Describing racial differences in US health insurance coverage: A mulitstate life table approach

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Millions of Americans do not have health insurance, and there are wide racial disparities in insurance coverage (Institute of Medicine 2001b; U.S. Department of Health and Human Services 2000). Current estimates of the number and proportion individuals who are uninsured vary depending on the definition used and time period under study, but approximately 25% of the US non-institutionalized population was uninsured at some point during 2003, and 14% were uninsured for the entire year (Rhoades 2005). As health care costs rise, being without health insurance poses an increasingly large risk for many Americans, and the growing number of individuals without health insurance coverage constitutes a huge social problem.

While statistics on the number and proportion of Americans uninsured are frequently cited, they provide an incomplete picture of the challenges facing the US heath care system. They give no sense of the "lifetime burden" of being uninsured, or the average length of time that individuals with certain characteristics spend without insurance coverage during their lifetimes. As being uninsured puts an individual's health and financial well-being at risk, understanding the average duration of exposure to being uninsured during a lifetime is important to informing policy on improving access to care. Furthermore, current statistics on the prevalence of being uninsured do not normally distinguish between those who are healthy and those who are unhealthy and, therefore, are most likely to be catastrophically affected by being without health insurance.

To address these issues, we construct multistate life tables to estimate the expected years of life that Blacks and Whites live in different health-specific insurance states (e.g., healthy and insured, unhealthy and uninsured). In the absence of individual data on lifetime insurance coverage, life-table analysis is an attractive tool that enables us

to simulate life course experiences with health insurance coverage and health. This approach enables us to address two main questions. First, given current age-specific mortality, morbidity, and health insurance rates in the U.S., how many years can individuals expect to live with different types of insurance coverage in different health states? Second, are there racial disparities in the expected number of years spent in different health-specific insurance states?

BACKGROUND

Health insurance coverage has important implications for both the physical and financial wellbeing of Americans. Uninsured individuals receive less appropriate care and fewer needed services than the individuals with health insurance (Ayanian 2000; Hadley 2003; Institute of Medicine 2001a; Institute of Medicine 2002). For example, being uninsured is associated with late detection of various types of cancer, including colorectal cancer, melanoma, breast cancer, and prostate cancer (Ayanian, Kohler, Abe, and Epstein 1993; Osteen, Winchester, Hussey, Clive, Freidman, and Cady 1994; Roetzheim, Pal, Tennant, Voti, Ayanian, Schwabe, and Krischer 1999). Consistent with these findings, uninsured near-elderly are at greater risk of premature death than their insured counterparts (McWilliams, Zaslavsky, Meara, and Ayanian 2004). Being uninsured also poses serious financial threats to Americans. It is estimated that 50% of all personal bankruptcies in the U.S. are attributable to debt associated with medical expenses (Himmelstein, Warren, Thorne, and Woolhandler 2005).

The availability of public health insurance ameliorates some of the risks associated with being unable to afford private insurance. For example, among white

children, those with Medicaid are more likely to have visits for preventive care than those who are uninsured (Currie and Thomas 1995). Yet individuals who are publicly insured are, in general, disadvantaged compared to those with private insurance. For example, having Medicaid is associated with late diagnosis for breast cancer and melanoma (Roetzheim et al. 1999)..

Thus, being uninsured poses a great risk to the financial and physical well being of Americans. This risk, unfortunately, is experienced disproportionately by Black Americans. Black Americans are much more often uninsured and publicly insured than whites (Rhoades 2005). Despite the expansions in public health insurance in the 1990s, racial disparities in the proportion of people uninsured persist, even among children who benefited most from the expansions (Wherry and Feingold 2004). At the same time, the risk of serious illness at any age and the lifetime burden of illness is greater for blacks than for whites; African Americans live fewer years than whites, and spend more years in ill health (Hayward and Heron 1999; Kington and Smith 1997). As a consequence, Blacks are over represented among people who are both uninsured and in poor health (Wherry and Feingold 2004).

