Early Adult Characteristics and Mortality Among Inner-City African American Women

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Objectives. This study examined predictors of longevity in a cohort of inner-city African American women.

Methods. Data were derived from a cohort study of inner-city African American mothers whose median age in 1966 was 31 years. Analyses involved single-decrement life tables and pooled logistic regression.

Results. Giving birth for the first time before age 25 and having at least a high school education predicted longevity in this sample. Effects of later age at first delivery in terms of mortality risk were stronger after 55 years and, especially, after 70 years.

Conclusions. The findings offer support for Geronimus's weathering hypothesis. Predictors of longevity among African Americans may be distinct from predictors for the population as a whole. (*Am J Public Health.* 2002;92:640–645)

It is well known that African Americans have higher death rates than other subgroups of Americans.[1] In addition, recent within-city studies of mortality rates have revealed that African Americans residing in poor, inner-city neighborhoods that are racially segregated have higher mortality rates than other African Americans living in different areas of the same city.[2] Although the relatively high mortality rates among African American infants have received the most attention,[3] working-age[4] and old-age mortality rates (except possibly at the very oldest ages[5]) are also higher among African Americans than other groups.

Epidemiologists hypothesize that differences in mortality rates across populations are due to differences in the prevalence of individual-level risk factors across populations. Recent studies have identified a number of individual-level risk and protective factors associated with longevity. The longer lives of people from higher social class backgrounds have been well documented.[1,6–8] In addition, other social background characteristics, such as family and household composition,[1,9–11] have been shown to affect mortality. A theme in many recent studies of mortality is the protective effect of social networks and religious involvement.[1,12–15]

In general, introduction of controls for these individual-level risk factors in multivariate models of longevity has not eliminated the negative effect of being African American.[1,16] One possible reason is that there are differences between African Americans and the groups with which they have been compared in terms of risk and protective factors for longevity. For example, Schoenbach and his colleagues[14] found that social network ties promote longevity among European Americans but not African Americans.

We used data from a longitudinal study[17] (the Woodlawn Project) to examine whether predictors of longevity that have demonstrable effects among European Americans have a significant impact among inner-city African American women.

METHODS

Data

Research setting. Woodlawn is one of the 76 community areas in Chicago. In the 1960s, when the project began, this community was overcrowded and was one of the 5 poorest areas in Chicago, with high rates of unemployment, poverty, and welfare participation: 23.2% of Woodlawn families were receiving aid in 1969, as compared with 7.4% for the city of Chicago as a whole. According to the 1970 census, 32% of Woodlawn families with children were living below the poverty level (vs 15% of Chicago families overall), 46% of these families with children had female heads (vs 21% for Chicago families), and 96% of Woodlawn residents were African American (vs 33% for Chicago as a whole). Despite the overall rates of poverty in the community, some blocks had high rates of employment and home ownership and high median education levels.

Since the 1960s, the population of the community has declined dramatically (from 81 000 in 1960 to approximately 27 000 in 1990).[17] Woodlawn may be typical of the inner-city areas described by Wilson.[18] That is, housing segregation resulted in the community's being heterogeneous with regard to social class; with increasing residential integration, those who could afford to leave the inner city did (often moving to other neighborhoods in Chicago), leaving behind those without the resources to relocate.

The Woodlawn Project. In 1966, all children who attended first grade in Woodlawn's 12 schools (9 public and 3 parochial) were asked to participate in a research and intervention program. Of the 1255 children eligible for inclusion in the study, 1242 (99%) agreed to participate. In 1967, a mother or mother surrogate (hereafter "mothers") was interviewed for each child (1158 mothers and 84 mother surrogates completed interviews). Twice since the initial 1967 interview, the mothers have been followed up, once in 1976 and once in 1997–1998. The mothers eligible for inclusion in these 2 follow-ups were those who were neither known to be dead nor known to have moved away from the Chicago area in 1976. There were 1136 mothers in this group, 91% of those eligible to participate in the initial round of data collection. All of these 1136 mothers were eligible for inclusion in the present study sample; their median age in 1967 was 32 years.

