

# The Mortality Effects of Community Mental Health Centers\*

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## Abstract

The Community Mental Health Act of 1963 established Community Mental Health Centers (CMHCs) across the country with the goal of providing continuous, comprehensive, community-oriented care to people suffering from mental illness. In this paper, we construct a novel dataset documenting the rollout of CMHCs from 1971 to 1981 to identify the effect of implementing a CMHC on county level mortality rates, focusing on causes of death related to mental illness. We find evidence that CMHCs reduced suicide rates among whites between the ages of 15 and 24 by 4%. CMHCs were particularly effective in reducing deaths from homicide and alcohol in the nonwhite population, with nonwhites experiencing a 5% decline in homicide rates and nonwhite adults experiencing an 11% decline in deaths caused by alcohol. The effect on mortality for nonwhite people is focused in rural areas. These results suggest CMHCs were effective in reducing mental illness related mortality, especially in populations with the greatest need and least access to alternative forms of treatment.

**JEL Codes: H75, I14, I18, I31, I32, I38, J15**

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# 1 Introduction

Mental illness is a worldwide concern with negative impacts at both the individual and societal levels. As of 2016, 1 in 5 adults lives with a mental illness in the United States, and 1 in 25 lives with a mental illness serious enough to make them unable to actively participate in one or more parts of their lives (NIMH 2017). In 2001 the World Health Organization estimated that serious mental illness cost the United States \$193.2 billion each year in lost earnings alone and identified depression as the leading global cause of disability (2001). Mental illness is associated with a host of negative effects for both the individual and society - for example, lower employment rates and earnings, higher likelihood of violent or criminal behavior, and homelessness (Frank and McGuire 2000). Between the personal distress caused by the symptoms of mental illness and the negative individual and societal effects of mental illness as describe above, the treatment and management of mental illness is of growing concern to national and international health organizations.

While certain forms of treatment have been shown to be effective at ameliorating some of these negative effects (Mintz et al 1992, Zhang et al 1999 a and b, Lang 2013), it is often difficult for people to access effective treatment. The private market for mental health care suffers from inefficiencies and inequities that makes it unable to cope with growing mental health care needs. Insurance providers have been wont to provide adequate coverage for mental health needs due to concerns about overuse and treatment efficacy (McGuire 1981, Keeler et al 1988, Mechanic 2014) and insufficient mental health resources, such as psychiatric beds and medical providers, prevent patients who are seeking help from being able to get it (Mechanic 2003, Sipe et al 2015). Decreased earning ability, negative stigmas, and the decreased ability to make decisions associated with (serious) mental illness prevent those who need mental healthcare from accepting it (McGuire 1981, Mechanic 2003, Rowan et al 2013, Mechanic 2014). Furthermore, inequalities in access to care arise along income level and insurance coverage, both of which are negatively associated with the severity of mental illness (Schlesinger and Dorwart 1984, Mechanic 2003, Rowan et al 2013, Mechanic

2014). These inequalities also exist along urban/rural lines, with rural areas having fewer available services and patients in rural areas being less likely to be able to get treatment for mental illness from a specialized mental health care provider (Blank et al 1995, Mechanic 2014, Sipe et al 2015). Between these inefficiencies and the positive externalities associated with treatment, mental health care is a prime candidate for government intervention.

Publicly provided community care provides an potential solution to these concerns with private market provision of mental health treatment, and the World Health Organization recommends community care as the gold standard worldwide (2001). Community care, as opposed to institutionalization, allows patients to live and work within the community while receiving outpatient treatment services. There is currently little evidence about the efficacy of community care.<sup>1</sup> The United States had it's first experiment with community care in the 1950s through 1980s with the passage of the Community Mental Health Act (CMHA) and the establishment of Community Mental Health Centers (CMHCs).<sup>2</sup> The goal of this program was to shut down the mental institutions that were providing mental health care to the seriously mentally ill, and to replace them with a system of community care. In this paper, we will analyze the efficacy of community care in terms of mortality from mental illness-related causes of death in order to understand whether publicly provided care generated benefits in this context.

