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The US Mortality Crisis: An Examination of Non-Hispanic White Mortality and Morbidity in Yavapai County, Arizona

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Abstract

Midlife non-Hispanic white mortality in the United States is rising, particularly in small metro and rural counties. This article responds to calls for county-level studies. We examine social determinants of morbidity and mortality among adult non-Hispanic whites in Yavapai County, Arizona, as part of an integrative study. We report overall mortality trends in Yavapai County using CDC Wonder data and then examine social determinants of reported physical health and mental distress in Yavapai County data using 6 years (2011–2016) of the Arizona Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS includes 1,024 non-Hispanic white respondents aged 25–64. We also present data from the recently established Yavapai County Overdose Fatality Review Board (YCOFRB). Mortality trends indicate that suicide and drug and alcohol-related mortality have all increased since 1999. These increases affect all 5-year age groups from 25 to 64 and both men and women. BRFSS data show that low education and unemployment, but not number of children or home ownership, are significantly associated with worse reported health and frequent mental distress in multivariate analyses. The YCOFRB point to the importance of homelessness and mental health. The mortality crisis in Yavapai County is not restricted to midlife or to drug-related deaths. The unemployed and those with low levels of education are particularly at risk. There is a need for integrative approaches that use local data to elucidate social determinants of morbidity and mortality and to reveal structural determinants.

Keywords Mortality · US · Health behavior · Social factors · Mental health

Introduction

Since 1998, mortality has increased among midlife non-Hispanic whites in the United States. The mortality increase, which appears to have begun in the southwest and spread throughout the US, is most severe among those with a high school education or less living outside of large urban areas [1]. The causes of death which contribute the most to excess mortality are behavioral, including suicides and drug and alcohol poisonings, but other causes such as cardiovascular disease are also at play [2]. Poorer reported mental and physical health accompany the crisis, notably increases in chronic pain, disability, and opioid addiction [3, 4]. It is also true that this increase in mortality among non-Hispanic whites in the United States is likely a recent permutation of decades-long declining health in the US, which affected minorities first, such as during the crack epidemic in the 1990s [5].

Outside of war and infectious disease epidemics, there are few cases of rising mortality in modern history. Post-Soviet countries are the major exception [6, 7]. Post-Soviet excess mortality was driven by cardiovascular, alcohol, and injury-related deaths, including suicides. Middle-aged men with lower levels of education were particularly at risk. Although mortality in some post-Soviet countries remains high, mortality has decreased since the early 1990s. Thus, midlife mortality among non-Hispanic whites in the US represents an unusual sustained mortality reversal, which has persisted for two decades. It is also unusual in that it disproportionately affects women [8].

Case and Deaton surmise that the causes of death implicated "are likely symptoms of the same underlying

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epidemic", concluding that there is "increasing distress among whites in midlife after the late 1990s", and calling these excess deaths "deaths of despair."[1, 9]. Scholars have questioned the speed at which despair has been adopted as an explanation for the deaths of non-Hispanic whites, when higher rates of mortality among Hispanics and African-Americans have often been attributed to individual responsibility [10]. Some assert that despair is less a driver of the mortality crisis than drugs, claiming that death rates from suicide and chronic liver disease are stable [11]. This despair versus drugs debate reflects valid political concerns about the racialized response to drug use, but the debate also detracts from the fact that despair and drug use are likely intertwined among all racial and ethnic groups.

Montez and Berkman, among others, call for studies of social context "within states and counties," noting that smaller studies have the potential to provide insight into the "specific contextual characteristics" of mortality [12]. "In other words, the search for explanations may benefit by moving away from methodological individualism (the notion that mortality inequalities can be explained exclusively by individual characteristics) and towards an approach that integrates the broader contexts that constrain individuals' lives." [12]. County-level studies are strengthened by integrative approaches using multidisciplinary methods of data collection and analysis.

Yavapai County

This article is part of a larger research project of social distress in midlife in Yavapai County, Arizona. Yavapai County is a small metro county with a population of around 211,000 people, comprised of 84% non-Hispanic whites, 14% Hispanics (the majority born in the US), and 2% Native American. Yavapai County was selected as the context to more closely examine social determinants of health because of its rural and small metro population, the large proportion of non-Hispanic whites, and the observed mortality disadvantage in such settings. Yavapai County also has one of the highest non-Hispanic white midlife suicide rates of all US counties [13, 14].