To date, no research has considered how the burdens of mortality, morbidity, and being uninsured overlap combine to affect the average exposure time of Blacks and whites to different health-specific insurance states. Instead, most previous research focuses on the proportion of individuals who are uninsured at any time, or the proportion who are uninsured for a specific period of time. In this study, we use multistate life table techniques to estimate the amount of time and the proportion of time spent in difference

health and insurance states, on average, in a life time, and how this differs between Blacks and whites.

DATA AND METHODS

Sources of Data

Data for this study come from two sources. Mortality data come from published period life tables from the National Center of Health Statistics (NCHS) based on 2000 vital statistics records (Arias 2002). Data on morbidity, insurance status, and race come from the 2000 Medical Expenditure Panel Survey (MEPS). MEPS is a series of on-going, longitudinal surveys based on clustered and stratified samples of households that provide nationally representative estimates of health care use, insurance coverage, and socio-demographic characteristics for the U.S. civilian noninstitutionalized population (Cohen 1996; Cohen 1997). In 2000, the MEPS panel contains 25,096 individuals. Note that the mortality data from NCHS pertain to the entire U.S. population, while MEPS data pertain only to the U.S. non-institutionalized population, excluding those who are incarcerated or in institutional homes (e.g., nursing homes). As a result, morbidity is likely lower in the MEPS sample than in the total U.S. population. We therefore suspect that the expected years lived in an unhealthy state is likely underestimated in our life tables.

Life Table States Defined by Insurance Coverage and Subjective Health Status

We define insurance status based on the information on coverage that is available for each month of 2000. For each month, we categorize individuals as having one of the

following four types of insurance: 1) private coverage exclusively, or in combination with any kind of public coverage, 2) Medicaid exclusively, 3) Medicare exclusively, or with some other public coverage, and 4) no coverage. As individuals who had private and public coverage during the same month are grouped with those who had private coverage only, the expected years spent with Medicaid or Medicare coverage is likely underestimated. Similarly, as individuals with both Medicare and Medicaid during a single month were grouped with those who had Medicare only, the expected years spent on Medicaid is slightly under estimated. However, the number of person-months spent with both Medicaid and private insurance, and the number spent with both Medicaid and Medicare are very small.

We use self-rated health as an indicator of current morbidity, and an indicator of the risk of future morbidity. Self-rated health is constructed from responses to the question, "In general, compared to other people of your age, would you say that your health is excellent, very good, good, fair, or poor?" Subjective measures similar to this one are strongly associated with other more objective indicators of health across a wide variety of settings (Idler and Angel 1990; Jytha, Guralnik, Ferrucci, Jokels, and Heikkinen 1998; Zimmer, Natividad, Lin, and Chayovan 2000). Furthermore, subjective health assessments are good predictors of future morbidity and mortality, even after controlling for measures of clinical health (Idler and Angel 1990; Idler and Benyami 1997). Self-rated health is therefore well-suited for our purpose. MEPS respondents reported on their health three times during 2000. We consider individuals who reported being in "excellent" or "very good" health to be healthy, and all others to be unhealthy.

Using the data on self-rated health and insurance status described above, we calculate the number of months during 2000 that individuals spent in different health-specific insurance states. For example, if an individual was coded as healthy in the first interview round in 2000 and was insured privately between the first and second rounds, then all months between the first and second round for this person are coded as "privately insured and healthy". If self-rated health status changed between two rounds, we assumed that change occurred halfway between the rounds. In this way, we define eight possible health-specific insurance states for each *person-month* of 2000 (2 health states times 4 insurance states).

Race

We construct multistate life tables separately for Blacks and Whites because there exist large and persistent disparities in mortality, health, and insurance status by race. We focus exclusively on differences between Blacks and Whites because the reliability of racial and ethnic information from death certificates does not permit analysis of other racial and ethnic groups (Arias 2002).

Analytic approach

We use the Sullivan method for calculating the expected number of years spent in eight possible health-specific insurance states. The starting point for the Sullivan method is race-specific period life tables constructed using Vital Statistics published by the National Center for Health Statistics. We then use the proportion of person-months spent in each health-specific insurance state calculated from the MEPS data to partition the

number of person years lived between two ages in these tables (T_x) into those spent in different states. Our outcomes of interest are the life expectancies in eight different health/insurance states calculated from these multistate life tables (e_x).

