# EDITORIAL

# Why Is Life Expectancy Declining Among Low-Educated Women in the United States?

Several recent studies report that life expectancy has declined (or that mortality rates have increased) among low-educated women in recent decades.[1–7] For instance, between 1990 and 2000, life expectancy at age 25 years declined by nearly one year among White women with zero to 12 years of education while it increased by one year among White women with at least 13 years of education.[2] A similar though less pronounced trend has been found among Black women.[2,7] These trends are perplexing, disconcerting, and unprecedented. With few exceptions, such as the aftermath of the collapse of the Soviet Union and temporary shocks such as the 1918–1919 influenza pandemic, mortality rates have been declining for over a century around the world.

## TWO PROPOSED EXPLANATIONS: COMPOSITION AND CAUSATION

While the declining life expectancy (or increasing mortality) among low-educated women has been replicated in many studies using several data sources,[1–7] there is little consensus about the reasons for the trend. Two plausible explanations have been put forth. The first asserts that the trend simply reflects compositional changes among low-educated women. As the proportion of women with at least a high school education has increased, the group left behind with less than a high school education is perhaps increasingly negatively selected. Tests of this hypothesis have not found strong support; however, the tests have not been particularly robust.[2,6] One approach has been to equalize the percentage of low-educated individuals across time periods. For instance, when comparing life expectancy by education in 1990 and 2000, one study randomly reassigned a percentage of individuals with 12 years of education in 1990 to the 13 or more years of education group so that the education distribution in 1990 matched the distribution in 2000.[2] Another study of trends in White women's mortality by education level statistically controlled for the percentage of the population that graduated high school when each respondent was 17 years of age.[6] The second proposed explanation for the declining life expectancy of low-educated women asserts that the trend reflects a causal process. That is, structural changes have made formal education increasingly necessary for health-enhancing resources such as employment, income, and marriage. Tests of this hypothesis are even rarer. In partial support of it, trends in employment among low-educated White women have played a vital role in the increasing mortality among this group.[5,6]

The purpose of this editorial is not to endorse either the composition or causation explanation. There is insufficient evidence to unequivocally support either (or both) of them. Rather, the purpose is to urge scholars who study these trends to consider both explanations as equally legitimate and to investigate them using research designs that can examine both within a single study. The design must a priori define the types of evidence that distinctly support each explanation because evidence for one explanation can often be (re)interpreted as evidence for the other. For example, a recent endorsement of the composition explanation pointed to rising poverty rates among the least educated.[8] Poverty rates may indeed have increased among this group if they have become negatively selected on characteristics that affect income, such as cognitive and noncognitive skills like persistence and accountability. An alternative (or additional), interpretation is that increasing poverty rates among this group may reflect deteriorating employment opportunities and lower wages relative to cost of living—exogenous forces unrelated to compositional changes.

### Composition

One defining feature of the 20th century is the rise in educational attainment. In 1910 approximately 10% of young adults graduated from high school.[9] Moreover, secondary education had primarily been a preparatory program for college rather than a terminal program.[9] Thus, the 90% who did not graduate were fairly representative of the US population. A century later, in 2009, 83% of young adults graduated from high school.[10] It is likely that the 17% who did not graduate are a more homogenous and disadvantaged group than nongraduates a century or so

ago on health-related characteristics.

An indirect example of how population composition can shape mortality trends was illustrated in a recent study of mortality in the four Census regions of the United States.[11] During 1986 to 2006, mortality rates of White women rose or remained steady in the Southern region across all education levels, but mortality rates of White women aggregated across all education levels declined in the region. This suggests that the declining mortality in the region as a whole was partly because of rising education levels (thus, proportionally more women had moved into the highest educated group, a group with low mortality) rather than an absolute decline in mortality in the region. While this example does not speak directly to compositional changes among low-educated women, it nonetheless illustrates the importance of considering compositional changes when explaining mortality trends.

The possibility that life expectancy of low-educated women may be declining for any other reason than compositional changes may seem inconceivable given historical trends in longevity and our vision of continued gains. However, putting the trends in context may help underscore why we must consider both composition and causation. Unfavorable trends in women's longevity extend well beyond low-educated women. For instance, between 1992 and 2006, women's mortality rates increased in more than 40% of US counties (vs 3% among men).[12] Between 1990 and 2000, life expectancy in the state of Wyoming declined from 79.29 to 78.55 years among women while it rose from 73.16 to 74.83 years among men.[3] In addition, White women's mortality rates did not decline for any education level between 1986 and 2006 in the Southern region.[11] Collectively, these broader trends suggest that the unfavorable trends in longevity among low-educated women may just be the tip of the iceberg.