Study sample. In each of the follow-up studies of the Woodlawn Project, the investigators

TABLE 1—Distribution of Woodlawn Mothers, by Deceased Status as of 1997 and Knowledge of Date of Death

Status	Sample, No. (%)	Percentage of Deaths
Alive in 1997	884 (77.5)	
Dead in 1997	252 (22.5)	100.0
Date of death known	162 (14.2)	64.4
Death between 1966 and 1997	1 (<1)	<1.0
Death between 1976 and 1997	19 (1.7)	7.5
Death between 1992 and 1997	70 (6.2)	27.3
Total	1136 (100.0)	

obtained information on whether or not mothers were alive at the time of the follow-up. This included the 1992 follow-up of the Woodlawn children, during which the mothers were not interviewed (i.e., each Woodlawn child who participated in the 1992 survey was asked whether his or her mother was alive).

Table 1 shows that 884 (78%) of the 1136 mothers who were eligible for the 1976 follow-up were alive in 1997. Of the 252 reported to be dead, a date of death was available for 162, or almost two thirds. The 90 cases of deceased mothers for whom we had no date of death could be broken down into 3 groups. The first contained only one case of a mother who was not interviewed in 1976 and whose child was not interviewed in 1992. The second group contained 19 women who were reported as deceased during the locating phase of the 1997 interview, who were known to be alive in 1976, and whose child was not interviewed in 1992. Finally, the members of the third and largest group of 70 women were reported by their children to be alive in 1992 but were reported as deceased during the locating phase of the 1997 follow-up study.

We decided to omit cases from the first 2 of these groups, in that any imputation of an age at death would be highly imprecise. We included the third group in the analyses presented here, for two reasons. First, this was the largest group, and as a result its omission could have biased the analysis. Second, because the period during which this group's members died spanned only 5 years (they were reported alive in 1992 and reported dead in 1997), imputed values for their age at death (to 1995, the midpoint of the interval) were more precise than in the case of the first 2 groups. This left us with a study sample size of 1116, or 89% of the 1255 mothers of Woodlawn first-graders in 1966. We repeated all analyses reported subsequently with the sample of 1046 women for whom we had firm ages at death. Any differences in the results are noted.

In addition to the low attrition rate in our study sample, a compelling advantage of the Woodlawn data in regard to the present study was their prospective, longitudinal nature. All of our predictor variables were measured in 1967, the beginning of the study; most of the deaths observed occurred at least 15 years later. Thus, the problem of reverse causality was greatly minimized in our study.

To illustrate this point, consider the case of religious involvement and social participation and their putative effects on longevity. In studies in which the time lag between measurement of predictors and mortality is short, there is always the possibility that poor health or another factor endogenous to mortality is responsible for a person's disinclination to participate in social activities or to attend church, resulting in a spurious relationship between the predictor and the outcome. Although controlling for health status, which some studies are able to do, minimizes this problem, it does not completely eliminate it.

Predictors of Mortality

Demographic factors. We examined a number of demographic factors to assess their impact on longevity. Some have argued that urban African Americans whose families were part of the large migration north in the 1950s and 1960s were disadvantaged (particularly regarding the quality of their education) relative to their counterparts who had been born in northern cities.[19] Thus, we included *birthplace* (Chicago, the South, or elsewhere) as a variable, hypothesizing that Chicago-born mothers would live longer than others. Nontraditional familial arrangements are associated with higher risks of death,[6–8] so we included *household headship in 1966* (couple, mother only, or "other"), hypothesizing that mothers residing in married-couple households would live longer than others. We also included an indicator of *number of moves during the previous 5 years* (0 to 5 or more). Past research has shown high mobility to be associated with negative outcomes.[20–22]

Finally, we included *age at which women first gave birth* (younger than 25 years vs 25 years or older). There are competing hypotheses as to the effect of age at first delivery on mortality. For example, there is an extensive literature on the association between maternal age at first delivery and subsequent socioeconomic status. Contributors to this literature regard delaying first deliveries as positive and as reflective of an "orderly" life course.[23] This suggests the hypothesis that a relatively early age at first delivery will be a risk factor for mortality.