This paper provides an analysis of the effects of CMHCs on mortality at the county level, focusing on mental health-specific mortality. We use the rollout of CMHCs over the course of 10 years - 1971 to 1981 - to identify the effect of implementing a CMHC in a community on mortality rates. To do this we construct a novel data set of the county-level location of CMHCs every two years within this time-frame to establish which counties ever received a

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<sup>1</sup>Community care is associated with less stigmatization of the mentally ill (Link and Cullen 1986, Boyd et al 2010) and better post-hospitalization outcomes for the mentally ill compared to no follow-up treatment (Stein and Test 1980). This form of care has been found to be more cost effective than institutionalization (Weisbrod et al 1980, Test and Stein 1980, Weisbrod 1983) based on cost of care and the usage decisions of patients.

<sup>2</sup>See Morrissey and Goldman (1986) for an account of the history of mental health treatment in the United States.

CMHC and when. Also, we constructed a novel data set of state priority rankings, in which states ranked counties in terms of need for mental health resources. While the construction of CMHCs were intended to follow these priority rankings, we show that these rankings do not predict which communities ever got CMHCs, nor do they predict which communities got CMHCs earlier rather than later. The lack of correlation between state rankings and treatment assists in the identification of treatment effects, and we take additional steps to address concerns regarding potential correlations between pre-existing mortality trends and selection into treatment. Due to the structure of our data and the randomness in receiving a CMHC, we are able to causally identify the effect of receiving a CMHC through a generalized difference-in-difference strategy.

While this paper is the first to quantitatively analyze the effect of community care on mental illness-related mortality, the CMHA has received plenty of qualitative scholarly attention. The conclusions of this work have been overwhelmingly negative. This program has long been regarded as a failure, charged with the “general abandonment” of the formerly institutionalized mentally ill and disabled population (Rose 1979) and “the creation of large populations of ‘homeless, deranged people’ ” (Grob 1992). This literature highlights two main reasons why the CMHA was considered unsuccessful: the program was never fully funded and far fewer CMHCs were built than were projected to be needed (Rose 1979, Grob 1992); and CMHCs were neither designed nor incentivized to treat the seriously mentally ill that were being forcibly released from mental institutions (Gronfein 1985, Grob 1994).<sup>3</sup> Because the creation of CMHCs was wrapped up with the deinstitutionalization of the mentally ill and seen as an alternative to mental institutions, their inability to treat everyone that was deinstitutionalized led to the conclusion that they were ineffective and a failed policy ex-

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<sup>3</sup>This is due to the fact that the treatment of serious mental illness is much more costly and requires more resources and specialized training compared to the treatment of non-serious mental illness, and extra funding was not provided for providing treatment to the seriously mentally ill. In effect, the government policy treated every mental illness as equally costly, which then incentivized CMHCs to focus on non-serious, less expensive mental illnesses. Additionally, the community care setting could not provide day-to-day services, such as housing, basic care, and medication management, that patients in mental hospitals received and that this patient body needed assistance with in order to function in daily life (US General Accounting Office 1977, US Interagency Council on the Homeless 1990).

periment. However, the goal of this paper is to consider the efficacy of community care as provided by CMHCs, rather than the success or failure of the Community Mental Health Act as a whole. Our paper is the first to disentangle the effect of community care from the overarching failure of the CMHA in order to evaluate whether community care contributed to improvements in mental illness related outcomes outside of the political context of the United States' first attempt at publicly provided community care.

Despite the negative conclusions from the previous literature on the CMHA, this paper shows that CMHCs were effective in reducing mental health related mortality for those who were most at risk. We find evidence that CMHCs reduced suicide rates among whites between the ages of 15 and 24 by 4%. CMHCs were particularly effective in reducing deaths from homicide and alcohol in the nonwhite population, with nonwhites experiencing a 5% decline in homicide rates and nonwhite adults experiencing an 11% decline in deaths caused by alcohol. The effect on mortality for nonwhite people is focused in rural areas. These results suggest CMHCs were effective in reducing mental illness related mortality, especially in populations with the greatest need and least access to alternative forms of treatment.

Due to the negative associations of CMHCs with the problems of deinstitutionalization and growing financial burden of mental illness on the national government, the CMHA was effectively disbanded in 1981 and replaced with mental health block grants to the states. Back of the envelope calculations, however, show that if the program was extended to the full 2000 CMHCs anticipated to be required to fully support the entire US population and were operational through the 1980s, 828 fewer deaths from suicide, 792 fewer deaths from homicide, and 234 fewer deaths from alcohol-related mortality would have occurred during the 1980s. These results only measure improvements in mortality; we would also expect improvements in other areas correlated with these improvements in mortality, such as improved quality of life, increased employment, increased earnings, decreased homelessness, and decreased incarceration. As the United States and other countries address the growing need for mental health care, publicly provided community care is a potential solution that

should be considered.

