The Impact of Unemployment, Income, and Cash Transfer Payments on Suicide: Evidence from the U.S. and Alaska, 1976-2019

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Abstract

From 2000 to 2018, the U.S. suicide rate rose by 41.7% to 14.8 deaths per 100,000 annually. Could this trend be reversed by providing citizens with a universal basic income? In this paper, I use both state-level data for the entire U.S. and state-level data for Alaska to examine the effects of unemployment, income, and cash transfer payments on suicide over the 1976-2019 period. Using data for the entire U.S., I estimate that a one percentage-point increase in the unemployment rate is predicted to increase the suicide rate by 1.0%. Controlling for unemployment, I find no association between per capita income and suicide. While, using regression analysis of state-level data for Alaska, I find no association between Alaska Permanent Fund dividend (APFD) payments and suicide, I conclude by arguing, with the use of descriptive statistics, that larger APFD payments could potentially improve mental health outcomes for Alaskans with low socioeconomic status.

I. Introduction

The idea of a universal basic income (UBI) – providing unconditional direct cash payments to an entire population over an extended period of time – has been met with considerable backlash. Critics claim that a universal basic income might decrease labor force participation, allow for free-riding, and be unaffordable from a budgetary perspective. Throughout history, UBI (or a version of UBI) has been championed by the likes of Thomas Paine and Martin Luther King Jr. and has gained increased relevance in recent years due to figures such as 2020 Democratic Presidential Primary candidate and 2021 New York Mayoral candidate Andrew Yang championing UBI as a key campaign proposal[1]. Even more recently, Los Angeles Mayor Eric Garcetti included a $24 million Basic Income Guarantee in his city budget released on April 20th, 2021[2]. Garcetti's plan, much like Yang's, aims to provide $1,000 to $2,000 monthly in unconditional aid to all families in Los Angeles over the next year.

While many UBI-related experiments have been run on small samples over the past several years, perhaps the most established and robust example of a modern-day UBI is the Alaska Permanent Fund dividend (APFD)[3]. The Alaska Permanent Fund was established in November of 1976 to save state oil revenues from the reach of day-to-day government and allow them to grow into perpetuity. The fund's investments are managed by the Alaska Permanent Fund Corporation and began paying out an annual dividend to Alaska residents in 1982[4]. The dividend amount is determined each year based on the number of eligible applicants in a given year as well as the fund's net income over the past five fiscal years[5,6].

While the APFD meets most of the criteria for a UBI—it has no means test, is long term, is largely unconditional, and is distributed to everyone in the region—it is not considered a complete UBI based on the criteria set forth by Marinescu (2018) because it is not large enough

to cover basic living expenses; the mean payment amount from 1982-2019 was just $1,458[7]. Due to these characteristics, it has been widely used as a proxy for UBI in past research. Jones and Marinescu (2020) study the APFD's impact on labor force participation—addressing what is arguably the largest criticism of UBI. Their analysis finds that the dividend had no effect on unemployment, and increased part-time work by 1.8 percentage points, or 17%. They suggest that the positive impact of increased consumption after receiving the dividend could stimulate labor demand and offset any reduction in employment due to the additional income. Watson, Guettabi, and Reimer (2020) study the APFD's effect on criminal activity. Their analysis finds that the payment has no effect on the majority of crimes studied, but that it leads to a short-term increase in substance abuse instances and a short-term decrease in property crimes. The authors also note that, prior to their paper, there had been virtually no research linking the permanent fund distribution to aspects of health, education, crime, or any other aspects of social well-being.

The relationship between economic conditions and health outcomes has been heavily studied. Ruhm (2000) examines precisely that—the relationship between business cycles and health. Using a state-level approach, Ruhm examines how income and unemployment affect ten causes of mortality from 1972-1991. The analysis finds that eight of the ten causes of mortality studied are procyclical, meaning that for these eight outcomes, mortality increases during economic expansion and decreases during recession. Notably, suicide is one of the two causes of death that Ruhm finds to be countercyclical. Ruhm attributes the procyclical nature of mortality to the fact that when the economy is in expansion, people tend to work more and spend less time on health-improving activities such as exercise or visits to the doctor. Ruhm (2015) takes a similar approach using a larger dataset—from 1972-2010—and finds that total mortality is no longer definitively procyclical. It is instead weakly related or unrelated to macroeconomic

conditions. However, in the larger study, Ruhm still finds suicide to be countercyclical and heavily associated with joblessness. Luo et al. (2011) takes a similar approach to Ruhm, although their focus is on the relationship between macroeconomic circumstance and suicide rates rather than total mortality. Unsurprisingly, their analysis also finds that suicide rates rise during recessions and fall during expansions. However, this is only true for groups aged 25-64; those aged 15-24 and 65+ were not affected.

Phillips (2012) takes a broader approach by looking at how various social, economic, demographic, and cultural correlates affect suicide. Phillips finds that social correlates, such as drops in the relative size of the young population and increases in the percentage of foreign-born, are associated with decreases in suicide. It is also notable that the analysis finds states with higher unemployment rates to exhibit lower non-firearm suicide rates. Phillips and Nugent (2014) follow up on Phillips (2012) with a more detailed analysis of how the economic factors surrounding the great recession affected suicide rates. Similar to Luo (2011), Phillips and Nugent find that unemployment rates are strongly positively associated with suicide rates in middle-aged men. They also find that other economic characteristics, such as percentage of manufacturing jobs and per capita income, are negatively associated with variations in suicide rates across states.

Other studies have looked more closely at a specific economic variable as a predictor of suicide. Blakely et al. (2003) examine how unemployment predicts suicide in New Zealand, and their analysis finds that unemployment was strongly associated with suicide for men aged 18-24 during the period of study. They also conduct sensitivity analysis that suggests mental illness might explain about half, but not all, of the association between unemployment and suicide. Sher (2006) looks specifically at how per capita income affects suicide rates in Europe. The analysis

finds that there is a trend towards a negative correlation between per capita income and suicide among men, and that men in countries with lower per capita income tend to commit suicide at a much higher rate than men in countries with higher per capita income.

Frasquilho et al. (2015) conduct a literature review of 101 papers examining the relationship between business cycles and mental health outcomes. Their analysis concludes that periods of economic recession tend to be associated with a higher prevalence of mental health disorders, substance disorders, and suicidal behavior.

This paper seeks to build on the growing body of literature about the relationship between macroeconomic circumstances and health outcomes—in particular, suicide—and uses the APFD as a case study for how a UBI might affect suicide, bridging the gap in research between the permanent fund dividend and aspects of social well-being. Suicide was chosen as the primary outcome variable as it is not only an important social and health issue, but it is also closely related to mental health outcomes and deaths of despair, all of which are outcomes that a UBI would, in theory, improve by providing a baseline level of income.

Here is how this paper proceeds. In Section II, I describe my data. In Section III, I discuss my model specifications. In Section IV, I describe the main results of my analysis. In Section V, I discuss these results in the context of prior research. In Section VI, I discuss potential extensions to the analysis conducted. I conclude in Section VII.

II. Data

Suicide data were collected from the National Center for Health Statistics (NCHS) at the Centers for Disease Control and Prevention (CDC) via the Wide-ranging Online Data for Epidemiologic Research (Wonder) database[8]. The NCHS collects data based on official death certificates, which identify a single underlying cause of death. While underlying cause of death

(ICD) codes changed throughout the period for which data were collected, consistent use of an identifier for "suicide" or "intentional self-harm" made it possible to collect comparable data over time[9].

