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RESEARCH ARTICLE

Drug Overdose Deaths Among Non-Hispanic Black Men in the U.S.: Age-Specific Projections Through 2025

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Introduction: Fatal drug overdoses have risen sharply in the U.S. since 2015, reaching their highest levels during the pandemic. Non-Hispanic Black men have been disproportionately harmed by this latest surge; overdose mortality per 100,000 has increased fourfold since 2015. Whether the mortality rate will continue to climb is unknown. In this study, we addressed the narrower question of which age groups are likely to experience a significant increase or decrease in the burden of drug overdose deaths through 2025, based on foreseeable changes in the age structure of the Black male population.

Methods: We used the 2020 and provisional 2021 age-specific mortality rates from the Centers for Disease Control WONDER (Wide-Ranging Online Data for Epidemiologic Research) database and the standard population balancing equation to project overdose deaths in 2025. Overdose deaths were identified by ICD-10 codes. We bracketed the projections between 2 plausible alternatives: a pessimistic forecast based on time series extrapolations and an optimistic forecast that assumes success nationally in lowering overdose deaths through prevention, treatment, and harm reduction initiatives.

Results: Among Black men aged 31−47 years, overdose deaths in 2025 are expected to increase by 440 or 11% (95% CI=8%, 14%) relative to 2020. By contrast, overdose deaths among younger Black men aged 19−30 years are expected to decline by 160 or −9% (95% CI= −15%, −5%). Among older Black men aged 48−64 years, overdose deaths are also expected to decline by 330 or −7% (95% CI= −10%, −4%). Similar results were found using 2021 provisional mortality rates.

Conclusions: Overdose deaths are predicted to increase significantly over current levels among Black men in their 30s and 40s. Local policy makers should direct harm reduction resources, such as naloxone kits, syringes, and fentanyl test strips, to places frequented by Black men in this age group. Outreach messaging should be tailored to resonate with men of middle age. Equally urgent is the scaling up of nonstigmatizing, evidence-based drug treatment and recovery support services in Black neighborhoods.

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INTRODUCTION

Fatal drug overdoses have risen sharply in the U.S. since 2015, reaching their highest levels during the pandemic. Black men have been disproportionately harmed by this latest surge due in part to the separate but unequal public health response to the opioid crisis.[1,2] The Centers for Disease Control and Prevention (CDC) estimates that from 2015 to 2020 the drug overdose death rate for non-Hispanic Black men more than tripled, increasing from 17.3 to 59.6 per 100,000 persons (or 245%), surpassing the high overdose fatality rate of White men.[3] CDC's 2021 provisional estimate of fatal drug overdoses for Black men is 73.0 deaths per 100,000 persons. Black males now account for 13% of all overdose deaths in the U.S. Whether the mortality rate will continue to climb is unknown; to date, models that forecast the course of the overdose epidemic have not performed well,[4] although recent models may hold more promise.[5] One reason for poor performance is the scope of the task, which involves identifying emerging trends in the illegal drug markets and quantifying their effects. In this study, we investigated a narrower question: among Black men, which age groups are likely to experience a significant increase or decrease in the burden of drug overdose deaths through 2025, based on foreseeable changes in the age structure of the Black male population?

METHODS

Study Sample

This study used anonymized publicly available data from the CDC WONDER (Wide-Ranging Online Data for Epidemiologic Research) database. As such, the study was deemed exempt from IRB review. The study followed the STROBE reporting guidelines.

Measures and Statistical Analysis

Our overdose mortality forecast model consisted of a set of numerical operations from basic demography. First, we estimated the 2025 population of non-Hispanic Black men in the U.S. using 2020 Census data and the population balancing equation, which states that the population of a country can increase or decrease between any 2 points in time only because of births, deaths, and movement of population across national boundaries.[6] To get an initial estimate of the 2025 Black male population, we advanced the 2020 age-population curve of Black males ahead for 5 years. People between the ages of 10 years and 59 years in 2020 will be 15 years and 64 years in 2025. We then adjusted the 2025 population by the age-specific probability of dying of any cause.[6] To minimize errors in calculating the lifespan of older persons, we also set the upper threshold at age 65 years because it is at this period of life that the rates of death begin to show a marked increase over those of the earlier years.[7] We assumed that overdose fatalities would be unaffected by net migration in the short term.[8] (The U.S. Census Bureau publishes population projections, but the most

recent versions are obsolete because they pre-date the 2020 Census and the pandemic. See Appendix I, available online.)