Geronimus, however, suggested that African American women in their 20s are subject to higher levels of stress than both European Americans in the same age range and African Americans younger than 20.[24] Noting that African American women who delay giving birth until their 20s have higher neonatal mortality rates, Geronimus proposed the "weathering hypothesis": in the case of African American women, owing to their uniquely disadvantaged social and economic position, the age range commonly regarded as normative for the transition to parenthood is not ideal.

Evidence for this hypothesis is the higher risk of ill health among the offspring of African American women who delay giving birth than among the offspring of African American women who become mothers for the first time at earlier ages. The assumption is that African American women giving birth for the first time at later ages are in poorer health than those doing so at earlier ages. On the

basis of the weathering hypothesis, one would expect a later age at first delivery to be negatively associated with longevity among African American women.

Social class. We hypothesized that mothers from higher social class backgrounds would live longer. Our social class measures included education, income, and receipt of welfare. Indicators were as follows: *educational attainment in 1966* (less than high school, high school or more), *poverty status* (poor, not poor), and *welfare receipt in 1966* (yes, no).

Health status. It is ideal that studies of mortality include indicators of health status, because policymakers need to understand the mechanisms through which structural correlates of mortality operate proximately. Recent research indicates that, in some populations, health status early in life affects later outcomes, including longevity.[25,26] We used 4 indicators of health status: 2 measures of physical health and 2 measures of mental health. The first physical health measure was a dichotomous dummy variable indicating whether the mother suffered from a *chronic condition in 1966.* The second was a dummy variable indicating whether the mother had *health problems* during the pregnancy with the focal child. The mental health indicators were dummy variables indicating whether the mother was *tense* and *sad* at the time of the baseline interview.

Religiosity. As mentioned earlier, one of the most robust findings in the literature on US mortality rate differentials is the protective effect of religious involvement on longevity. Many studies of religion and mortality are limited by the data available to measuring religiosity in terms of church attendance. It is difficult in these studies to know the factors for which church attendance is acting as a proxy (e.g., a temperate lifestyle, serenity stemming from religious commitment, the social support of an intentional community). Our indicator of religiosity was more direct, indicating the *importance of religion* to the mother (extremely, very, not important).

Social participation. Social participation and social network ties have been found to predict longevity.[1,14,15] We used 4 indicators of social integration and participation. First, in separate items, mothers were asked how often they visited friends and relatives. These 2 items were combined, and the mothers were divided into 4 groups according to their score on this sum. Second, mothers were asked about PTA membership and involvement. Third, mothers were asked about their participation in up to 4 civil rights and political organizations (the 1960s were a time when there was much political activity in Chicago and in Woodlawn specifically). Finally, the mothers were asked whether they had voted in the most recent election.

Analytic Techniques

We used 2 analytic techniques. The first, a single-decrement life table, allowed us to examine whether levels and patterns of mortality in our study sample were similar to those observed in other, comparable samples.