I used the CDC Wonder website to capture state-level suicide rates from 1976-2019 for three different groups: the total population, the male population, and the female population[10]. For confidentiality reasons, sub-national death counts that are less than 10 are reported as "suppressed" and not displayed. These suppressed values are treated as missing values in my analysis, and the resulting sample sizes are displayed in my regression tables. I also used the CDC Wonder website to construct age controls (the percentage of the population aged: 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, and 85+) and controls for sex and race (the percentage of the population who are: male and white).

Economic variables were collected from a number of different sources. State unemployment rates were obtained from the Bureau of Labor Statistics (BLS) Local Area Unemployment Statistics (LAUS) database[11,12]. The LAUS database uses data from the Current Population Survey (CPS), the Current Employment Statistics (CES) survey, and state unemployment insurance (UI) systems to estimate unemployment rates across states and time. Gross per capita personal income levels were captured from the Bureau of Economic Analysis (BEA)[13]. Per capita personal income is calculated as total personal income for each state-year divided by the total midyear population of the state. Personal consumption expenditures (PCE), expressed in relation to a base year of 2012, were also captured from the BEA and used to calculate real per capita income levels[14]. Alaska Permanent Fund dividend payment amounts were captured for the years 1982-2019 from the Alaska Department of Revenue's Permanent Fund Dividend Division[15,16]. Real dividend payments are also expressed in 2012 dollars.

In my paper, I analyze both state-level data for the U.S. and state-level data for Alaska. Descriptive statistics for the U.S. sample appear in Table 1 and descriptive statistics for the Alaska sample appear in Table 2. Trends in national suicide rates are displayed in Figure 1[17]. From 1977 to 2000, the overall suicide rate declined by 20.1% (from 13.1 to 10.4), the male suicide rate declined by 13.4% (from 19.8 to 17.1), and the female suicide rate declined by 40.4% (from 6.7 to 4.0). Since 2000, however, suicide rates have risen substantially. From 2000-2018, the overall suicide rate increased by 41.7% (from 10.4 to 14.8), the male suicide rate increased by 37.0% (from 17.1 to 23.4), and the female suicide rate increased by 59.3% (from 4.0 to 6.4). Suicide rates decreased slightly from 2018 to 2019, although it is unclear if this is a temporary deviation from the long-term trend over the past two decades.

III. Empirical Models

Examining the effects of unemployment, income, and cash transfer payments on suicide over the 1976-2019 period, I use both state-level data for the entire U.S. and state-level data for Alaska. When analyzing the data for the entire U.S., the base model specification (model 1) that I use, which is similar to the model used by Ruhm (2015), is:

$$log\_suicide\_rate_{gst} = \beta_0 + \beta_1 unemployment\_rate_{st} + \beta_2 \%white_{st} + \beta_3 \%male_{st} + age\ controls + \alpha_s + \lambda_t + T_{st} + \varepsilon_{gst} \quad (1)$$

The variables are defined for observations in group *g* in state *s* in year *t*:

log_suicide_rate: the log of the suicide rate (measured in deaths per 100,000) for group *g*

unemployment_rate: state unemployment rate

%white: the percentage of the population who are white

%male: the percentage of the population who are male

age controls: the percentage of the overall population aged: 15-24, 25-34, 35-44, 45-54, 55-64, 65-74, 75-84, 85 and over (defined for state *s* in year *t*)

α_s: state dummy variables

λ_t: year dummy variables

T_{st}: linear state-specific time trends

Model 2 is the same as model 1, except that the unemployment rate is replaced by per capita income (expressed in thousands of 2012 dollars and defined for state *s* in year *t*). Model 3 is the same as model 1, except that per capita income is added to the right-hand side. I run regressions for the total population, the male population, and the female population. For all of the samples, the right-hand-side variables are the same. The difference is that, for each sample, the dependent variable is the group-specific suicide rate.

State effects control for unobservable factors that affect suicide that vary across states, but not over time. Year effects control for unobservable factors that affect suicide that vary over time, but not across states. Linear state-specific time trends allow trends in suicide rates over time to vary across states. Lastly, robust standard errors that are clustered on state are used to account for heteroskedasticity and autocorrelation.

When examining the effects of unemployment and cash transfer payments on suicide, I use state-level data for Alaska. The Alaska Permanent Fund provides cash transfer payments without a means test or work requirement. Alaska is the only state in which this type of government program, which can be considered a partial basic income, is in effect. To focus on the relationship between economic conditions and suicide over time within a single entity, I use an empirical strategy similar to the one employed by Tapia Granados (2005)[18]. Specifically, I regress the rate of change of the age-adjusted suicide rate in Alaska (expressing the relative

change from the former year: $\left((x_t - x_{t-1})/x_{t-1}\right) \times 100\%$) against the rate of change of the unemployment rate in Alaska (model 4). In a second regression (model 5), I also add the real value of the Alaska Permanent Fund dividend payment to the right-hand-side (measured in year *t*).

IV. Results

The results from the regressions I run using state-level data from the U.S. are displayed in Tables 3-5. The regression results for the total population are shown first in Table 3. In model 1, a one percentage-point increase in the unemployment rate is predicted to increase the overall suicide rate by 0.8%. The two demographic variables that are statistically significant are the share who are white and the share aged 55-64. Both of those coefficient estimates are positive. In model 3, when per capita income is added to the right-hand side, the coefficient estimate on the unemployment rate increases by about 17% (from 0.0081 to 0.0095). No association is found between per capita income and the overall suicide rate.

The results for the male population are displayed in Table 4. In model 1, a one percentage-point increase in the unemployment rate is associated with a 0.6% increase in the male suicide rate. Among the demographic variables, the share who are white and the share aged 15-24 are both positively associated with male suicide. Moving from model 1 to model 3, the coefficient estimate on the unemployment rate increases by about 26% (from 0.0057 to 0.0072). Per capita income is not found to have a statistically significant impact on the male suicide rate.

The results for the female population are reported in Table 5. In model 1, a one percentage-point increase in the unemployment rate is predicted to increase the female suicide rate by 1.6%. While increases in the share aged 15-24 and the share aged 25-34 are both predicted to decrease the female suicide rate, an increase in the share aged 55-64 is predicted to

have the opposite effect. In model 3, when per capita income is added as a regressor, the coefficient estimate on the unemployment rate increases by about 5% (from 0.0163 to 0.0171). As was the case in model 3 of both Tables 3 and 4, per capita income is also not statistically significant in model 3 of Table 5.

There are three important takeaways from Tables 3-5. First, I find compelling evidence that, over the past four and a half decades, suicides have been countercyclical. Second, my regression results suggest that suicide is impacted by unemployment, but not by per capita income. Per capita income is not statistically significant in either model 2 or model 3 for any of the groups examined. Third, I estimate that female suicide is more responsive to the business cycle than male suicide. The model 3 unemployment rate coefficient estimate for females (0.0171) is more than twice as large as it is for males (0.0072).

The results from the regressions I run using state-level data from Alaska are displayed in Table 6. In model 4, I regress the rate of change of the age-adjusted suicide rate against the rate of change of the unemployment rate. In model 5, I add the Alaska Permanent Fund dividend payment to the right-hand side. Although none of the results are statistically significant, the results should be interpreted somewhat cautiously. First, the sample size is relatively small compared to the regressions previously discussed. Second, since the population of Alaska is much smaller than the overall population of the U.S., one would expect more natural variation in the dependent variable in these regressions than if the left-hand-side variable were the rate of change of the national suicide rate.