This article reports on quantitative analysis of a multidisciplinary research project to understand the cultural context of excess mortality in Yavapai County. The larger project includes secondary analysis of existing datasets, in-depth interviews, a bespoke survey, participant observation at county institutions and meetings, and archival research. In this article we report on epidemiological data on mortality and morbidity, documenting county mortality trends and the sociodemographic determinants of reported health and frequent mental distress. We also draw on the work of the Yavapai County Overdose Fatality Review Board. The aim is twofold: (1) to characterize county mortality trends and compare them to national trends and (2) to determine the sociodemographic risk profile of health and distress among non-Hispanic whites in Yavapai county, Arizona.

Methods

We analyze CDC Wonder mortality data from 1999 to 2017. Following Case and Deaton [9] we focus on specific cause of death codes from the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD10), including alcoholic liver diseases and cirrhosis (ICD10 K70, K73-74), suicide (X60-84, Y87.0), and poisonings (X40-45, Y10-15, Y45, Y47, Y49). We examine these deaths by 5-year age groups and by cause of death (suicide, drug-related, and alcohol-related).

We analyze Yavapai county data from 6 years (2011–2016) of the Arizona Behavioral Risk Factor Surveillance System (BRFSS). These aggregated data contain 2,858 respondents with 1,186 respondents aged 25–64. Of these, 1,024 are non-Hispanic white. The non-Hispanic white sample fulfills BRFSS analytic guidelines which recommend 500 respondents per sampling unit (usually the county) and at least 50 respondents per survey item for stable county-level estimates [15]. Stable multivariate analyses are precluded with the small number of persons in other race/ethnic groups and therefore these participants were excluded. We adjusted state-specific sample weights from each year by multiplying them by the proportion of that year's sample size relative to the 6-year total sample size to create a 6-year pooled sample weight [16].

At present the BRFSS data are not linked to mortality data. We therefore use two proxy health outcome measures, self-rated health status and frequent mental distress. Self-rated health, assessed by the question "How would you rate your health? excellent, very good, good, fair, or poor?" is a key marker of health-related quality of life and predicts mortality risk independent of established health determinants [17] and health-related biomarkers [18], although this may be less true for behavioral causes of death such as suicides and drug and alcohol-related causes [19]. We dichotomized this variable into poor/fair versus better health. Participants were also asked "Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?" We created a variable indicating participants who reported poor mental health 14 or more days of the last 30. This variable, called frequent mental distress by the CDC [20], identifies persons with a substantial burden of poor mental health and greater activity limitation.

We examine these outcomes and their associations with marital status, number of children, education, employment

(employed versus unemployed), and housing (rent versus own). We also statistically control for age, sex, and smoking. Education was represented using indicator variables (less than high school, high school graduate, some college, and college graduate or higher) and the number of children was coded as 0, 1, 2 and 3 or more. The number of children met an interval assumption and therefore did not require indicator variable form for proper model specification. We report sensitivity analyses using income as a covariate.

We restrict our analyses to non-Hispanic white Yavapai county residents aged 25–64. We used a generalized linear model with a Poisson distribution and a log link. This model, in combination with a robust standard error estimate, has several desirable properties. It provides more accurate confidence intervals and generates incidence rate ratios which are preferable to odds ratios for the analysis of binary outcomes [21]. All BRFSS analyses were conducted using Stata MP 15.1 and incorporate the complex survey design.

We also draw on two annual reports of the Yavapai County Overdose Fatality Review Board and over 2 years of ethnographic research in the county to add contextual information that is not available in existing datasets.

Results

Mortality

Among non-Hispanic whites aged 25–64 in Yavapai County, age-adjusted drug, alcohol, and suicide mortality has increased from 53.7 per 100,000 in 1999 to 126.8 per 100,000 in 2017. The comparable US rate in 2017 was 83.2 per 100,000. The 2017 Yavapai County rate for non-Hispanic white men was 153.5 per 100,000; for women it was 102.6. While non-Hispanic white women's rates are lower than men's they have increased by a greater percentage. Among Hispanics in Yavapai County the rates are unreliable; grouping data from 2016 to 2017 gives an age-adjusted rate of 79.4 per 100,000 compared to a rate of 38.4 from 1999 to 2005. All 5-year age groups from 25 to 64 have experienced increases in these causes of mortality over the past two decades, suggesting that the 45–54 age group originally identified by Case and Deaton [9] is too narrow, a conclusion supported by other analyses [22]. The mortality crisis in Yavapai County affects non-Hispanic white and Hispanic adults aged 25–64.