FINDINGS

We begin by describing how common certain insurance states are in the population during 2000. The first three columns of Table 1 display the proportion of individuals who had private insurance, Medicaid, Medicare, and who were uninsured *at any time during 2000.* All differences between Blacks and whites are significant at the 0.01 level. The results indicate that three quarters of whites were insured by a private plan at some time during 2000, but only 59% of Blacks were. Blacks were over twice as likely as whites to spend some time on Medicaid during the year (26% versus 11%). The difference between whites and Blacks in the likelihood of being uninsured at any time during the year is also significant; 28% of Blacks were uninsured at some time during 2000, while about 22% of whites were uninsured at some time during 2000. These statistics are consistent with previous work, but do not give any indication of the duration of time spent in different insurance states. To address this, the last three columns of Table 1 display the proportions of total person-months spent in four insurance states by race during 2000.

-- Table 1 --

Table 1 shows that 68% of all person months in 2000 are spent with private insurance, 8 percent are spent with Medicaid only, 7 percent with Medicare or some combination of Medicare and Medicaid, and 16 percent are spent without health

insurance of any kind. These proportions differ markedly between whites and Blacks. For whites, the proportion of person-months spent with no insurance during 2000 was only 15%, while that for Blacks was 21%. Compared to Blacks, whites also spent proportionately less time on Medicaid (8% vs. 17%), and more time with private insurance (71% vs. 54%). The proportion of person months spent with Medicare differed little between whites and Blacks in 2000.

We elaborate further using Figure 1, which shows the proportion of person-months spent uninsured for five year age groups by race. The figure indicates that, with exception of children age 5 to 9, Blacks spend more time without health insurance than whites in every age interval. This gap generally increases with age until age 65, when nearly everyone becomes eligible for Medicare. The most notable difference between whites and Blacks comes between the ages of 50 and 60, where the uninsurance rate spikes dramatically for Blacks, but much less so for whites. This is particularly noteworthy for policy makers as rates of disability and ill health begin rising rapidly at these ages.

-- Figure 1 --

We next use the age and race specific proportions of person months spent in different insurance states and different health states to construct multistate life tables. Based on these life tables, the first five columns of Table 2 display health and insurance-specific life expectancies for the total population (both whites and Blacks). These results indicate that if an individual experienced the age-specific insurance and mortality rates recorded in 2000 over their entire life, they would live 76.9 years, of which 51.61 years would be spent with private insurance, 5.61 years with Medicaid, 7.98 years with

Medicare, and 11.67 years with no health insurance. The last ten columns of Table 2 separate healthy and non-healthy life expectancy. These results suggest that, of the 28.23 years of life spent in fair or poor health, nearly five years will be spent without health insurance. We consider these years to be the riskiest both for the physical and financial wellbeing of individuals.

-- Table 2 --

Tables 3 and 4 reveal stark differences between whites and Blacks in total life expectancy, healthy life expectancy, and insurance-specific life expectancies. Focusing on the first five columns of Tables 3 and 4, Blacks live 5.7 fewer years overall than whites, but they live 3.2 more years in fair or poor health. Moreover, Blacks experience fewer years with private insurance than whites (38 vs. 54), more years on Medicaid (10 vs. 5), and more years with no insurance (14 v. 11). Differences are even larger when years spent in excellent or very good health are considered separately from years spent in good, fair or poor health. Blacks spend fewer unhealthy years insured privately than whites (13.8 vs. 16.2), more years on Medicaid (4.2 vs. 2.2), and more years uninsured (6.2 years vs. 4.5 years). These disparities can be seen more easily in Figures 2 and 3.