V. Discussion

The national suicide rate increased by 41.7% from 2000 to 2018, and suicide was the 10th leading cause of deaths among Americans in 2019[19]. Establishing the relationship between

macroeconomic conditions and suicide has wide-ranging policy implications. My finding that suicide is countercyclical is in line with previous findings in the literature including Ruhm (2000), Ruhm (2015), and Luo et al. (2011). The positive association between unemployment and suicide suggests that perhaps more targeted aid is needed to those who are unemployed. The reasons unemployment might lead to increased suicide incidence can be split into two categories: financial and latent.

Unemployment often leads to financial distress. The relationship between financial distress and suicide has been heavily studied, and it is generally agreed upon that financial distress tends to lead to increased incidence of suicide (Assari, 2018; Hempstead and Phillips, 2015; Economou et al., 2013). Put simply, when one loses their main income source, they may face increasing levels of stress from inability to pay bills, mortgage/rent payments, and more. The current U.S. unemployment benefits system aims to solve this by providing cash transfers to those who are recently unemployed. Given the statistically significant and positive relationship between unemployment and suicide that my analysis finds, perhaps unemployment transfers need to be larger or a new approach is needed to solve financial distress-related suicides among the unemployed.

The loss of latent benefits of employment, such as time structure, activity, status, collective purpose, and social contact, is another key reason why unemployment might lead to increased incidence of suicide[20]. This loss is a much more complex problem to solve than the financial loss associated with unemployment. However, a stronger social safety net might give individuals freedom to pursue more desirable jobs and hence lead to fewer instances of unemployment.

The regression results on the Alaska sample displayed in Table 6 suggest that the Alaska Permanent Fund dividend payments, at their current size, do not have a material impact on suicide rates in Alaska. Perhaps a larger, or more frequent, cash transfer would have a material effect on suicide rates.

VI. Extensions

While the regression results of model 5 (displayed in Table 6) suggest that the Alaska Permanent Fund dividend did not have a material effect on suicide during the period of analysis, there is still a strong case to be made for why a larger, or more frequent, universal cash payment—perhaps large enough to be considered a universal basic income—might have a significant impact on mental health outcomes and, potentially, suicide. First, it is worth noting just how small the dividend has been historically. The mean payment amount from 1982-2019 was $1,458, and the 2019 payment amount was $1,606. The 2019 payment as a percentage of median per capita income by education level in Alaska is displayed in Figure 2[21]. Among the lowest education group, those with no high school diploma, the dividend accounted for just 6.9% of the median 2019 income. Among the highest, those with a graduate or professional degree, it accounted for just 2.2% of the median income. Payment is annual, so it is also unlikely that the cash transfer would arrive in a time of need for somebody recently unemployed. An annual payment of 6.9% of income is certainly helpful, although perhaps not significant enough to materially address the financial burden brought on by unemployment.

Unemployment, which, as discussed previously, my analysis found to be a statistically significant predictor of suicide, is much more common among those with lower education levels. As displayed in Figure 3[22], unemployment is significantly more common among those with less education. Among the Alaska population aged 25-64, those without a high school diploma were

7.1 times more likely to be unemployed compared to those with a bachelor's degree or higher (11.4% vs 1.6%). It is possible, if not likely, that this is a result of there being less demand in the labor market for less educated workers, however it is also likely that this is a result of less educated workers being forced to take on jobs that bring them less satisfaction compared to those who are more educated, resulting in higher turnover.

In addition to less-educated groups earning less money and experiencing higher levels of unemployment compared to their more educated peers, those in low-income groups tend to experience significantly worse mental health outcomes than those in high-income groups. The percentage of Alaskans with mild or moderate-to-severe depression in the year 2012 by household income is displayed in Figure 4[23]. While those earning less than $25,000 were just 1.5 times more likely to experience mild depression compared to those earning $50,000 and higher, they were 4.7 times more likely to experience moderate-to-severe depression. Overall, 43.1% of those earning less than $25,000 experienced depression compared to 28.0% of those earning $25,000-$49,999 and 19.9% of those earning $50,000 and higher. Given the difference in mental health outcomes among low-income and high-income groups, it is unsurprising that low-income groups are much more likely to consider suicide. In 2013, 9.1% of Alaskan residents earning less than $25,000 considered suicide compared to just 2.7% of residents earning $50,000 and higher. These results are displayed in Figure 5[24]. Finally, Figure 6 shows that those in low-income groups were significantly more likely to spend time without health insurance or coverage during the year 2014[25].

Evidence from Alaska in recent years suggests that less-educated individuals tend to experience unemployment at higher rates, low-income earners tend to experience depression and consider suicide at higher rates while simultaneously being less likely to have access to

healthcare, and that the current Alaska Permanent Fund dividend makes up a rather small percentage of Alaskans' annual incomes, even for those in low-income groups. These unfavorable outcomes among Alaskans with low socioeconomic status suggest that a larger social safety net might lead to a better societal outcome. On the simplest of levels, a larger cash transfer, in the form of a universal basic income, might improve mental health and suicide outcomes among the lower-income segment of the population.

Not only would a universal basic income ease the financial distress associated with unemployment, but it would also provide greater freedom to pursue more desirable work. By receiving a monthly transfer large enough to live off of, less-educated workers would no longer be forced into low-wage, undesirable work. They would have the freedom to turn the least desirable jobs down and to pursue jobs that might be better fits—and subsequently leave them less likely to become unemployed. Moreover, it would force employers of undesirable jobs to fairly compensate employees and no longer allow them to take advantage of uneducated workers desperate for a source of income. As people choose more and more desirable jobs, it is plausible to presume that they are more likely to enjoy them and less likely to become unemployed, and even when people inevitably become unemployed, the financial burden of unemployment would be eased.

There are a few counterarguments to the proposition of a universal basic income in Alaska and beyond. First, and perhaps most prominent, is the notion that a UBI might disincentivize people to work. However, past literature suggests that this might not be the case. As noted previously in the literature review, Jones and Marinescu (2020) find that the Alaska Permanent Fund dividend has no significant effect on employment, but that it does increase part time work. Evidence from lottery winners (Cesarini et al., 2015; Imbens et al., 1999) suggests

that the marginal propensity to earn out of unearned income is about -0.11, implying that an 11 percent increase in unearned income would reduce earned income by about 1 percent. This is small enough that it could be offset by the increase in labor demand from increased consumption as a result of the cash transfers. This also suggests that it's possible scaling to a larger cash transfer from the existing Alaska Permanent Fund dividend might not have a large effect on the labor market.

Another counterargument to the implementation of a UBI is that it might be too expensive to implement. In the instance of the Alaska Permanent Fund, that is simply not the case. The Alaska Permanent Fund was valued at $78,265,700,000 as of April 27th, 2021[26]. In the 36.5 years since inception, the fund has achieved an investment performance of 8.68% annually[27]. When factoring in the adult population of Alaska (18+), which is estimated to be 551,585[28], that leaves room for an annual payment of $12,316, or a monthly payment of about $1,000, solely off of investment profits and without decreasing the value of the fund. To date, the Alaska Permanent Fund has not been used to fund anything other than the annual dividend. While funding a UBI might be more difficult in other states, it is reasonably affordable for the state of Alaska and could be feasible in other states as well.

