 | 1.34 (1.28, 1.40) | .000 |
| Perceived unmet basic needs | 0.057 | 1.06 (1.03, 1.09) | .000 |
| Income × income | −0.006 | 0.99 (0.99, 1.00) | .086 |
| Years in school × years in school | −0.003 | 1.00 (0.99, 1.00) | .011 |

proportional hazards modeling. The mean perceived unmet basic needs score at baseline for those who died during the study period was 4.03, compared with 3.65 for those remaining alive (F = 40.9, P < .001) (Table 1). African Americans had more perceived unmet basic needs (4.31) than did Whites (3.30). Actual income was significantly but not strongly correlated with perceived unmet basic needs (r = .40, P < .001) for the overall sample.

To determine whether proportional hazards assumptions were met for each variable, we plotted the log–log hazard curves for each variable in the final model.[35] Through visual inspection we determined that all variables met the proportional hazards assumption. Unadjusted proportional hazards of mortality by the end of the 10-year study period for perceived deficit in basic needs and covariates are presented in Table 2. As can be seen, each factor was significantly associated with mortality over the years of follow-up on the basis of these bivariate results. For the entire sample, African American race was not a predictor of 10-year mortality (odds ratio = 1.03, 95% CI = 0.945, 1.12; P = .516). We examined these bivariate associations by race and found that the hazard ratio for African Americans for perceived deficit in basic needs, as well as for other covariates with the exception of male gender, was lower than the hazard ratio for Whites. These bivariate results indicate significant risk of mortality for each unit increase in perceived unmet basic needs.

Finally, we explored perceived unmet basic needs as a predictor of mortality in controlled analyses and checked for an interaction of race and basic needs. The interaction term was not significant. Results from the final Cox proportional hazards model are presented in Table 3. Unmet basic needs remained a significant predictor of mortality, as did all of the control variables except income (P = .001).

## DISCUSSION

The perception of inadequately met basic needs is a significant predictor of mortality in elderly community-dwelling participants. No racial differences, however, were found in the association between unmet basic needs and mortality. To our knowledge, this is the first published study to evaluate the association of perceived inadequately met basic needs and mortality in the elderly. Advantages of this study include a large, racially diverse sample of elderly people and a substantial follow-up

period. Key variables known to be associated with increased risk of mortality were controlled in the analyses. When both actual income and perceived unmet basic needs were included in the same analyses, perceived unmet basic needs remained a strong predictor of mortality. Because strong relation between SES and health outcomes has been found,[10,11] this result suggests that an individual's perception of problems in meeting basic needs is of central importance in understanding the relation between SES and health outcomes. Perception of unmet basic needs is equally important for Whites and African Americans.

How is it that perception of unmet basic needs plays such a central role in the well-being of elderly people? Chronic inadequately met basic needs may directly and indirectly increase psychological distress and lead to acute and chronic stressors.[36] Inadequacy of basic living conditions may increase stress by reducing the availability of important resources such as social support, thus creating both increased psychological distress and diminished resistance capacity.[37] In fact, problems in meeting basic needs are likely to affect an individual's functioning across an array of important domains (e.g., obtaining needed health care, using social support networks, maintaining a safe living environment). However, chronic deficits in resources are typically studied in terms of SES.[36] Yet not all people with a low income have the same objective experience. Some will have more daily economic struggles, whereas others will be more sheltered owing to social support, welfare, and access to social services.[36] Thus, in future research, it may be important to consider not only an individual's actual income but also perceptions of difficulties in meeting basic needs across domains such as food, housing, clothing transportation, and safety. ■

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## Contributors

D. Blazer and N. Sachs-Ericsson worked together in conceptualizing the project, especially the construct of basic needs and how it might apply to a community sample. C. Hybels helped to develop the analysis strategy and helped to conceptualize and develop the tests to ensure that the model was sufficient. All authors wrote the article.

## Human Participant Protection

The Duke University Medical Center institutional review board approved data collection by the Duke University Established Populations for Epidemiologic Studies of the Elderly and continues to review and approve analyses based on the project.

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