-- Tables 2 and 3, Figures 2 and 3 --

Figure 2 shows healthy, uninsured life expectancies at each age interval for whites and Blacks. At every age, Blacks can expect to live more years without health insurance than whites, but the difference is modest. For example, Whites can expect 6.7 healthy years of life without health insurance, while Blacks can expect 7.8 healthy years of life without health insurance. This disparity narrows with age, and disappears by age 45. When unhealthy life expectancy is examined, however, the difference is larger, both in

absolute and relative terms, and persistent (Figure 3). Whites can expect to live 4.5 unhealthy years without health insurance, while for blacks this figure is 6.2 years. Moreover, this disparity remains substantial well into the mid-50s, disappearing only at age 65, the age at which most individuals qualify for Medicare. Thus, the racial disparities in insurance-specific life expectancies are greatest in the riskiest category, namely, being in poor or fair health and being uninsured.

DISCUSSION

Health insurance coverage is an important determinant of access to medical care, which in turn is associated with morbidity and mortality. Being uninsured not only makes individuals more likely to experience delays in receiving necessary medical care, it also exposes them to the potentially huge financial consequences of ill health. Many previous studies provide estimates of the number and proportion of Americans who are uninsured, and marked racial disparities in health insurance coverage are well documented. Little is know, however, about the life time exposure to being uninsured in different health states. In this study, we provide estimates of the number of expected years lived in different health-specific insurance states for the US non-institutionalized population, and quantify racial disparities therein. This provides a sense of the duration of exposure to different health and insurance specific states a person would experience in a lifetime, on average, rather than focusing on the number or proportion of individuals insured at a single point in time.

Though this multistate lifetable approach provides a rich picture of the current health insurance coverage environment of the U.S., interpretation should be done carefully. We use period lifetables for mortality, together with individual-level survey

data on insurance coverage and subjective health collected over a single year. As such, our estimates of expected life time exposure to different insurance states are based on mortality, morbidity, and insurance rates during a single year. This synthetic cohort approach tells us what the life time experience of individuals would be if a cohort were to age through the prevailing conditions in 2000. It does not describe an actual average life time, nor does it provide a prediction of the future lifetime experience of individuals or groups.

Another important consideration when interpreting our results is that empirical transition rates were not used to calculate q_xs for each transition. Rather, the number of person years lived (L_x) was partitioned using the proportion of person months spent in different states. An alternative to this method is to use transition rates to and from each state calculated from a hazard rate model or multinomial logit model. This approach uses longitudinal data, and has the added benefit of being able to control for other covariates that might explain differences between whites and Blacks. Unfortunately, this model-based approach is not a realistic option for our analysis because age is not related in a parametric way to insurance status. Age would have to enter the models used to predict the transition rates as dichotomous variables in order to capture the non-parametric relationship between age and insurance coverage. The number of actual transitions in each age group is too small to allow us to do this. As more panels of MEPS become available, however, this may be possible.

These limitations notwithstanding, this study describes the current insurance coverage environment in the US in a new and detailed way. Our findings suggest that individuals will, on average, spend nearly 12 years of the life without health insurance, or

15% of their total lifespan. For blacks, both the absolute number of years and the proportion of their life spent uninsured are greater than that of whites. When unhealthy years are examined, the disadvantage of Blacks becomes even greater. Taking the morbidity and insurance experience of Blacks into account as we have done here suggests that the Black disadvantage may be larger than previous studies suggest.

Table 1. Proportion of months spent in four insurance states by race

Health and Insurance Status	Proportion of individuals with four insurance types at any time during 2000			Proportion of person-months in different states during 2000		
	Total	Blacks	Whites	Total	Blacks	Whites
Total				1.00	1.00	1.00
Any private insurance	0.73	0.59	0.75	0.68	0.54	0.71
Medicaid only	0.13	0.26	0.11	0.08	0.17	0.06
Medicare only, or with other public	0.14	0.11	0.15	0.07	0.08	0.07
Uninsured	0.23	0.28	0.22	0.16	0.21	0.15

Table 2. Health status/insurance-specific life expectancies by age, Whites and Blacks