The third main argument against a UBI is that it is not necessary to provide cash transfers to the wealthy; perhaps it makes more sense to just provide a basic income to the poor. However, political support tends to be much stronger for universal programs than for targeted programs (Gelbach and Pritchett, 2002). In addition, universal programs tend to be more horizontally equitable, meaning that people with the same relevant conditions are treated the same (Hanna and Olken, 2018). Means testing can be both difficult and costly, and both challenges in means testing and discontinuities in targeted welfare programs can lead to a lack of horizontal equity.

Targeted relief programs are also susceptible to fraud. From March 2020 to January 2021, the state of Illinois alone reported over one million cases of unemployment fraud[29]. While universal programs pose challenges in getting money into people's hands, they are less susceptible to fraud in that there is no means test to be cheated, and if everyone is set to receive the cash transfer, fraudulent claims would be easier to detect. For these reasons, universal welfare programs might be preferable to programs more narrowly targeting the poor.

Given the poor mental health outcomes currently faced by Alaskans with low socioeconomic status, expanding the Alaska Permanent Fund dividend into a universal basic income could potentially improve mental health outcomes among this group. While it is plausible that sufficiently generous payments could even reduce suicide, that is an untested hypothesis.

VII. Conclusion

This paper investigates the impact of unemployment, income, and direct cash transfers on suicide in the United States from 1976-2019. Using a model of fixed effects, I find that suicides were countercyclical during the period studied. Moreover, I find that unemployment was a positive and statistically significant predictor of suicide, while per capita income was not associated with suicide. I also examine the state of Alaska for evidence that universal cash transfers might impact the suicide rate. Using state-level data for Alaska, I find no association between Alaska Permanent Fund dividend (APFD) payments and suicide. Finally, as an extension of my analysis, I make the argument for why larger dividend payments could potentially improve mental health outcomes of Alaskans with low socioeconomic status.

Table 1. Descriptive Statistics for U.S. Sample

Variable	Mean	Standard deviation	Sample size
Overall suicide rate	13.38	3.79	2,244
Male suicide rate	21.55	5.90	2,244
Female suicide rate	5.52	1.86	2,207
Unemployment rate	5.91	2.08	2,244
Per capita income (in thousands of 2012 dollars)	35.03	10.14	2,244
Percentage white	83.30	13.66	2,244
Percentage male	49.10	0.92	2,244
Note: All of these variables are captured for the 50 states and the District of Columbia for the years 1976-2019. See the note for Table 5 for a list of the entities with some missing female suicide rates.			

Table 2. Descriptive Statistics for Alaska Sample

Variable	Mean	Standard deviation	Sample size
Age-adjusted suicide rate	19.20	4.64	44
Unemployment rate	7.87	1.37	44
Alaska Permanent Fund dividend payment (in thousands of 2012 dollars)	1.26	0.67	44
Note: All of these variables are captured for Alaska for the years 1976-2019. The Alaska Permanent Fund dividend payment was $0 from 1976-1981.			

Table 3. Determinants of Suicide Rates for Population, U.S. Sample, 1976-2019

	(1)	(2)	(3)
Unemployment rate	0.0081***		0.0095***
	(0.0029)		(0.0030)
Per capita income (in thousands of 2012 dollars)		0.0009	0.0036
		(0.0025)	(0.0026)
Percentage white	0.0233**	0.0225**	0.0224**
	(0.0096)	(0.0102)	(0.0098)
Percentage male	-0.0435	-0.0588	-0.0501
	(0.0375)	(0.0376)	(0.0379)
Percentage aged 15-24	0.0085	0.0033	0.0062
	(0.0058)	(0.0054)	(0.0056)
Percentage aged 25-34	0.0024	-0.0071	-0.0019
	(0.0109)	(0.0122)	(0.0129)
Percentage aged 35-44	-0.0111	-0.0229*	-0.0131
	(0.0114)	(0.0115)	(0.0113)
Percentage aged 45-54	0.0109	0.0048	0.0106
	(0.0109)	(0.0104)	(0.0106)
Percentage aged 55-64	0.0244*	0.0116	0.0216
	(0.0136)	(0.0137)	(0.0137)
Percentage aged 65-74	0.0082	0.0023	0.0120
	(0.0129)	(0.0137)	(0.0139)
Percentage aged 75-84	-0.0298	-0.0469	-0.0377
	(0.0247)	(0.0281)	(0.0282)
Percentage aged 85 and over	0.0246	0.0406	0.0406
	(0.0592)	(0.0611)	(0.0593)
R^2	0.9311	0.9305	0.9312
n	2,244	2,244	2,244

Note: The dependent variable is the log of the suicide rate for the population (measured in deaths per 100,000). Also included in the regressions are state and year dummy variables and linear state-specific time trends. Robust standard errors that are clustered on state appear in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 4. Determinants of Suicide Rates for Male Population, U.S. Sample, 1976-2019

	(1)	(2)	(3)
Unemployment rate	0.0057** (0.0026)		0.0072** (0.0027)
Per capita income (in thousands of 2012 dollars)		0.0018 (0.0027)	0.0038 (0.0029)
Percentage white	0.0167** (0.0071)	0.0158** (0.0077)	0.0157** (0.0075)
Percentage male	-0.0288 (0.0333)	-0.0425 (0.0322)	-0.0358 (0.0330)
Percentage aged 15-24	0.0148** (0.0064)	0.0101 (0.0062)	0.0123* (0.0063)
Percentage aged 25-34	0.0055 (0.0103)	-0.0031 (0.0124)	0.0009 (0.0126)
Percentage aged 35-44	-0.0075 (0.0115)	-0.0171 (0.0120)	-0.0097 (0.0116)
Percentage aged 45-54	0.0125 (0.0108)	0.0077 (0.0103)	0.0122 (0.0106)
Percentage aged 55-64	0.0179 (0.0129)	0.0073 (0.0139)	0.0149 (0.0130)
Percentage aged 65-74	0.0129 (0.0137)	0.0096 (0.0140)	0.0169 (0.0148)
Percentage aged 75-84	-0.0202 (0.0234)	-0.0357 (0.0273)	-0.0287 (0.0270)
Percentage aged 85 and over	0.0558 (0.0563)	0.0730 (0.0590)	0.0730 (0.0586)
R^2	0.9183	0.9180	0.9185
n	2,244	2,244	2,244

Note: The dependent variable is the log of the suicide rate for the male population (measured in deaths per 100,000). Also included in the regressions are state and year dummy variables and linear state-specific time trends. Robust standard errors that are clustered on state appear in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 5. Determinants of Suicide Rates for Female Population, U.S. Sample, 1976-2019

	(1)	(2)	(3)
Unemployment rate	0.0163***		0.0171***
	(0.0061)		(0.0061)
Per capita income (in thousands of 2012 dollars)		-0.0029	0.0020
		(0.0054)	(0.0054)
Percentage white	0.0224	0.0221	0.0216
	(0.0177)	(0.0178)	(0.0168)
Percentage male	-0.0631	-0.0816	-0.0661
	(0.0566)	(0.0602)	(0.0599)
Percentage aged 15-24	-0.0238**	-0.0301***	-0.0252**
	(0.0114)	(0.0100)	(0.0108)
Percentage aged 25-34	-0.0277*	-0.0393**	-0.0302
	(0.0164)	(0.0180)	(0.0193)
Percentage aged 35-44	-0.0266	-0.0450**	-0.0278
	(0.0199)	(0.0217)	(0.0213)
Percentage aged 45-54	0.0031	-0.0075	0.0029
	(0.0168)	(0.0182)	(0.0166)
Percentage aged 55-64	0.0489*	0.0294	0.0474
	(0.0277)	(0.0271)	(0.0292)
Percentage aged 65-74	0.0047	-0.0108	0.0068
	(0.0193)	(0.0229)	(0.0204)
Percentage aged 75-84	-0.0422	-0.0628	-0.0464
	(0.0503)	(0.0530)	(0.0552)
Percentage aged 85 and over	0.0036	.0110	0.0129
	(0.1187)	(0.1125)	(0.1077)
R^2	0.8040	0.8021	0.8040
n	2,207	2,207	2,207