Age-adjusted mortality rates among non-Hispanic whites aged 25–64 in Yavapai County in 2017 are 43.8 per 100,000 for drug-related causes, 32.8 per 100,000 for alcohol-related causes, and 50.2 per 100,000 for suicide, all well above national rates. Comparing these rates to the rates in 1999–2003 (combined years are used to generate reliable rates), suicides and drug-related and alcohol-related mortality rates have all increased. Suggestions that suicide and alcohol-related causes are not driving excess mortality do not reflect mortality in Yavapai County [5, 11].

Morbidity

Descriptive statistics for the 2011–2016 BRFSS sample from Yavapai county are shown in Table 1. These data show that the non-Hispanic white population aged 25–64 has a mean age of 49 years. A majority (64%) are married or partnered. Thirty-six percent have at least one child. Only 23% have a college degree. Almost a fifth of this subpopulation (17%) report being unemployed or unable to work. Over a third have an annual household income of less than $35,000. Almost three-quarters report owning their home. Seventeen percent report poor or fair self-rated health. Thirteen percent report frequent mental distress.

Incidence rate ratios for reported health and frequent mental distress are shown in Table 2. The multivariate analyses indicate that both health outcome variables show significant statistical associations with education, employment, and smoking among non-Hispanic whites in the expected directions. A high school degree or higher protects against poor reported health, while high school and some college protects against frequent mental distress. Unemployment or being unable to work is a determinant of both frequent mental distress and self-rated health—the unemployed/unable to work are almost four times as likely to report poor reported health and more than two times as likely to report frequent mental distress. Interestingly the relationship with current smoking is stronger for frequent mental distress than poor self-rated health.

In multivariate analyses age was inversely associated with reported health and unrelated to frequent mental distress. Being married or partnered was inversely associated with frequent mental distress. Gender and number of children were not associated with either outcome. In bivariate analyses income was inversely associated with both poor reported health and frequent mental distress (r's $= -0.34$ and -0.12, respectively) but was only associated with poor self-rated health in multivariate models (data not shown).

Given the consistent association between education and the health outcomes we more closely examined both outcomes by education level. Overall, 17% of participants report poor reported health (95% CI 14–20%) and 13% reported frequent mental distress (95% CI 11–17%). However, among those with less than a high school education, 43% (95% CI 27–62%) reported poor health and 40% (95% CI 23–60) reported frequent mental distress. Likewise among the unemployed/unable to work, 53% (95% CI 44–63%) reported poor health and 33% (95% CI 25–43%) reported frequent mental distress.

Table 1 Demographic characteristics of Yavapai County non-Hispanic Whites aged 25–64, 2011–2016 Arizona behavioral risk factor surveillance system (N = 1024)

Characteristic	%	N
Age years, mean (SD)	48.7 (12.9)	1024
Sex		
Female (%)[a]	51.6	594
Male (%)	48.4	430
Marital status (%)		
Married/partnered	64.1	620
Divorced	18.6	209
Widowed	2.9	48
Separated	1.7	20
Never married	12.8	127
Number of children (%)		
0	64.3	775
1	14.4	99
2	10.4	81
3 or more	10.8	68
Missing	0.1	1
Education level (%)		
Less than high school	9.1	46
High school diploma	31.3	266
Some college	36.3	337
College graduate or higher	23.3	375
Employment (%)		
Employed	62.3	586
Unemployed/unable to work	16.6	185
Homemaker	7.4	54
Student	1.5	10
Retired	11.6	182
Missing	0.7	7
Annual household income (%)		
$0–$19 999	17.1	180
$20–$34 999	17.1	172
$35–$75 000	30.0	320
$75,000 or more	23.4	231
Missing	12.5	121
Own home (%)		
No	26.1	255
Yes	73.9	769
Current smoker	23.2	207
Self-rated health (%)		
Poor	5.2	74
Fair	11.9	122
Good	25.6	251
Very good	37.1	359
Excellent	19.8	214
Missing	0.5	4
Mean (SD) self-rated health	3.5	(1.2)
Days with poor mental health, last 30 days (%)		
0–14 days	85.5	888
14–30	13.3	127
Missing	1.3	9
Days with poor mental health, mean (SD)	4.1	(9.5)

Table 1 (continued)

SD Standard deviation

[a]Percentages are weighted to represent non-Hispanic whites aged 25–64 in Yavapai County, Arizona

Table 2 Multivariate incidence rate ratios for poor reported health and frequent mental distress; Yavapai County, AZ, 2011–2016 behavioral risk factor surveillance system