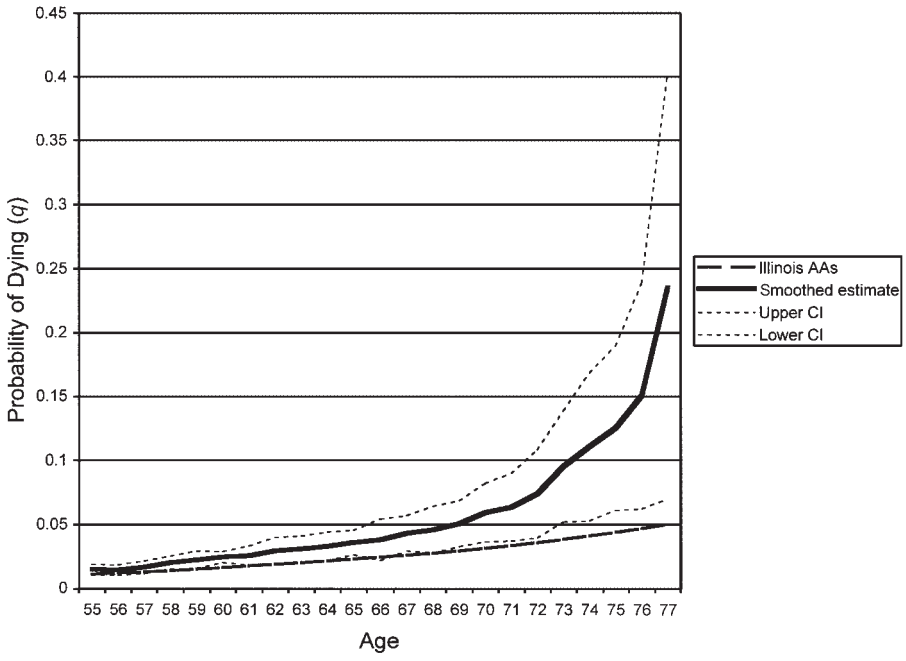
The second technique we used was pooled logistic regression. In this analysis, log odds of dying at a given age were regressed linearly on a set of covariates. All relevant years were included in each analysis (n=57 644). This approach allowed us to use all of the information available to us, to incorporate age as a time-varying covariate, and to examine whether predictors of longevity have different effects across the life course.[27–29]

In our presentation of the results, all of the effects we report are net of the effects of age (linear and quadratic), even in the case of effects labeled "unadjusted."

RESULTS

Data Quality

To verify that this cohort of mothers was not atypical, we estimated a single-decrement life table for our sample and compared the results with 1990 data for African American women who were residents of Illinois.[30] In Figure 1, we present our estimates of the life table quantity q (one's probability of dying during the interval from age x to age $x+1$, given that one was alive at exact age x), bounded by the confidence intervals of the estimates; also, we present similar values from the 1990 life table for female African American residents of Illinois. For ease of presentation, we have limited the graph to the ages of 55 through 77 years (death rates at earlier ages were very low).



Note. CI = confidence interval.

FIGURE 1—Probability of dying (q), by age: Woodlawn Project mothers and African American (AA) women residing in Illinois.

TABLE 2—Distributions of Predictor Variables and Unadjusted and Adjusted Odds Ratios (ORs)

	Sample, %	Unadjusted OR (CI)	Adjusted OR (CI)
Social and family background			
Birthplace			
Chicago	33.2	1.00	1.00
South	47.5	0.94 (0.81, 1.09)	0.87 (0.74, 1.02)
Elsewhere	19.3	1.19 (0.99, 1.42)	1.23 (1.02, 1.49)
Age at first delivery, y			
Younger than 25	82.3	1.00	1.00
25 or older	17.7	2.25*** (1.95, 2.59)	2.18*** (1.88, 2.53)
Household headship in 1966			
Couple	45.0	1.00	1.00
Mother alone	39.4	1.07 (0.93, 1.23)	0.92 (0.76, 1.12)
Other	15.5	0.81 (0.66, 1.00)	0.73 (0.58, .90)
Number of moves, 1961–1966			
0	13.0	1.00	1.00
1	22.3	0.93 (0.75, 1.16)	0.96 (0.77, 1.20)
2	22.6	0.91 (0.73, 1.14)	1.01 (0.80, 1.27)
3	21.7	0.84 (0.67, 1.06)	0.91 (0.72, 1.16)
4	10.8	0.97 (0.75, 1.26)	1.12 (0.84, 1.48)
≥5	9.6	0.81 (0.61, 1.07)	0.83 (0.61, 1.12)
Social class			
Education in 1966			
Less than high school	57.5	1.46** (1.27, 1.68)	1.51** (1.30, 1.75)
High school or more	42.5	1.00	1.00
Household poor in 1966			
Yes	51.5	1.28* (1.13, 1.46)	1.27 (1.07, 1.51)
No	48.5	1.00	1.00
Household welfare receipt in 1966			
Yes	32.5	1.16 (1.01, 1.34)	0.99 (0.82, 1.20)
No	67.5	1.00	1.00
Health status in 1966			
Chronic condition			
Yes	89.1	1.38 (1.15, 1.65)	1.21 (0.99, 1.48)
No	10.9	1.00	1.00
Healthy during pregnancy			
Yes	22.7	1.14 (0.98, 1.32)	1.03 (0.88, 1.21)
No	77.3	1.00	1.00
Tense			
Yes	36.3	1.20 (1.05, 1.36)	1.26 (1.08, 1.46)
No	63.7	1.00	1.00
Sad			
Yes	17.1	0.93 (0.78, 1.12)	0.72 (0.59, 0.88)
No	82.9	1.00	1.00
Importance of religion			
Extremely important	29.0	1.22 (1.01, 1.48)	1.19 (0.98, 1.43)
Very important	47.5	1.17 (0.99, 1.39)	1.15 (0.96, 1.38)
Not important	24.5	1.00	1.00