Next, we projected overdose deaths in the 2025 Black male population using the 2020 and provisional 2021 age-specific drug overdose deaths per 100,000 from CDC's WONDER database. We identified drug overdose deaths using the ICD-10 codes X40−44, X60−64, X85, and Y10-14 (see code definitions in Appendix II, available online). We used a nonparametric smoother to reduce transient peaks and declines in the mortality and population data and to adjust for age heaping, the distortions in the age distribution of a population where the number of ages reported that end in 0 and 5 are greater than expected.[9]

Utilization of the last observed rates (Black male overdose mortality rates in 2020 and 2021) to forecast short-term future values (overdose mortality rates in 2025) is usually called the naive forecast and is appropriate for time series that are poorly understood, that is, reliable and accurate prediction models are not yet available.[10] To our knowledge, there are no published models that forecast overdose mortality rates by racial or ethnic group.

As a check on the feasibility of the naive forecast, we examined the 2017−2021 overdose mortality curves of Black men for consistency in the age distributions over the 5-year period. To identify potential bias due to cohort effects, we inspected the mortality curves for age groups (e.g., millennials) with a higher or lower mortality rate than neighboring generations that persists as the groups grow older.[11]

Finally, we applied the 2020 overdose mortality rates to the 2025 population to determine the expected number of age-specific deaths in 2025. We reported differences between 2020 observed and 2025 projected deaths by age groups with standardized mortality ratio CIs.[12] We also computed the expected number of deaths using the CDC's 2021 provisional mortality rates. In computing the provisional 2021 mortality rates, the CDC used the 2020 population census counts in the denominator. Counts of overdose deaths are rounded to the nearest 10.

For comparison purposes, we also projected 2025 overdose deaths using an interrupted time series analysis (ITSA). We modeled overdose mortality trends before and after the onset of coronavirus disease 2019 (COVID-19) in March/April 2020. We used ITSA because there appears to have been an abrupt increase in overdose deaths in March/April 2020, and this change in level appears to have persisted. ITSA is designed to analyze both change in level and change in trend lines (slopes). Using the ITSA estimates for the 3 age groups (Black men aged 19−30, 31−47, and 48−64 years), we extrapolated the identifiable trend lines through December 2025 (full details of the model are described in Appendix III, available online).

As a third scenario, we projected the impact of the nationwide expansion of drug prevention, treatment, and harm reduction interventions designed to reduce overdose deaths. We posit a reduction in the naive forecast of 3% per year (reduction of 11.5% by 2025), comparable with the observed annual percent reductions in cancer and heart disease in Black men that resulted from concerted public health efforts (Appendix IV, available online).[13]

RESULTS

Figure 1 displays the overdose mortality rate with respect to age for years 2017−2021. It shows that the shape of the
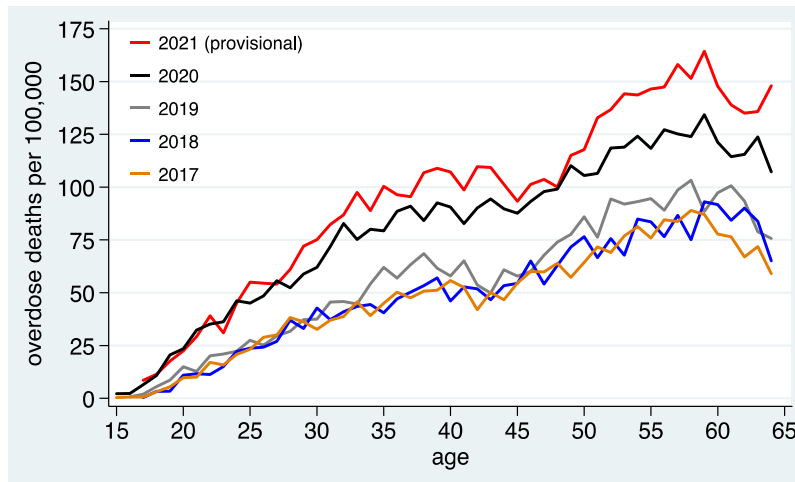
Figure 1. Drug overdose mortality rate by age and year, Black men, 2017−2021.

age-mortality curve for Black men was stable even though the amplitude of the curves generally increased over time, reaching a high point in 2021 (Appendix V, available online). Cohort effects were not detected (Figure S7).