	Poor reported health		Frequent mental distress	
	IRR	95% CI	IRR	95% CI
Age (years)	**1.03**	[1.01,1.06]	0.99	[0.97,1.02]
Man	0.98	[0.71,1.34]	0.85	[0.56,1.28]
Married/cohabiting	0.96	[0.68,1.35]	**0.56**	[0.34,0.93]
Number of children (0–3+)	1.14	[0.90,1.43]	1.15	[0.91,1.46]
Less than high school (referent)	1.00	–	1.00	–
High school	**0.61**	[0.38,0.99]	**0.51**	[0.28,0.94]
Some college	**0.57**	[0.35,0.91]	**0.41**	[0.22,0.74]
College or higher	**0.37**	[0.20,0.67]	0.55	[0.26,1.17]
Unemployed/unable to work	**3.84**	[2.69,5.48]	**2.45**	[1.53,3.93]
Own home	1.03	[0.67,1.58]	1.14	[0.69,1.89]
Current smoker	**1.50**	[1.01,2.22]	**2.50**	[1.54,3.95]

N's = 1013 & 1008. These analyses include 20 missing values of smoking singly imputed to nonsmoker. Poor mental health is 14 or more mentally unhealthy days in the last 30 days. Poor self-rated health is fair or poor health versus good, very good or excellent health

Bold indicates $p <= 0.05$

IRR Incidence rate ratio, *CI* confidence interval

Overdose Deaths

A number of governmental and non-governmental community organizations in Yavapai County formed the Yavapai County Overdose Fatality Review Board in August 2016. The board selects a sample of overdose deaths each year to review, examining the medical examiner's report, police report, medical history, and legal history of the deceased. When possible, family members are interviewed to gather additional information on the history of drug and alcohol use, employment, education, and veteran status.

Twenty-one deaths were reviewed in 2017. These deaths were selected as a purposeful sample, based on the drugs implicated: heroin, fentanyl, methamphetamine, mixed drug (including oxycodone), and mixed drug and alcohol intoxication. While conclusions drawn from these few cases must be regarded with caution, it is worthwhile to note that the vast majority of these individuals suffered from mental illness and substance use. All but two had at some time been prescribed opioids. About three-quarters were unemployed and about half were homeless at the time of death. About half had spent time in jail or prison and were on probation

or parole at the time of death. About a fifth of them came to Yavapai County for substance abuse recovery programs. These data evoke the ways that risk factors converge on lives and illustrate the importance of mental health and homelessness.

The overdose fatality reviews are geared toward generating specific recommendations and interventions—for example, offering education to users on new synthetic drugs, referring family and friends to support services after an overdose death, involving law enforcement in intervention programs, and providing education and support to employees of recovery homes and services. While the potential for scaling up interventions is important, interventions must also be responsive to local context.

Discussion

Analysis of mortality data indicate that among non-Hispanic whites in Yavapai County all 5-year age groups from 25 to 64 have experienced increases in "deaths of despair"; both men and women have been affected, although the rate among women has increased by a greater percentage. Excess mortality is related to drugs, alcohol, and suicide. Furthermore, there is unavoidable overlap between overdose deaths and suicides, since intentionality is not always clear in these cases. The debate between drugs and despair [11] is important in drawing attention to the racialized responses to drug crises, but at least in Yavapai County, cause of death data suggests that both drugs and despair are both implicated in rising mortality.

In our analysis of reported health and frequent mental distress gender was not significant in multivariate models. Given reported associations in the literature between gender and poorer mental health—women are more likely to report poorer mental health [23, 24]—this result is interesting and may signal historical change, also reflected in increases in midlife mortality from behavioral causes of death that have traditionally disproportionately affected men. It is also possible that other measures of mental health would show a gender difference. Our results show that both men and women are experiencing poor health in Yavapai County.

Among non-Hispanic whites in Yavapai County education and employment are the most robust predictors of physical and mental health among ages 25–64. In our analysis benefits accrue with a high school diploma or more; a college education may have more benefits in the area of reported health than frequent mental distress. Other recent analyses show that educational disparities in mortality have widened since the 1960s, particularly for non-Hispanic whites [25]. Much of this is due to improving mortality among those with higher education, but some of it is due to worsening mortality among those with lower levels of education, particularly among non-Hispanic white women [26]. Given that the proportion of the US population with less than a high school education has decreased, selection may also play a role [1]. Public health scholars commonly cite the fact that education secures advantages in society, highlighting access to better jobs and healthcare [26]. It is also true that family and social relationships are increasingly stratified by level of education, thus segregating those with less education from potential social network resources [27, 28]. In rural and small metro counties it may be that those with higher levels of education absorb a greater proportion of the available employment opportunities, while those with lower levels of education are left with fewer, less desirable opportunities. It is also likely that individuals with higher levels of education migrate to urban areas where there are more employment opportunities [5]. The strong relationship between unemployment and health is likely bidirectional. People with poor physical or mental health are more likely to be unable to work.