Note: The dependent variable is the log of the suicide rate for the female population (measured in deaths per 100,000). Also included in the regressions are state and year dummy variables and linear state-specific time trends. Entities with some missing values are: AK, DE, DC, ND, VT, and WY. Robust standard errors that are clustered on state appear in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6. Determinants of Rate of Change of Suicide Rate for Population, Alaska Sample, 1977-2019

	(4)	(5)
Rate of change of unemployment rate (year *t* relative to year *t* – 1)	-0.2821 (0.6633)	-0.2793 (0.6786)
Alaska Permanent Fund dividend payment (in thousands of 2012 dollars, measured in year *t*)		0.3150 (5.6242)
R^2	0.0108	0.0109
n	43	43
Note: The dependent variable is the rate of change of the age-adjusted suicide rate for the population (year *t* relative to year *t* – 1). The suicide rate is measured in deaths per 100,000. Robust standard errors appear in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively.		

Figure 1: U.S. Suicide Rates for Population, Male Population, and Female Population, 1976-2019

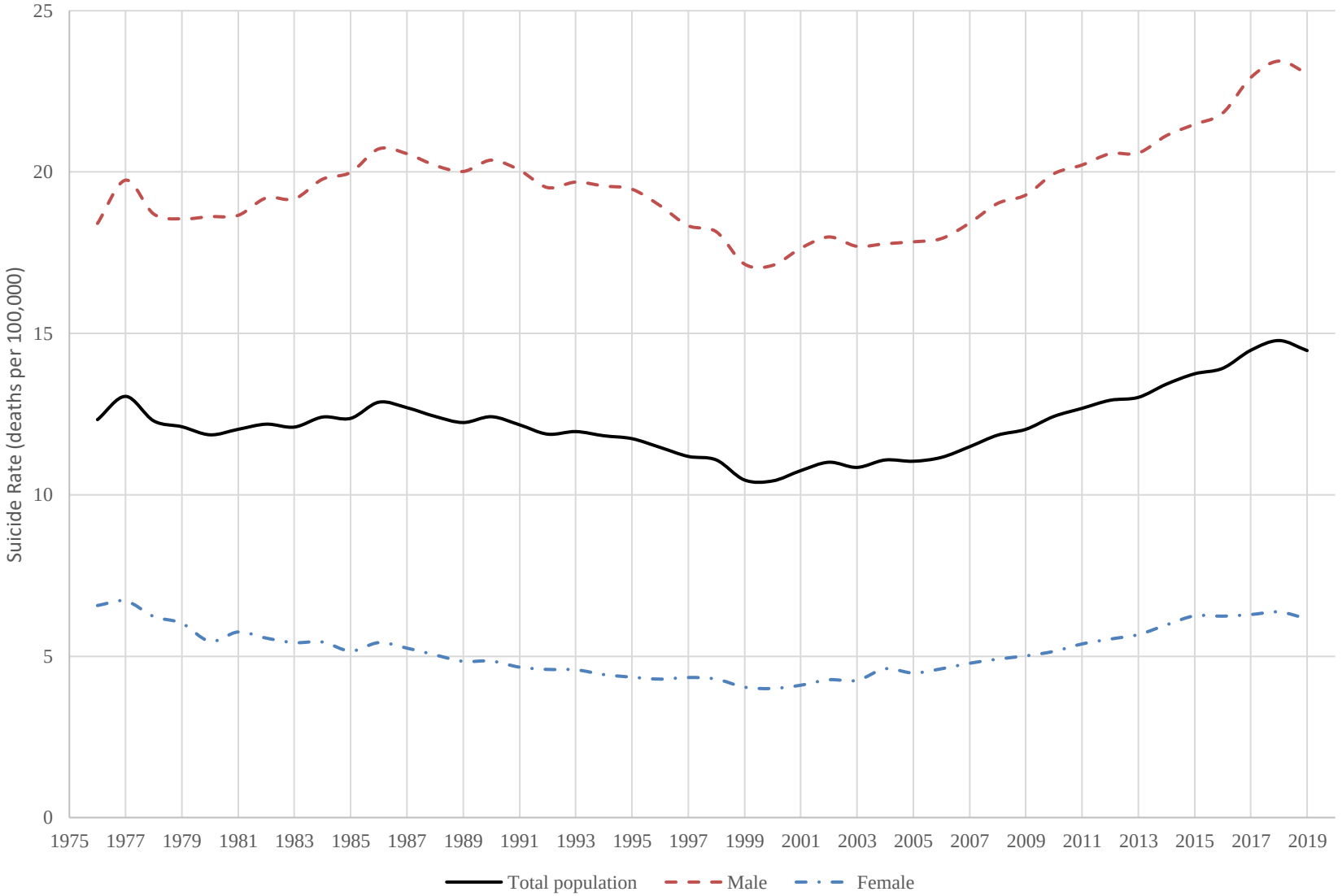


Figure 2: Alaska Permanent Fund Dividend as a Percentage of Median Per Capita Income by Education Level, 2019