Figure 2 graphs the 2020 actual and the 2025 projected population curves. Three large shifts in the age structure of the population are visible. The population of both younger (aged 19−30 years) and older (aged 48−64 years) Black men are projected to decline. The population of men in the middle years (aged 31−47 years) is projected to increase.

Applying 2020 age-specific mortality rates to the 2025 population projections (which produces the naive forecast), deaths among Black men aged 31−47 years are expected to increase by 440 or 11% (95% CI=8%, 14%) relative to 2020, because this age group will be larger in 2025 (see population bulge peaking at age 33 years in Figure 2) and overdose deaths generally increase with age until age ∼58 years (Figure 1). By contrast, deaths among younger Black men aged 19−30 years are expected to decline by 160 or −9% (95% CI=−15%, −5%). Deaths among older men aged 48−64 years are expected to decline by 330 or −7% (95% CI= −10%, −4%).

Similar death counts were projected using the 2021 provisional mortality rates: 490 additional deaths in
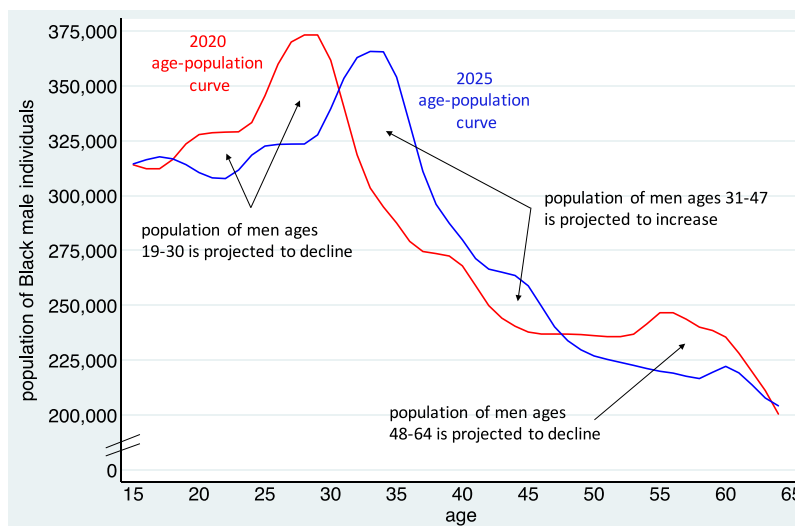
Figure 2. Projected population change by age of Black men from 2020 to 2025.
Where the red (2020) population curve is above the blue (2025) population curve, a decline in the 2025 population is projected. Where the blue curve is above the red curve, an increase is projected.

Table 1. Forecasts of 2025 Overdose Deaths Among Black Men Aged 19−64 years and Comparisons With 2020 Observed Deaths (Rounded to Nearest 10)

Estimate	Ages 19−30 years	Ages 31−47 years	Ages 48−64 years
2020 overdose deaths	1,820	3,960	4,720
2025 naive forecast	1,660	4,400	4,390
Minus 2020 deaths	−160	440	−330
% different from 2020	−9%	11%	−7%
2025 naive forecast with 3% per year mitigation	1,470	3,900	3,890
Minus 2020 deaths	−350	−70	−830
% different from 2020	−19%	−2%	−18%
2025 ITSA projections	1,880	8,070	8,850
Minus 2020 deaths	60	4,110	4,130
% different from 2020	3%	104%	88%

ITSA, interrupted time series analysis.

2025 among men aged 31−47 years, 170 fewer deaths among men aged 19−30 years, and 330 fewer deaths among men aged 48−64 years.

We also projected a 3% per year reduction from the naive forecast owing to strenuous policy and funding initiatives across the U.S. to enhance access to drug programs and harm reduction services. For each age group, this reduction would bring the number of deaths below the 2020 observed counts. In 2025, there would be 350 fewer deaths (−19%) for men aged 19−30 years, 70 fewer deaths (−2%) for men aged 31−47 years, and 830 fewer deaths (−18%) for men aged 48−64 years.