The findings presented here are limited to individual-level characteristics and do not reflect the effects of population composition or other layers of contextual risk present in Yavapai County, including relatively high housing costs and limited employment opportunities. Veterans represent 15% of the county population, compared to 8% of the total US population [13]. The county is also a substance use recovery destination which has received national press coverage for the preponderance of sober living homes and recent moves to regulate them [29]. There were 289 individuals experiencing homelessness in the county during the January 2018 point-in-time (PIT) count; this number represents a similar proportion of the general population as in Phoenix [30]. Compared to the total US population, Yavapai County has an older and less diverse population. These county-level contextual risk factors could potentially be incorporated into multi-level statistical models. Other studies have found that counties with greater proportions of the population with less than a high school education and living in poverty have higher overdose mortality [31]. Exogenous trade liberalization [32] and economic and family distress [33] have also been identified as city and county-level contextual risk factors for mortality. Multi-level analyses have the potential to connect individual risk factors to contextual risk factors. Multi-level analyses, however, may still elide regional or national flows of drugs, individuals experiencing homelessness, and individuals in recovery.

Since 1999 Yavapai County has seen increasing rates of suicide and alcohol and drug-related deaths in all non-Hispanic white adult ages examined. Poor mental and physical health are associated with low levels of education and unemployment. Yavapai County is also home to sizeable veteran, homeless, and recovery communities. Interventions to address the mortality crisis must address social determinants

of health, such as education and employment, which appear to carry risks across many contexts, and also local structural determinants of health, such as drug accessibility and the presence of particular vulnerable communities. National level data may mask local particularities. Local data may elide national flows. Mixed-methods integrative studies are best able to attend to the complex multilevel determinants of mortality.

Compliance with Ethical Standards

Conflict of interest We have no conflicts of interest or financial conflicts to report.

References

1. Case, A., & Deaton, A. (2017). Mortality and morbidity in the 21st century. *Brookings Papers on Economic Activity*, pp. 397–476.
2. Schmid, C. H. (2016). Increased mortality for white middle-aged Americans not fully explained by causes suggested. *Proceedings of the National Academy of Sciences of the USA, 113*(7), 2912.
3. Zajacova, A., & Karas, J. (2017). Physical functioning trends among US women and men age 45–64 by education level. *Biodemography and Social Biology, 63*(1), 21–30.
4. Manchikanti, L., et al. (2012). Opioid epidemic in the United States. *Pain Physician, 15*, ES9–ES38.
5. Muennig, P. A., Reynolds, M., Fink, D. S., Zafari, Z., & Geronimus, A. T. (2018). America's declining well-being, health, and life expectancy: Not just a white problem. *American Journal of Public Health, 108*(12), 1626–1631.
6. Notzon, F. C., Komarov, Y. M., Ermakov, S. P., Sempos, C. T., Marks, J. S., & Sempos, E. V. (1998). Causes of declining life expectancy in Russia. *Journal of the American Medical Association, 279*(10), 793–800.
7. Parsons, M. (2014). *Dying unneeded: The cultural context of the Russian mortality crisis*. Nashville: Vanderbilt University Press.
8. Montez, J. K., & Zajacova, A. (2014). Why is life expectancy declining among women in the United States? *American Journal of Public Health, 104*(10), 5–7.
9. Case, A., & Deaton, A. (2015). Rising morbidity and mortality in midlife among white non-Hispanic Americans in the 21st century. *Proceedings of the National Academy of Sciences of the USA, 112*(49), 15078–15083.
10. Diez Roux, A. V. (2017). Despair as a cause of death: More complex than it first appears. *American Journal of Public Health, 107*(10), 1566–1567.
11. Masters, R. K., Tilstra, A. M., & Simon, D. H. (2017). Mortality from suicide, chronic liver disease, and drug poisonings among middle-aged U.S. white men and women, 1980–2013. *Biodemography and Social Biology, 63*(1), 31–37.
12. Montez, J. K., & Berkman, L. F. (2014). Trends in the educational gradient of mortality among US adults aged 45 to 84 years:

Bringing regional context into the explanation. *American Journal of Public Health, 104*(1), 82–90.
13. US Census Bureau. American FactFinder. [Online]. Retrieved from https://factfinder.census.gov/faces/nav/jsf/pages/community_facts.xhtml.
14. CDC and NCHS. (2018). Underlying cause of death 1999–2016 on CDC WONDER Online Database, released December, 2018. [Online]. Retrieved from http://wonder.cdc.gov/ucd-icd10.html.
15. Klein, R. J., Proctor, S. E., Boudreault, M. A., & Turczyn, K. M. (2002). Healthy people 2010 criteria for data suppression. *Statistical Notes, 24*, 1–12.
16. Korn, E. L., & Graubard, B. I. (2011). *Analysis of health surveys*. New York: Wiley.
17. Idler, E. L., & Benyamini, Y. (1997). Self-rated health and mortality: A review of twenty-seven community studies. *Journal of Health and Social Behavior, 38*(1), 21–37.
18. Barger, S. D., Cribbet, M. R., & Muldoon, M. F. (2016). Participant-reported health status predicts cardiovascular and all-cause mortality independent of established and nontraditional biomarkers: Evidence from a representative US sample. *Journal of the American Heart Association, 5*, 1–9.
19. Benjamins, M. R., Hummer, R. A., Eberstein, I. W., & Nam, C. B. (2004). Self-reported health and adult mortality risk: An analysis of cause-specific mortality. *Social Science and Medicine, 59*, 1297–1306.
20. Cook, J., et al. (1998). Self-reported frequent mental distress among adults—United States, 1993–1996. *Morbidity and Mortality Weekly Report, 47*(16), 325–331.
21. Barros, A. J. D., & Hirakata, V. N. (2003). Alternatives for logistic regression in cross-sectional studies: An empirical comparison of models that directly estimate the prevalence ratio. *BMC Medical Research Methodology, 3*, 21.
22. Minton, J., Green, M., McCartney, G., Shaw, R., Vanderbloemen, L., & Pickett, K. (2017). Two cheers for a small giant? Why we need better ways of seeing data: A commentary on: 'Rising morbidity and mortality in midlife among White non-Hispanic Americans in the 21st century'. *International Journal of Epidemiology, 46*(1), 356–361.
23. Macintyre, S., Hunt, K., & Sweeting, H. (1996). Gender differences in health: Are things really as simple as they seem? *Social Science and Medicine, 42*(4), 617–624.
24. Seedat, S., et al. (2009) Cross-national associations between gender and mental disorders in the World Health Organization World Mental Health Surveys. *Archives of General Psychiatry, 66*(7), 785–795.
25. Krueger, P. M., Tran, M. K., Hummer, R. A., & Chang, V. W. (2015). Mortality attributable to low levels of education in the United States. *PLoS ONE, 10*(7), 1–13.
26. Montez, J. K., Hummer, R. A., Hayward, M. D., Woo, H., & Rogers, R. G. (2011). Trends in the educational gradient of U.S. adult mortality from 1986 to 2006 by race, gender, and age group. *Research on Aging, 33*(2), 145–171.
27. Schwartz, C. R., & Mare, R. D. (2005). Trends in educational assortative marriage from 1940 to 2003. *Demography, 42*(4), 621–646.
28. McPherson, M., Smith-Lovin, L., & Brashears, M. E. (2006). Social isolation in America: Changes in core discussion networks over two decades. *American Sociological Review, 71*, 353–375.
29. Stone, W. (2016). Residents Call for Regulation of Sober Living Homes in Arizona. *National Public Radio*, 2016. [Online]. Retrieved from https://www.npr.org/2016/08/22/490969839/residents-call-for-regulation-of-sober-living-homes-in-arizona.
30. Basta, K. L., & Bridge, D. (2018). Arizona balance of state continuum of care sheltered & unsheltered point in time report, 2018.
31. Zoorob, M. J., & Salemi, J. L. (2017). Bowling alone, dying together: The role of social capital in mitigating the drug overdose

epidemic in the United States. *Drug and Alcohol Dependence, 173*, 1–9.

32. Pierce, J. R., & Schott, P. K. (2016). Trade liberalization and mortality: Evidence from U.S. counties. *NBER Working Paper Series, 22849*, 1–66.

33. Monnat, S. M. (2018). Factors associated with county-level differences in U.S. drug-related mortality rates. *American Journal of Preventive Medicine, 54*(5), 611–619.