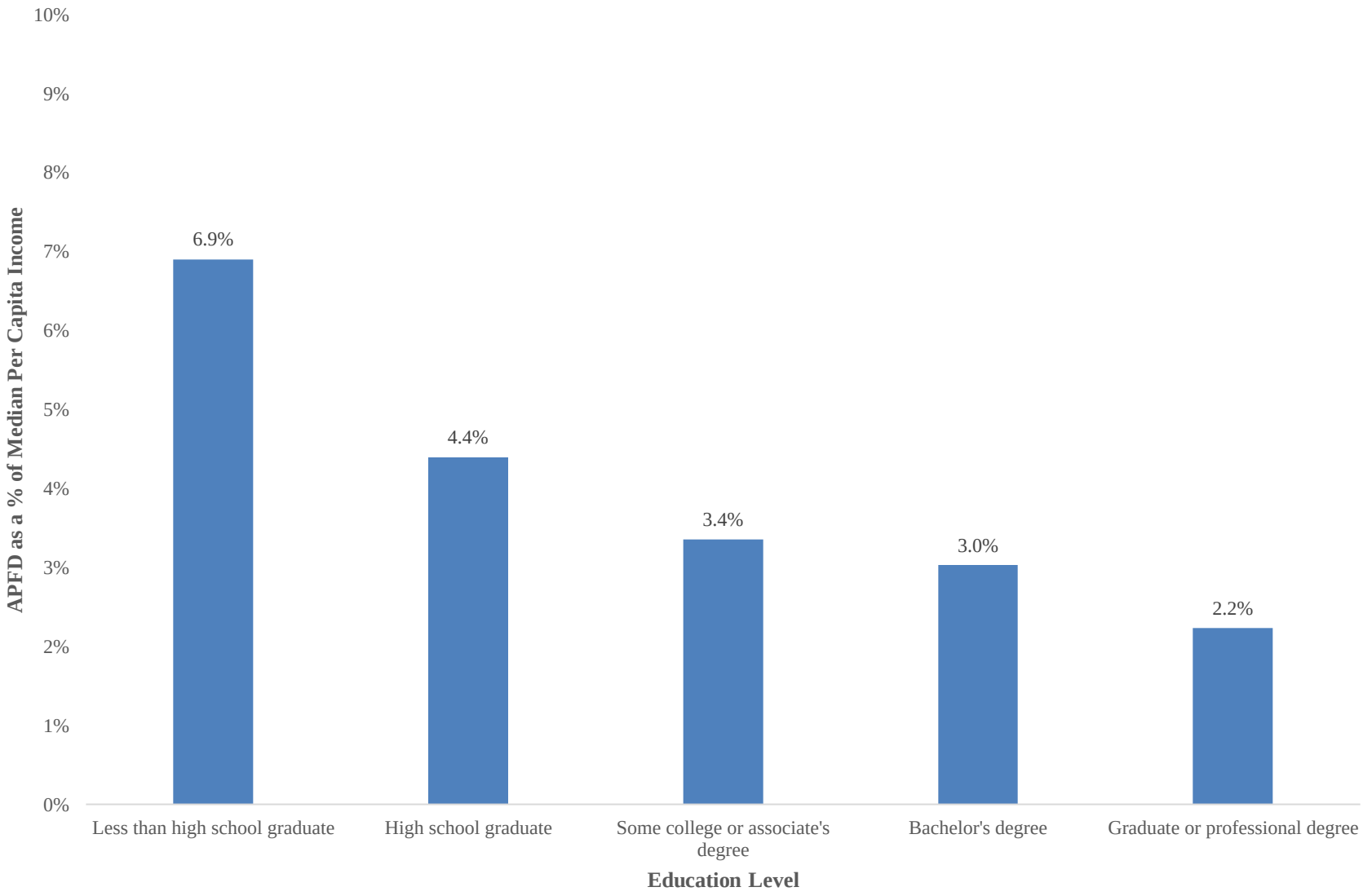


Figure 3: Unemployment by Education Level, Alaska Population Aged 25-64, 2019

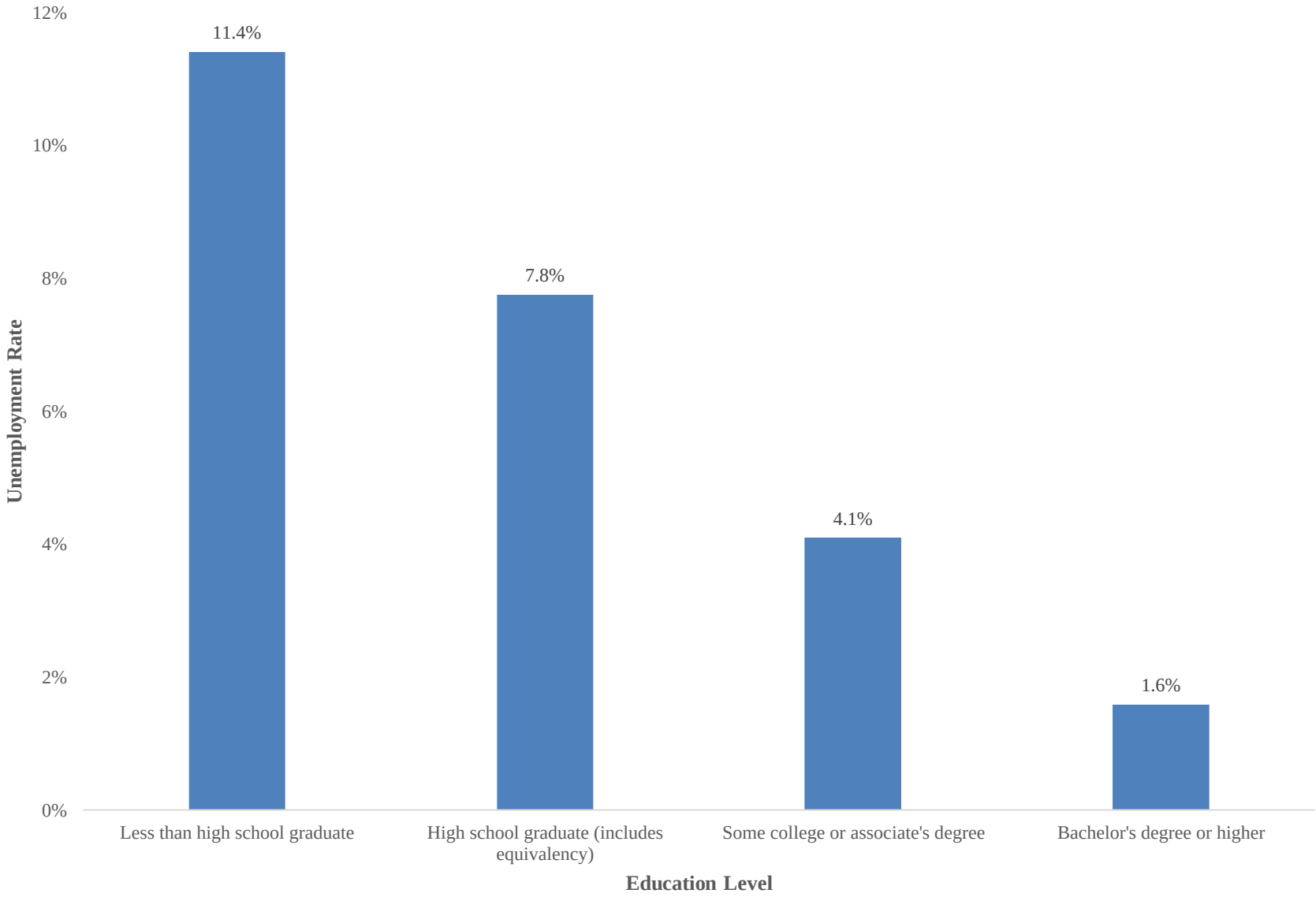


Figure 4: Percentage of Alaskans with Mild or Moderate to Severe Depression by Household Income, 2012