In addition to the naive forecast and the naive forecast adjusted for a 3% per year reduction, we projected overdose mortality trends using ITSA. The ITSA estimates show that, following the emergence of COVID-19 in March/April 2020, each of the 3 age groups experienced a large, abrupt increase in overdose deaths, from 66 to 88 deaths per month, that persisted through the study period ending December 2021 (regression details are provided in Appendix III, available online). Apart from this increase, there also were changes in the overdose trend lines after March/April 2020. Among Black men aged 19−30 years, the overdose mortality trend line diverged from its pre−COVID-19 trajectory, changing from an increasing slope to a nearly flat slope (Figure S2). For the age group 19−30 years, the 2020 annual death toll of 1,820 is estimated to increase marginally (60 deaths or 3%) by 2025. In contrast, the positive pre−COVID-19 mortality slopes of Black men in the older age groups continued after March/April 2020, and at slightly higher rates (Figures S3 and S4). Among Black men aged 31−47 years, the ITSA-estimated overdose deaths are projected to double (104%), rising from 3,960 in 2020 to 8,070 in 2025. Similarly, overdose deaths

are expected to rise sharply among Black men aged 48 −64 years, from 4,720 in 2020 to 8,850 (88%) in 2025. Table 1 presents the 3 alternative projections: naive forecast, naive forecast with 3% per year mitigation, and the ITSA-extrapolated forecast. Figure 3 shows the projections relative to the observed deaths in 2020.

DISCUSSION

By the second year of the pandemic (2021), the overdose death rate for Black men had reached a new peak. Assuming only minor variations in that rate through 2025 (i.e., the drug mortality rate will not regress to lower prepandemic levels or rise to even higher levels), the shift in the age distribution of the Black male population will gradually reduce the number of deaths in both the younger and older age groups while increasing the burden of overdose deaths among men in their 30s and 40s. These are benchmark expectations against which the statistics on actual deaths may be compared. We have bracketed the naive forecast between 2 alternative future scenarios: a pessimistic forecast based on the time series extrapolations and an optimistic forecast that assumes success nationally in lowering overdose deaths through prevention, treatment, and harm reduction initiatives. We note, however, that our death projections are the tip of the iceberg in that for every overdose death, there are hundreds of individuals who survived drug misuse but will struggle with drug use disorder and the risk of overdose in the years ahead.[14,15] In addition, there is mortality attributable to drug use other than overdose death, for example, from conditions associated with injection drug use such as infective endocarditis and sepsis.[16]

The 2025 death projections are usefully summarized by our age categories (ages 19−30, 31−47, 48−64 years),
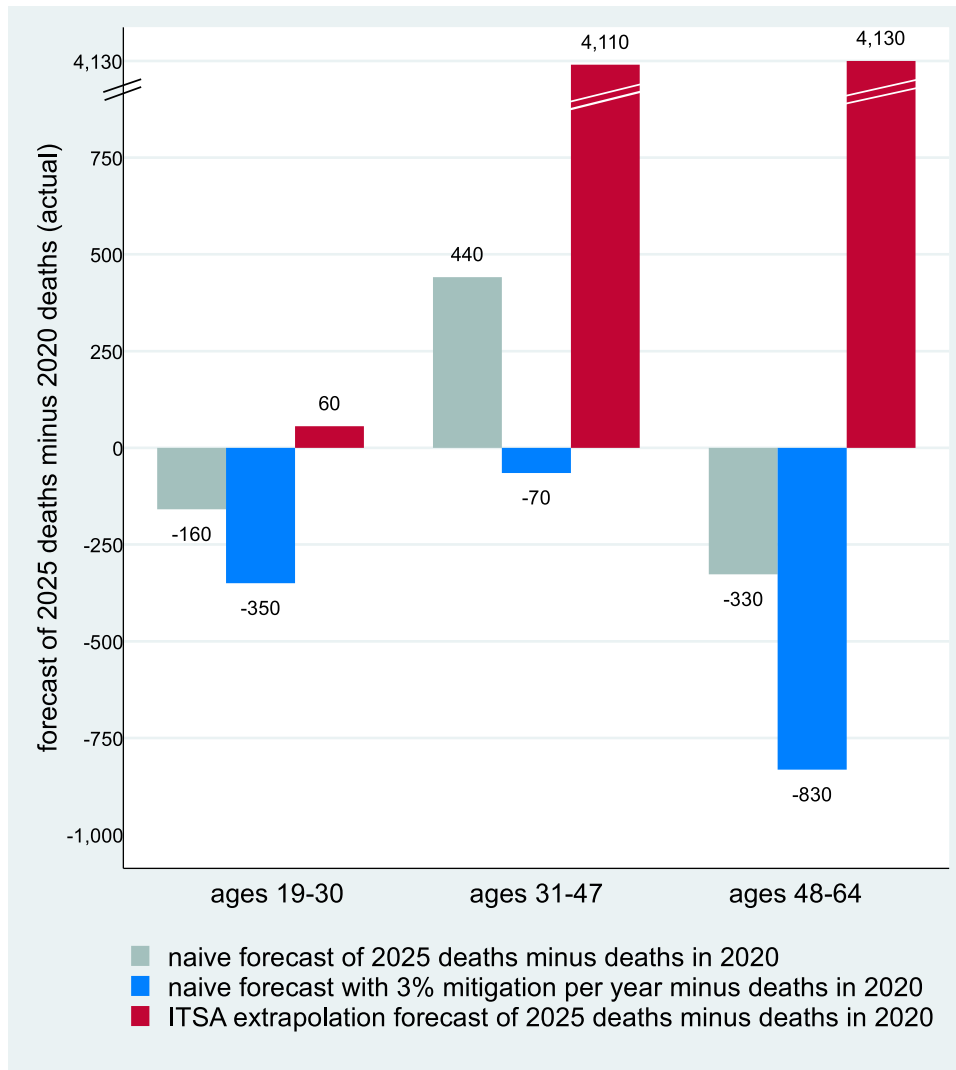
Figure 3. Three forecasts—naive, naive with 3% mitigation, and extrapolation using interrupted time series analysis (ITSA)—of 2025 overdose deaths relative to 2020 deaths of Black men aged 19−30, 31−47, and 48−64 years.