Age	Total					Healthy (excellent, very good, or good)					Unhealthy (fair or poor)				
	Total (e_x)	Private Insur.	Medicaid	Medicare	No Insur.	Total (e_x)	Private Insur.	Medicaid	Medicare	No Insur.	Total (e_x)	Private Insur.	Medicaid	Medicare	No Insur.
0-4	76.90	51.61	5.61	7.98	11.67	48.64	35.69	3.09	2.94	6.92	28.23	15.92	2.52	5.04	4.75
5-9	72.50	49.12	4.57	7.75	11.06	45.42	33.67	2.40	2.87	6.48	27.08	15.45	2.17	4.88	4.58
10-14	67.60	45.94	3.49	7.73	10.40	41.39	30.89	1.66	2.85	6.00	26.17	15.05	1.83	4.88	4.41
15-19	62.60	42.54	2.66	7.72	9.71	37.40	27.94	1.14	2.84	5.49	25.22	14.60	1.53	4.88	4.22
20-24	57.80	39.34	2.01	7.73	8.75	33.62	25.25	0.74	2.84	4.79	24.21	14.09	1.27	4.89	3.96
25-29	53.10	36.76	1.60	7.75	6.99	30.14	23.16	0.52	2.85	3.62	22.95	13.60	1.08	4.91	3.36
30-34	48.30	33.62	1.30	7.76	5.66	26.80	20.75	0.36	2.86	2.82	21.55	12.87	0.94	4.90	2.84
35-39	43.60	30.19	1.07	7.73	4.62	23.55	18.23	0.25	2.87	2.21	20.07	11.97	0.82	4.86	2.42
40-44	38.90	26.56	0.91	7.73	3.74	20.38	15.58	0.18	2.88	1.74	18.57	10.99	0.73	4.85	2.00
45-49	34.40	22.97	0.72	7.76	2.93	17.44	13.10	0.14	2.90	1.30	16.94	9.88	0.58	4.85	1.62
50-54	30.00	19.40	0.57	7.77	2.22	14.74	10.72	0.11	2.94	0.97	15.21	8.68	0.46	4.83	1.24
55-59	25.70	15.79	0.40	7.87	1.61	12.19	8.42	0.07	3.00	0.70	13.49	7.37	0.33	4.87	0.91
60-64	21.60	12.52	0.25	7.96	0.90	9.94	6.39	0.04	3.12	0.40	11.68	6.13	0.21	4.84	0.50
65+	17.90	9.52	0.01	8.21	0.13	7.91	4.58	0.00	3.26	0.07	9.96	4.94	0.01	4.96	0.05

Table 3. Health status/insurance-specific life expectancies by age, Whites only

Age	Total					Healthy (excellent, very good, or good)					Unhealthy (fair or poor)				
	Total (e_x)	Private Insur.	Medicaid	Medicare	No Insur.	Total (e_x)	Private Insur.	Medicaid	Medicare	No Insur.	Total (e_x)	Private Insur.	Medicaid	Medicare	No Insur.
0-4	77.40	53.96	4.60	7.65	11.21	49.81	37.72	2.45	2.91	6.73	27.62	16.24	2.15	4.74	4.48
5-9	73.00	51.24	3.72	7.40	10.59	46.57	35.52	1.89	2.86	6.30	26.39	15.72	1.83	4.55	4.29
10-14	68.00	47.85	2.84	7.40	9.92	42.50	32.53	1.31	2.85	5.80	25.51	15.32	1.53	4.55	4.12
15-19	63.10	44.26	2.20	7.40	9.22	38.43	29.38	0.91	2.85	5.29	24.64	14.88	1.29	4.55	3.92
20-24	58.30	40.89	1.66	7.41	8.31	34.59	26.50	0.60	2.85	4.65	23.68	14.39	1.07	4.56	3.66
25-29	53.50	38.17	1.34	7.43	6.57	31.11	24.30	0.44	2.85	3.51	22.41	13.87	0.90	4.58	3.06
30-34	48.70	34.99	1.07	7.43	5.25	27.78	21.91	0.30	2.86	2.71	20.96	13.08	0.77	4.57	2.54
35-39	44.00	31.45	0.87	7.40	4.27	24.49	19.28	0.20	2.87	2.13	19.49	12.16	0.66	4.53	2.13
40-44	39.30	27.72	0.73	7.39	3.43	21.27	16.55	0.16	2.88	1.69	18.01	11.17	0.58	4.52	1.74
45-49	34.70	24.01	0.59	7.41	2.67	18.22	13.93	0.13	2.89	1.27	16.46	10.08	0.46	4.51	1.41
50-54	30.20	20.28	0.47	7.42	2.02	15.37	11.40	0.11	2.92	0.93	14.82	8.87	0.37	4.50	1.09
55-59	25.90	16.52	0.36	7.51	1.47	12.69	8.96	0.07	2.98	0.68	13.16	7.56	0.29	4.53	0.79
60-64	21.80	13.12	0.23	7.59	0.81	10.34	6.83	0.04	3.09	0.38	11.41	6.29	0.19	4.50	0.43
65+	17.90	10.00	0.00	7.82	0.11	8.20	4.91	0.00	3.21	0.07	9.74	5.09	0.00	4.61	0.04