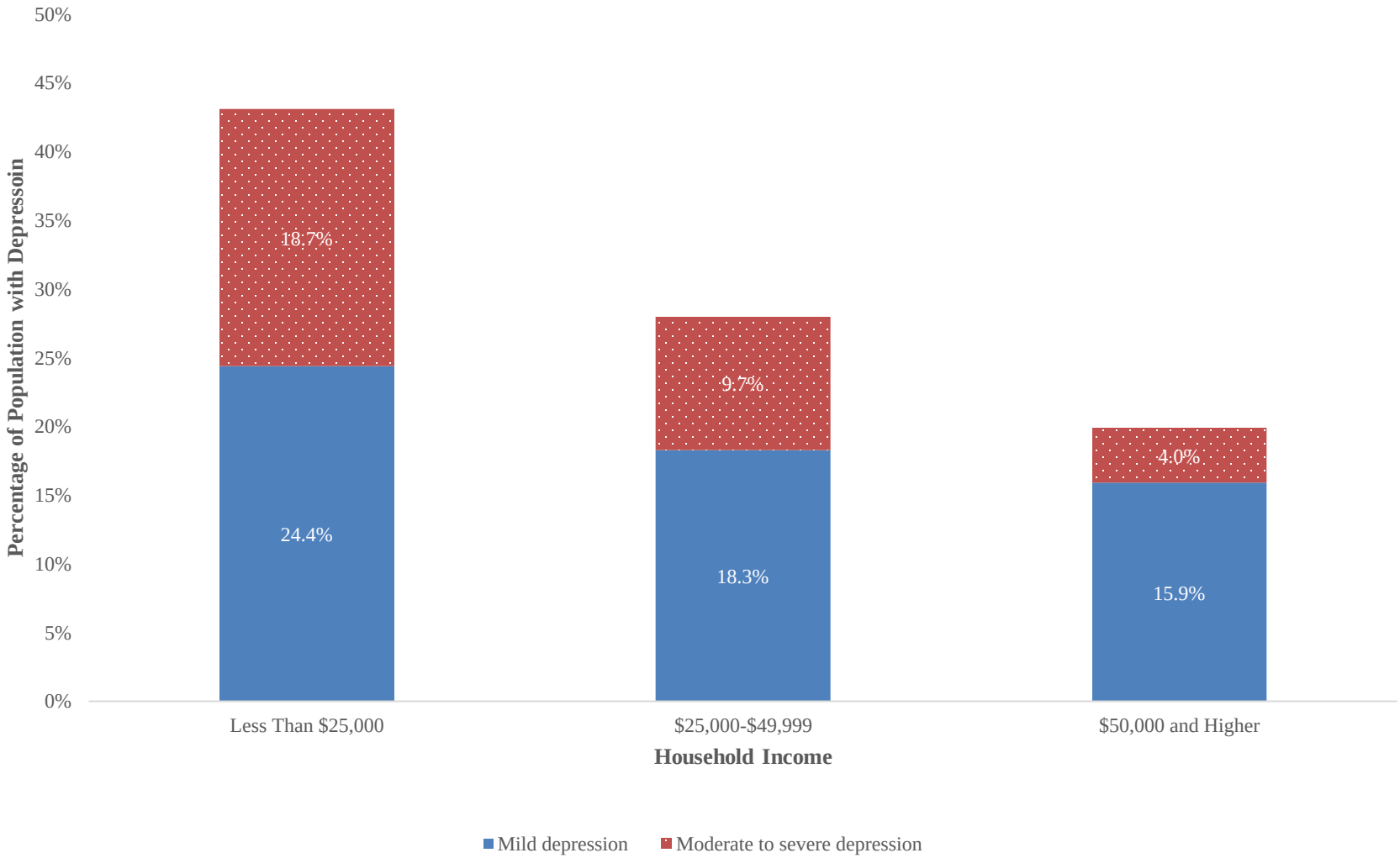


Figure 5: Percentage of Alaskans Considering Attempting Suicide Within Past 12 Months, 2013

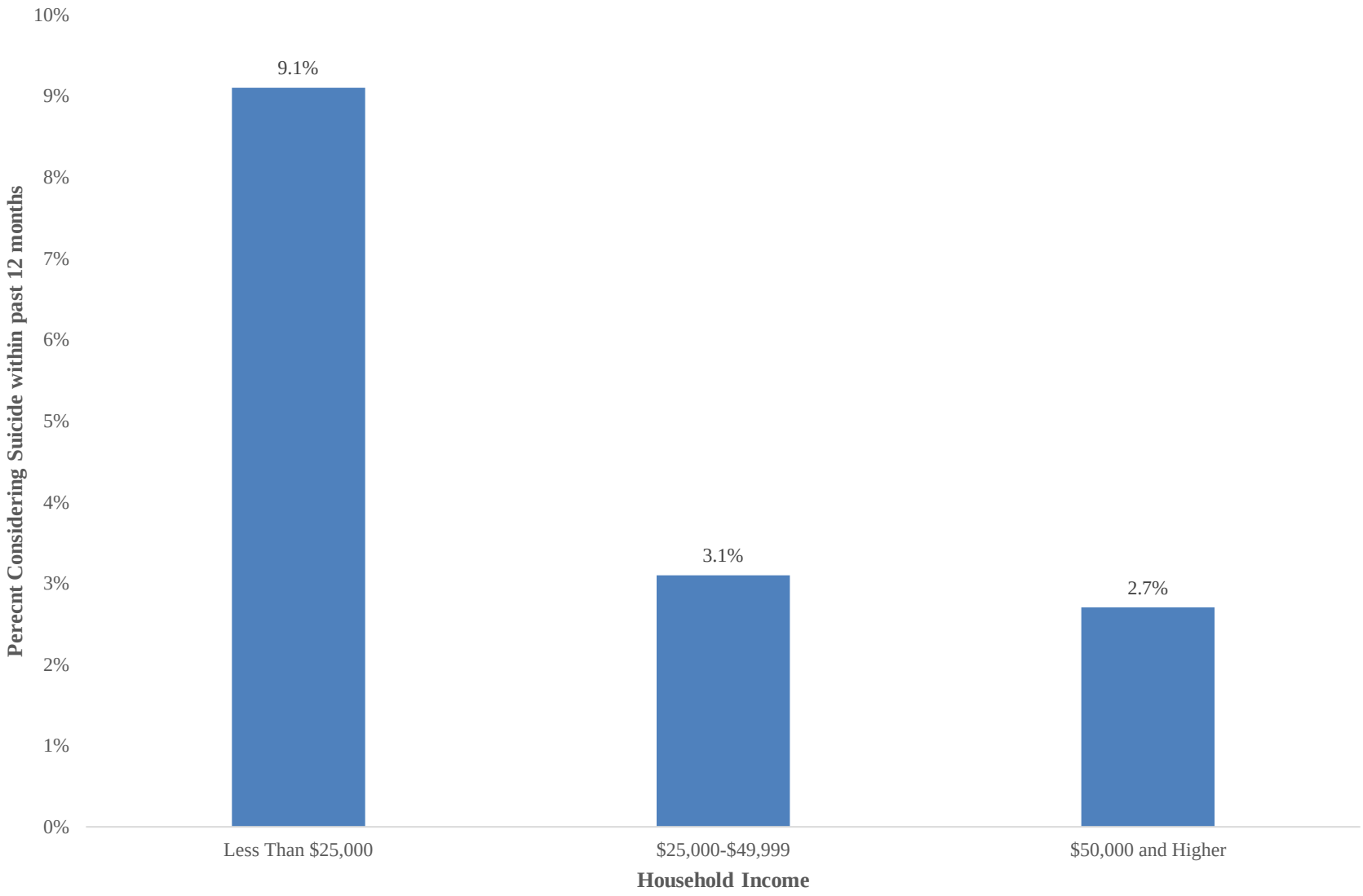
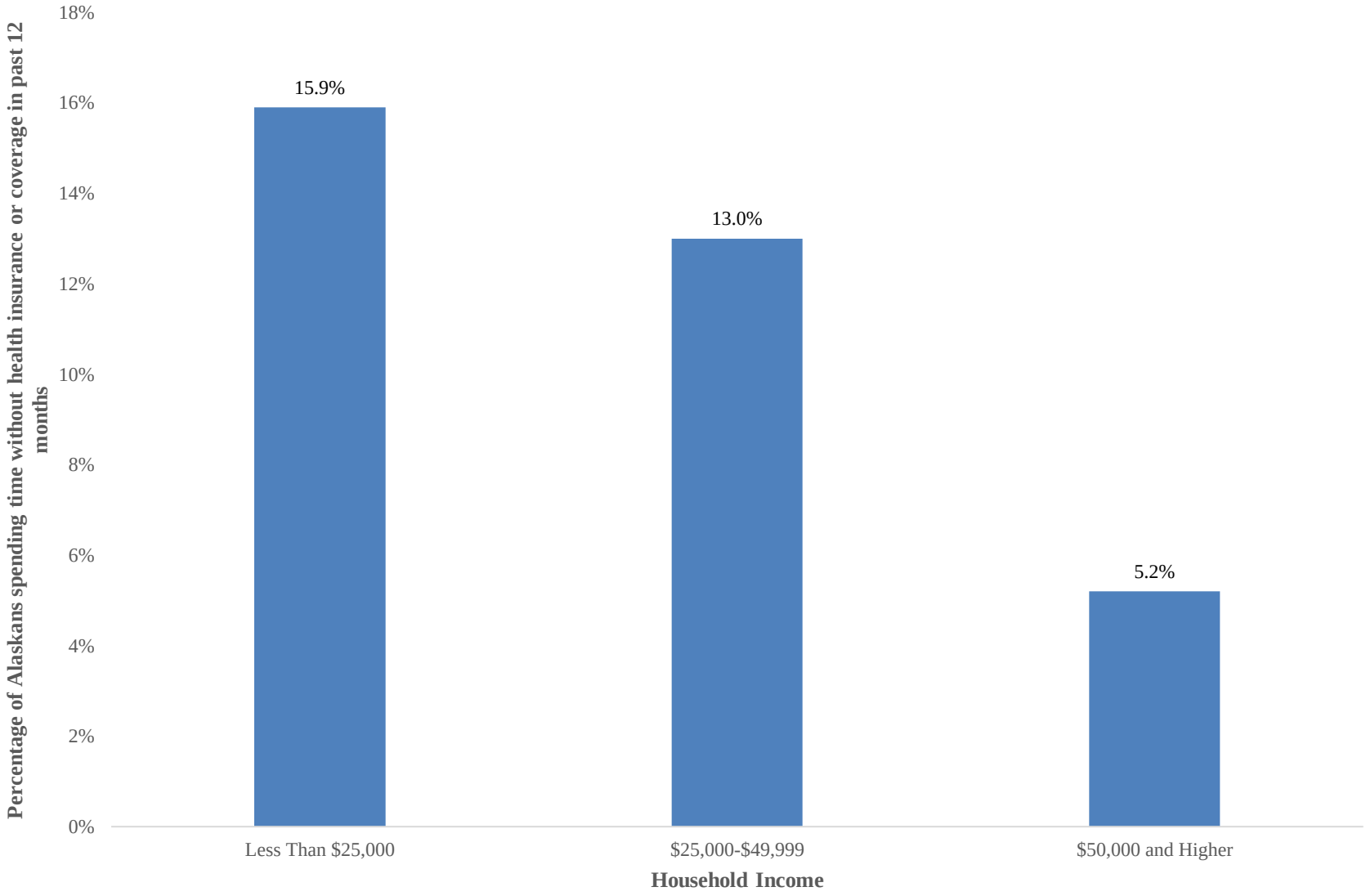