Continued

Our estimates (with ages at death for 70 women imputed) suggest that mortality rates in this population of inner-city African American women were somewhat higher than those among the state's general population of African American female residents. Our estimates were also higher than census values when we used the sample in which women without a firm date of death were eliminated (data not shown); in this case, however, the census values fell within the confidence intervals of our estimates (which were, of course, somewhat wider than in the larger sample). These results, as well as the differences between them, suggest to us that our estimated death rates were quite reasonable; the finding of slightly higher death rates among the women in our sample would be expected owing to the fact that they were inner-city residents.

Predictors of Longevity

Table 2 presents (1) the distribution of the predictor variables; (2) "unadjusted" odds ratios (i.e., adjusted for age only), along with their associated confidence intervals, for probability of dying in a given year from the pooled logistic regression models; and (3) odds ratios for each predictor after adjustment for the effects of all of the other predictors. The only social or background factor significantly associated with longevity was age at which a woman first gave birth. Women who delayed childbearing until they were 25 years or older had higher death rates than women who gave birth at younger ages. This effect persisted after control for the other predictors, as can be seen in the third column of Table 2.

Two aspects of social class had significant associations with the probability of dying in a given year: education and poverty status. The death rates among mothers who had less than a high school education in 1966 were 1.5 times higher than those among women with more education. Also, after adjustment for age (only), the death rates of women who lived in households with incomes below the poverty line were about one third higher than those of women whose households had higher incomes. The effect of low education persisted after adjustment for all other predictors. The effect of poverty did not persist, but it should be borne in mind that poverty is

TABLE 2—*Continued*

Social participation			
Visits friends and relatives			
Highest group	26.7	1.00	1.00
Middle high group	20.3	1.22 (1.01, 1.48)	1.30 (1.07, 1.57)
Middle low group	33.2	1.05 (0.89, 1.24)	1.09 (0.91, 131)
Lowest group	19.8	1.15 (0.94, 1.40)	1.17 (0.96, 1.43)
PTA membership			
Not a member	62.0	1.00	1.00
Member, attends few meetings	13.7	1.06 (0.88, 1.28)	1.07 (0.88, 1.31)
Member, attends some meetings	14.5	0.96 (0.79, 1.17)	1.00 (0.81, 1.24)
Member, attends most meetings	9.8	1.14 (0.92, 1.40)	0.99 (0.79, 1.25)
Political participation			
No activities	67.8	1.00	1.00
One activity	18.9	0.79 (0.65, 0.96)	0.88 (0.64, 1.20)
Two activities	8.6	0.84 (0.71, 0.98)	0.87 (0.73, 103)
Three or four activities	4.7	1.40 (1.06, 1.86)	1.48 (1.12, 1.95)
Voted in last election			
Yes	67.9	1.16 (1.01, 1.34)	1.12 (0.86, 1.45)
No	32.1	1.00	1.00

Note. CI = confidence interval.
*P < .05; **P < .01; ***P < .001.