Table 4. Health status/insurance-specific life expectancies by age, Blacks only

Age	Total					Healthy (excellent, very good, or good)					Unhealthy (fair or poor)				
	Total (e_x)	Private Insur.	Medicaid	Medicare	No Insur.	Total (e_x)	Private Insur.	Medicaid	Medicare	No Insur.	Total (e_x)	Private Insur.	Medicaid	Medicare	No Insur.
0-4	71.70	38.18	10.21	9.33	13.98	40.89	24.40	6.00	2.71	7.78	30.82	13.78	4.22	6.63	6.20
5-9	67.90	36.77	8.47	9.22	13.43	37.66	23.03	4.72	2.58	7.33	30.23	13.74	3.75	6.64	6.11
10-14	63.00	34.55	6.49	9.09	12.83	33.81	21.23	3.22	2.47	6.89	29.16	13.32	3.27	6.63	5.94
15-19	58.10	31.99	4.97	9.04	12.05	30.03	19.14	2.15	2.45	6.30	28.02	12.85	2.82	6.59	5.76
20-24	53.30	29.49	3.76	9.07	10.98	26.49	17.26	1.30	2.46	5.47	26.81	12.23	2.45	6.62	5.51
25-29	48.70	27.58	2.95	9.12	9.04	23.10	15.70	0.82	2.48	4.10	25.60	11.88	2.13	6.65	4.94
30-34	44.10	24.81	2.48	9.16	7.65	19.81	13.50	0.56	2.48	3.27	24.29	11.31	1.92	6.68	4.38
35-39	39.60	21.96	2.14	9.10	6.34	16.93	11.55	0.37	2.49	2.52	22.62	10.41	1.77	6.61	3.83
40-44	35.10	18.85	1.87	9.13	5.24	13.90	9.30	0.21	2.52	1.86	21.18	9.55	1.66	6.60	3.37
45-49	30.80	15.94	1.50	9.26	4.10	11.51	7.52	0.13	2.57	1.29	19.29	8.43	1.38	6.68	2.80
50-54	26.80	13.15	1.18	9.24	3.21	9.75	5.94	0.12	2.64	1.04	17.03	7.21	1.06	6.60	2.17
55-59	23.00	10.26	0.75	9.49	2.49	7.94	4.38	0.07	2.74	0.74	15.05	5.87	0.67	6.75	1.75
60-64	19.40	7.98	0.30	9.67	1.50	6.43	3.05	0.00	2.89	0.49	13.01	4.92	0.30	6.78	1.01
65+	16.20	5.84	0.05	10.07	0.21	5.46	2.23	0.00	3.17	0.06	10.72	3.61	0.05	6.90	0.16

Figure 1. Proportion of person-months lived without health insurance by age and race