## 2 Background Information

### 2.1 Effect of Mental Health and Mental Health Treatment

Mental illness is associated with a host of costly problems for the individual and society. Mental illness has been found to cause increased unemployment and impoverishment (Hamilton et al 1997), decreased labor market participation (Mullahy and Sindelar 1993), decreased work hours and income conditional on employment (Benham and Benham 1982, Bartel and Taubman 1986, Ettner et al 1997, Marcotte and Wolcox-Gok 2003), higher absenteeism (French and Zarkin), more transitions into and out of the labor market (Roan Gresenz and Strum 2004), performance deficits (Lerner and Henke 2008), and even decreased coworker performance (Ettner et al 2011). The total economic burden of serious mental illness in 2002 was estimated to be \$317.6 billion, with \$193.2 billion due to lost earnings (Insel 2008). Mental illness is also associated with decreased educational attainment (Curie and Stabile 2006, Fletcher 2008, Eisenberg et al 2009), decreased social connectedness and problems with social relationships (Kirk 1974, Bartel and Taubman 1986, Kelleher et al 1994, Kessler et al 1998, Teitler and Reichman 2008), violent and criminal behavior (Link et al 1992, Torrey 1994, Steadman et al 1998), incarceration and homelessness (Jemelka et al 1989, Harcourt 2011, Raphael and Stoll 2013), decreased quality of life (Saarni et al 2007), and excess mortality (Brown et al 2000, Saha et al 2007, McGrath et al 2008, Druss et al 2011, Thornicroft 2011), especially for the seriously mentally ill. While this list provides a plethora of outcomes that CMHCs could have affected, we focus on mortality due to this being the most extreme and substantial concern related to mental illness. However, future research should address the effects of CMHCs on other, less extreme outcomes.

There is limited evidence showing that mental health treatment has impacts on economic outcomes. The treatment of depression using medication and psychotherapy has been found

to decrease depressive symptoms and return depressed people to work (Mintz et al., 1992), making treatment either cost-neutral or beneficial based on the increased earnings and the cost of treatment (Zhang et al., 1999 a, b). The effect of changing access to treatment is even less well understood. Lang (2013) finds that laws requiring that health insurance include mental health benefits at parity with physical health benefits lead to a decrease in the suicide rate by 5%. However, these benefits are restricted to the subset of the population with health insurance, which is likely not universal in the population of the mentally ill due to the negative employment and earnings effects of mental illness. This will attenuate the potential effect that increased access could have on mental health related mortality. Because CMHCs were available to everyone regardless of income or insurance coverage, we will be able to get a better grasp of how increases in access would affect mortality for the entire population.

## **2.2 Evidence on Publicly-Provided Health Care**

While the public provision of mental health care has a history mostly limited to the CMHCs, there has been more attempts to provide (physical) health care through public provision. A recent federally funded program to provide free breast and cervical cancer screenings, analyzed in Bitler and Carpenter (2019), increased the probability of being screened by about 3 to 6 percentage points for eligible women. In a more historical context, Bailey and Goodman-Bacon (2015) analyze another community health program: Community Health Centers (CHCs). Compared to CMHCs, CHCs provided care in a similar way and to a similar population, but the care they provided was for physical, rather than mental, health. They find a 2% decrease in mortality for people ages 50 and over, with effects concentrated in cerebrovascular diseases. Additionally, they find that the timing of the roll out of CHCs had little to do with underlying need or planned development, citing the “great administrative confusion” that led to CHCs being approved and developed almost at random. We show that the roll out of CMHCs was also inconsistent with prior plans and priority rankings.

## 2.3 Historical Context of Community Mental Health Act

During the early 1960s, community-based care was considered a “bold new approach” to the treatment of the mentally ill. To stimulate the usage of community care techniques, President Kennedy signed the Community Mental Health Centers Construction Act of 1963. This act provided a three-year authorization for grants totaling \$150 million to fund the development and construction of Community Mental Health Centers (CMHCs) across the country.