Figure 6: Percentage of Alaskans Who Spent Any Time Without Health Insurance or Coverage in Past 12 Months, 2014



Endnotes

1. Further reading on the history of UBI and Paine and King Jr.'s roles can be done here: https://basicincome.stanford.edu/about/what-is-ubi/.

2. Further reading on Garcetti's basic income proposal in Los Angeles can be done here: https://www.latimes.com/california/story/2021-04-20/garcetti-la-guaranteed-basic-income-plan-what-to-know.

3. Examples of smaller-scale UBI's include Finland (De Wispeleare, 2019) and the Cherokee Indian Casino Payments (Akee et al., 2013).

4. Further details on the history of the Alaska Permanent Fund can be found here: https://apfc.org/who-we-are/history-of-the-alaska-permanent-fund/.

5. A more detailed explanation of the dividend amount calculation can be found here: https://pfd.alaska.gov/Division-Info/About-Us.

6. Complete eligibility requirements can be found here: https://pfd.alaska.gov/Eligibility/Requirements.

7. The mean is calculated in inflation-adjusted dollars using the personal consumption expenditures (PCE) index with a base year of 2012.

8. The CDC Wonder website is: https://wonder.cdc.gov.

9. The following ICD codes were used: ICD 8: E950-E959; ICD 9: E950-E959; ICD 10: X60-X84.

10. I collected data for all 50 states and the District of Columbia. I treat the District of Columbia as a state throughout this paper.

11. The BLS LAUS data website is: https://www.bls.gov/lau/.

12. Unemployment rates were not seasonally adjusted.

13. The BEA personal income data can be found in table SAINC1. Table SAINC1 can be found here: https://apps.bea.gov/iTable/index_nipa.cfm.

14. PCE data were collected from row 2 of table 1.14. Table 1.14 can be found here: https://apps.bea.gov/iTable/index_nipa.cfm.

15. The Alaska Permanent Fund Dividend Division website is: https://pfd.alaska.gov/Division-Info/Summary-of-Applications-and-Payments.

16. The Alaska Permanent Fund dividend program began in 1982. For the years 1976-1981, the dividend amount is $0.

17. National suicide rates were captured from the CDC Wonder website.

18. Using national-level data for the U.S. from 1920-1996, Tapia Granados regresses the percentage change in the suicide rate against percentage change in the unemployment rate and finds a positive association (Table 4).

19. These figures come from the CDC leading cause of death fact sheet. The fact sheet can be accessed here: https://www.cdc.gov/nchs/fastats/leading-causes-of-death.htm.

20. The relationship between unemployment-related loss of the latent benefits of unemployment and well-being has been studied by Creed and Macintyre (2001) and Creed and Watson (2003), among others.

21. The income data displayed in Figure 2 were collected from the U.S. Census Bureau report on median income by education level (Table B20004). The Census website is: https://data.census.gov/. The 2019 Alaska median income amounts by education level are as follows: less than high school graduate: $23,264; high school graduate: $36,522; some college or associate's degree: $47,878; bachelor's degree: $53,033; graduate or professional degree: $71,947. The 2019 Alaska Permanent Fund dividend amount was collected from the Alaska Department of Revenue's Permanent Fund Dividend Division. The website can be found here: https://pfd.alaska.gov/Division-Info/Summary-of-Applications-and-Payments.

22. The data displayed in Figure 3 were collected from the U.S. Census Bureau website from Table B23006. Unemployment rates were calculated by dividing the number of unemployed individuals by the number of individuals in the labor force. The Census website can be found here: https://data.census.gov/.

23. The data displayed in Figure 4 were collected from the AK-IBIS Public Health Data website. The AK-IBIS website can be found here: http://ibis.dhss.alaska.gov/.

24. The data displayed in Figure 5 were collected from the AK-IBIS Public Health Data website. The AK-IBIS website can be found here: http://ibis.dhss.alaska.gov/.

25. The data displayed in Figure 6 were collected from the AK-IBIS Public Health Data website. The AK-IBIS website can be found here: http://ibis.dhss.alaska.gov/.

26. The current Alaska Permanent Fund value was collected from the Alaska Permanent Fund Corporation Website. The website can be found here: https://apfc.org/our-performance/.

27. The current Alaska Permanent Fund investment return was collected from the Alaska Permanent Fund Corporation Website. The website can be found here: https://apfc.org/financial-and-performance-reports/#monthly-performance-reports.

28. The population from Alaska is the estimate for 2019 and was collected from the U.S. Census Bureau website. The Census website is: https://www.census.gov/quickfacts/AK.

29. Here is a link to a news article about Illinois's issues with unemployment fraud: https://abc7chicago.com/ides-unemployment-in-illinois-fraud-report/10367159/.

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