which we derived from several sources. One was the age-mortality curves in Figure 1, which showed a fast rise in overdose deaths before age 30 years, followed by a period of slower increase and then another period of sharp rise beginning about age 48 years. Another was the population shifts in Figure 2. Our population forecast indicated a decline in the younger and older populations and a large increase in the middle years. The age categories also correspond to life stages where individuals share commonalities with regard to experiences. For African American men, the likelihood of drug use disorder may be linked to extended deprivation in childhood, whether material or psychosocial, which could begin to surface in the early adult years.[17] By middle adulthood, the structural racism that young Black men endure may lead to marginalized roles within the family and community

and prevent the development of protective factors at a time of growing responsibilities and commitments with respect to employment, marriage, and parenting.[18] In later middle age, Black men may have to withstand the additional stressors of work discrimination and impeded advancement, health challenges with increasing comorbidities, social isolation, and chronic financial strain.[19] Over the life course, the accumulation of disadvantage is manifested in age-related patterns of overdose risk.

Limitations

This study has limitations. First, the assumption that the rate of overdose deaths will not change through 2025 (naive forecast) cannot be justified by experience; rather, it is proposed as a reasonable default position until it can be replaced by a more accurate assumption

supported by research. Second, the CDC's 2021 provisional data are a report of actual counts adjusted for incomplete reporting. Suicide-related overdose deaths are probably the most underestimated because the cause and circumstances of death may take longer to determine and are hard to distinguish from accidental overdose deaths.[20,21] Because our data were compiled >5 months after the event, underestimation of this component of the total should be minimal. We report the projections on the basis of provisional data without CIs because they are subject to change.[22]

CONCLUSIONS

The increased death toll of persons in the middle years of life, with the irreplaceable losses in human capital, earnings, and caregiving responsibilities for young and old, will have a damaging impact on Black families and communities that could reverberate for decades. To combat the expected increase in drug-related deaths, policy makers should direct harm reduction resources, such as fentanyl test strips, syringes, and naloxone kits, to places frequented by Black men in this age group, such as work sites, churches, neighborhood gathering spots (barber shops, civic clubs), and sporting and entertainment venues.[23] Outreach messaging should be tailored to resonate with Black men of middle age. Equally urgent is the scaling up of accessible and nonstigmatizing evidence-based drug treatment and recovery support services in Black neighborhoods.[24]

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CREDIT AUTHOR STATEMENT

Rebecca Arden Harris: Conceptualization, Methodology, Formal analysis, Software, Data curation, Writing- Original draft preparation, Visualization, Investigation, Validation, Writing- Reviewing and Editing.

SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.focus.2022.100063.

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