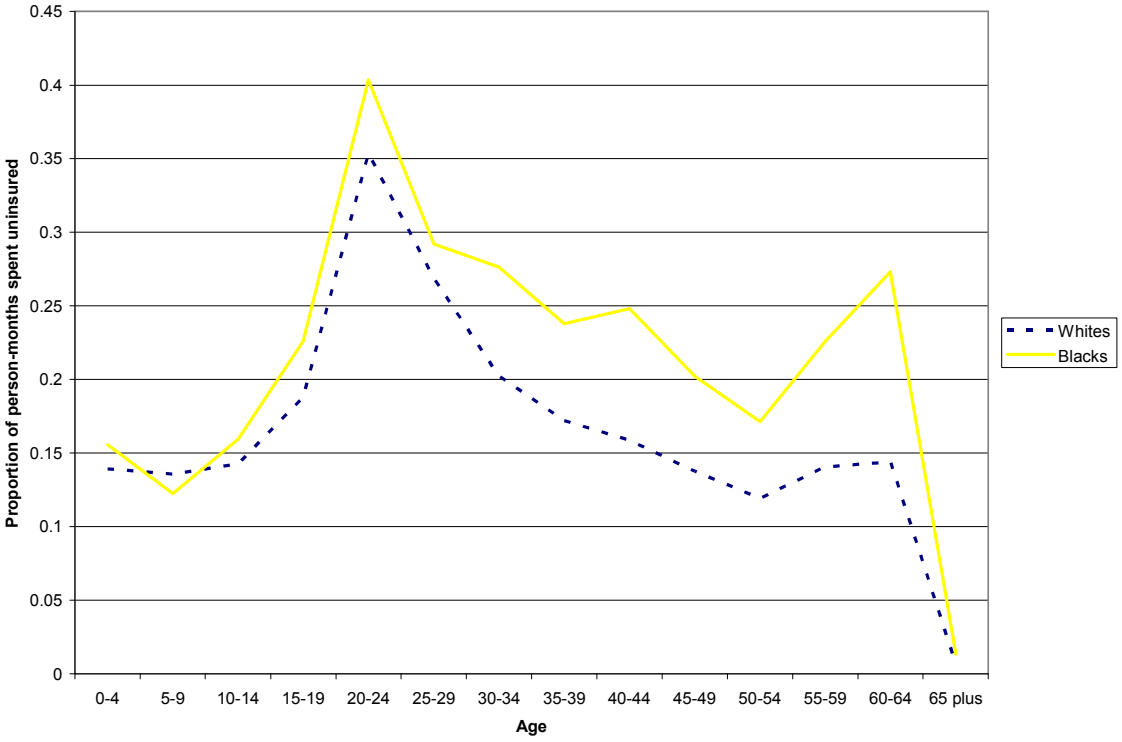


Figure 2. Expected years remaining in life in a healthy, uninsured state by age and race