### Causation

Among the many factors that shape longevity, socioeconomic resources (e.g., education, employment, income) are among the most powerful. These resources may be considered a "fundamental cause" of disparities in longevity because they provide access to material goods, safe neighborhoods, social networks, psychological well-being, power, and prestige across different time periods and places.[14] These resources also tend to cluster; individuals with higher levels of education tend to have higher incomes and larger social networks for example. However, the strength of that clustering can change over time. In particular, large-scale trends in the labor market have increased the returns from education, making it even more important for accessing other socioeconomic resources such as employment, income, and marriage. In other words, the clustering of socioeconomic resources has likely become even tighter.

With the above in mind, could large-scale changes in the labor market have disproportionately affected low-educated US women and help explain their life expectancy trends? A brief look at some economic indicators is instructive. To start, structural changes in the labor market have reduced the share of jobs for low-skill (i.e., low-educated) labor. At a national level, the share declined 6.5% points in the 1980s and 1.4 points in the 1990s.[15] The decline in unionization among manufacturing jobs and the replacing of manufacturing jobs with service jobs has further exacerbated these trends by reducing income, fringe benefits, and job stability. Depending on the measure used, real income has declined or stagnated among low-skill labor. For example, between 1967 and 2000, real income of the bottom income quintile budged little and even declined at times.[16] In addition, the mean income of households with heads who completed nine to 11 years of education declined from $45 531 in 1967 to $41 708 in 2000 (in 2012 dollars).[17] This is in sharp contrast to the $82 196 to $122 624 increase (in 2012 dollars) among heads with at least a bachelor's degree. Even if the decline in income among low-educated adults was partly caused by compositional changes among this group (perhaps they are more disadvantaged in terms of cognitive and noncognitive skills than previous cohorts of low-educated adults), this group is nonetheless navigating an increasingly unforgiving and precarious job market and living on less income than in the past.

Relevant structural changes are not limited to the labor market. For instance, residential segregation between the richest and poorest income quintiles increased between 1960 and 2000.[18] The geographic concentration of disadvantage often means lower quality schools, fewer sources of healthy foods, fewer parks and recreational spaces, and higher crime. Since the early 1970s, the likelihood of being married and "marrying up" declined most precipitously for low-educated women. Specifically, adults with very low or high levels of education have become increasingly likely to marry similarly educated adults and "most striking is the decline in the odds that those with very low levels of education marry up."[19(p621)] Because marriage is thought to enhance health, and because the education of each spouse can affect the health of the other, these trends may have had deleterious consequences for low-educated women's well-being. Taken together these broader trends imply that, while low-educated adults may be increasingly disadvantaged in the characteristics they bring to the labor and marriage markets (i.e., a compositional explanation), the labor and marriage markets for low-educated adults provide fewer returns than in the past (i.e., a causation explanation). In other words, composition and causation can be tightly intertwined.

Given the arguments above, consider the following thought experiment. If socioeconomic resources are a fundamental cause of health and longevity, and if socioeconomic resources have declined in real terms among the least-educated, is it possible then that the health and longevity of this group has deteriorated as a result? If their health and longevity has not deteriorated, we may need to reconsider a core tenant of social epidemiology—that income and employment affect health.

## PROPOSED CRITERIA FOR A BALANCED RESEARCH APPROACH

The challenge posed here to researchers is to aggressively pursue an explanation for the declining life expectancy of low-educated women, incorporating the following two criteria.

1. The research must be designed so that both the composition and causation explanations can be examined and teased out within a single study. The design must a priori define the specific types of evidence that will distinctly support each explanation.
2. The research should explain why (or at least be consistent with) the bulk of evidence that finds the declining life expectancy of low-educated adults is occurring: (1) primarily among women, (2) among White and Black women, even though the latter are much less likely to graduate high school than White women and men,[2,4,11] and (3) most strikingly in the Southern region of the United States and negligibly in the Northeast.[11]

Whether the reported declines in life expectancy among low-educated women reflect compositional changes among this group, exogenous structural changes that have disproportionately affected this group, or a combination of these forces remains an open question. A balanced research approach to answering this question is needed. ■

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