TABLE 3—Parsimonious Model

	Estimate (95% Confidence Interval)
Age at first delivery, y	
Younger than 25	1.00
25 or older	2.22** (1.93, 2.56)
Education in 1966	
Less than high school	1.39* (1.21, 1.60)
High school or more	1.00
Household poor in 1966	
Yes	1.17 (1.02, 1.35)
No	1.00
Chronic condition	
Yes	1.20 (0.99, 1.45)
No	1.00
Age	
Linear	1.92** (1.79, 2.05)
Quadratic	0.99** (0.99, 0.99)

*P < .05; **P < .001.

highly collinear with 2 other predictors: education and welfare status.

Before adjustment for other predictors, mothers who reported a chronic condition in 1966 had higher odds of dying than those who did not, and this association narrowly failed a test of statistical significance (P=.08). None of the other indicators of health status were significantly associated with mortality. Also, none of the indicators of religiosity or social participation exhibited associations with mortality that reached statistical significance, before or after adjustment for other predictors.

None of the findings in Table 2 were substantially different when we conducted the regressions with the sample of 1049 women who were alive or had valid dates of death. On the basis of the findings shown in Table 2, we estimated a parsimonious model of mortality. This model included all variables that had a significant unadjusted effect on mortality, as well as the indicator of chronic conditions, which we included because of the importance of controlling for health status in models of mortality. These results are presented in Table 3 alongside linear and quadratic effects of age, which were highly significant. Neither poverty status nor the presence of chronic conditions had a significant effect on mortality in the parsimonious model.

One advantage of the pooled logistic regression model was that it permitted examination of interactions between age and other predictors. In Table 4, we report the results of the only significant interaction we found: that between current age and the age at which women first gave birth. As can be seen in Table 4, giving birth for the first time at 25 years or older was associated with a lower risk of death while women were younger than 55 years. Between the ages of 55 and 70 years, however, mothers who had given birth for the first time at 25 years or older had more than twice the odds of dying, and after the age of 70 years their risk was much higher than that among women who gave birth for the first time at younger ages.

DISCUSSION

Our findings provide support for Geronimus' weathering hypothesis: the African American women in our sample who gave birth for the first time after the age of 25 years exhibited higher mortality rates than those who became mothers earlier. This effect began to appear only after the age of 55 years and seemed to be stronger among older women. We also confirmed the well-known relationship between social class and mortality, in that women who achieved minimal levels of education early in life had lower rates of mortality than others.

With the exception of our findings regarding social class, our results in general are not in accord with those observed in the recent

TABLE 4—Interaction of Age at First Delivery with Current Age

Age at First Delivery, y	Odds Ratio (95% Confidence Interval)
Younger than 25	1.00
25 or older, current age younger than 55	0.54 (0.37, 0.79)
25 or older, current age 55–69	2.39* (1.99, 2.86)
25 or older, current age 70 or older	13.20* (9.78, 17.8)

*P < .001.

literature on mortality rate differentials, which identifies social participation and religiosity as important factors promoting longevity among Americans. In our population, these predictors were not associated with mortality, even when no adjustment was made for other predictors. Many of the studies assessing religiosity and social participation as risk factors for mortality have involved European American populations or large, nationally representative samples in which European Americans represent the majority of the subjects. The one study that looked for interactions between African American ethnicity and religiosity or social participation revealed no effects.

Our findings underscore the possibility that there may be interactions such as those just described, particularly in the case of predictors that reflect the influence of institutional context and involvement. Residential and social segregation result in de facto segregation in American institutions such as churches, neighborhood organizations, and political groups. Thus, the meanings and prevalence of involvement in these institutions vary greatly among population subgroups. There is every reason, therefore, to believe that involvement in such groups may have different effects on health and well-being among different groups. ■

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Contributors

N.M. Astone helped to formulate the hypotheses and designed and conducted the statistical analysis. M. Ensminger helped to formulate the hypotheses and design the statistical analysis, as well as assisting in the presentation of the results. H.S. Juon assisted in the data analysis and the presentation of the results.

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