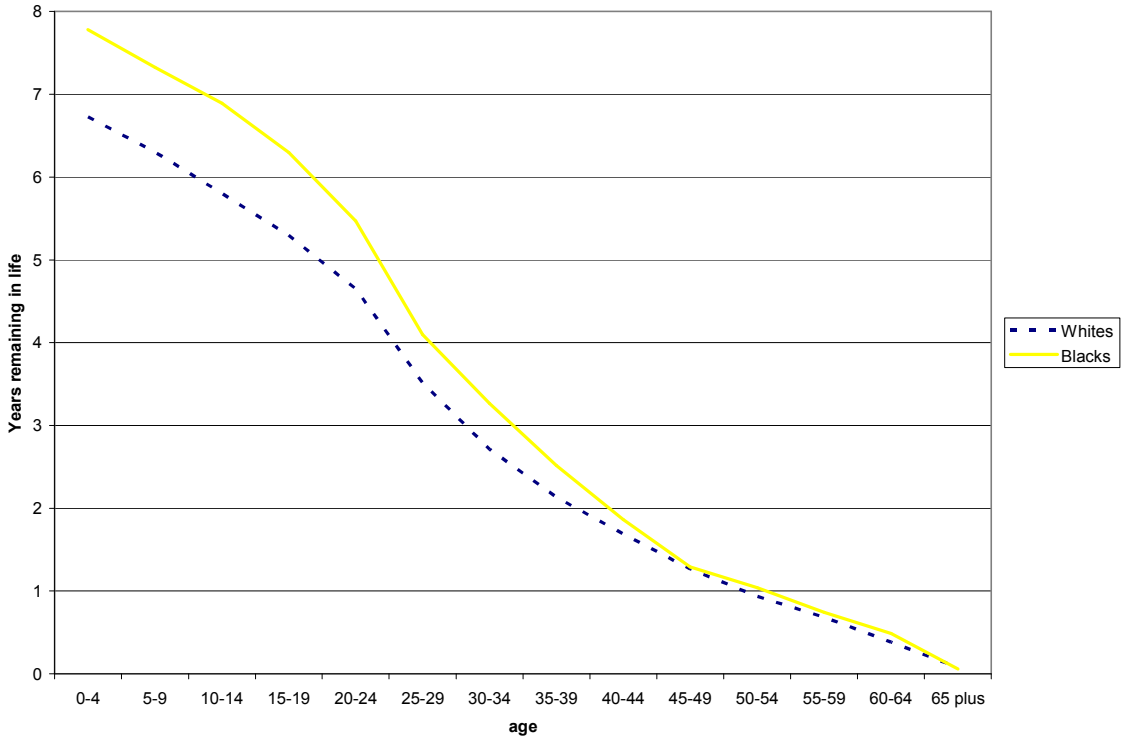
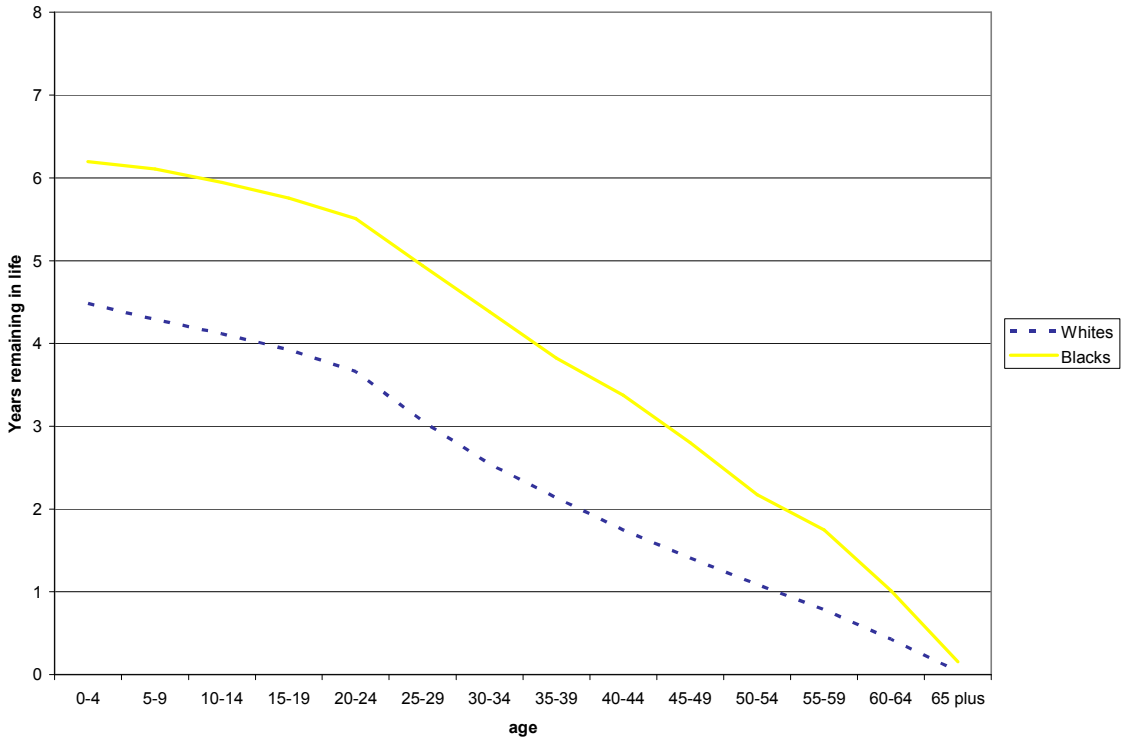


Figure 3. Expected years remaining in life in an unhealthy, uninsured state by age and race



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