This act mandated community focused treatment centers be regionally planned and oriented toward prevention. To be eligible for federal funds, states had to first submit a comprehensive plan to the Department of Health, Education, and Welfare (HEW). This state plan was required to designate an agency to administer the plan, as well as an advisory council with broad representation. State mental health planning reports outlined the condition of mental health services available at the time of compilation, the mid-1960s, and contained recommendations for improvements.

The state plan was also required to develop a proposal for the construction of community mental health centers. The construction plan defined and prioritized catchment areas serving a population of 75,000 to 200,000 people. When determining the priority of each catchment area, states were required to target especially needy populations and, as such, priority was largely determined by demographics correlated with the need for mental health services including median family income, the infant mortality rate, and alcoholism rates. Priority of catchment areas was also impacted by the current availability of mental health resources in each community, such as construction projects approved in previous years and the number of psychiatrists in an area.

For a project to be approved, it was required to have priority over other projects within the state. Funds were to be allocated to applicants in areas of greatest unfilled need and in the order of area priority, meaning the neediest catchment areas would be the first to get CMHCs and other areas could only receive CMHCs after those neediest areas were served. However,

a 1971 report issued to Congress by the Comptroller General of the United States reviewed this process and found evidence of considerable discrepancy between funding guidelines and actual spending. For example, they cite that, although centers were supposed to be funded by need as specified in state plans, California and Florida had been funding centers with little regard to prioritization (Kenig, pg. 82).

Under President Johnson in 1965, amendments expanded the original legislation to include funding for staff. This funding took the form of staffing grants that lasted for 51 months but declined over the life of the grant using a sliding scale.<sup>4</sup> The construction and staffing grant were a “seed money” mechanism to encourage the development of community focused centers that would eventually be funded by third parties, such as patient fees, local and state funds, and fundraising. After 51 months, centers were expected to have generated adequate alternative funds. To qualify for staffing grants, centers were required to offer the following five services: inpatient services, outpatient services, partial hospitalization, emergency services, and consultation/education programs (Naierman et al, 1978).

In 1967, the CMHC construction grants were extended for three more years and staffing grants for an additional two years (Kenig pg 72). In the years that followed, it became apparent that centers would not be able to acquire adequate funds to replace federal funding by the end of 51 months and eligibility for staffing grants was extended to eight years. A more generous sliding scale was introduced in high poverty catchment areas that left as much as 70 percent of the initial grant in the last year, compared to 30 percent for non-poverty centers. By 1975, in an attempt to force centers to obtain higher levels of alternative funding earlier in their development, a new sliding scale was introduced that maintained high initial levels for both poverty and non-poverty centers, but funds declined at a faster rate.<sup>5</sup> Lastly,

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<sup>4</sup>This bill authorized \$73.5 million dollars for three years (although funding could be spread over fifty-one months to ensure that new centers receiving grants in the second and third year of the program would have full funding). The sliding scale begin with 75 percent cost coverage and decreased to 30 percent. (Grob pg 249)

<sup>5</sup>Funds decreased to a 30 percent federal contribution in the eighth year for poverty centers and a 25 percent federal contribution in non-poverty centers. Another provision of this amendment provided “distress” grants to some of the older centers that failed in finding adequate alternative funding. These grants were limited to a total of three years and mandated that 7 additional services be provided by the center.

recognizing that the preventative functions of centers might be the first to be eliminated as funding diminished, the law provided the only permanent grant mechanism for consultation and education services.

Under the Carter administration, a new President's Commission on Mental Health was appointed to revisit the nation's mental health needs and services. The outcome of the commission's work was a short-lived piece of legislation, the Mental Health Systems Act, which was passed in 1981, replacing the earlier Community Mental Health Centers Construction Act with a newly developed approach to providing mental health services.<sup>6</sup> However, the 1981 Omnibus Budget Reconciliation Act repealed most of the previous mental health legislation, including the CMHC Act and the Mental Health Systems Act, in favor of Alcohol, Drug Abuse, and Mental Health Block Grants to states. These block grants consolidated funding for services related to mental health, alcoholism, and drug abuse into a block grant starting in fiscal year 1982. Most CMHCs initially funded prior to 1982 received some portion of each State's allotment for as many years as they would have been eligible for basic staffing or operations support when first funded. However, the amount of the award to each center was not guaranteed.

By the end of the program in 1981, a total of \$2,659.3 million was spent on CMHCs.<sup>7</sup> Despite the goal of having mental health care coverage nationwide through the establishment of over 2000 centers, only 781 CMHCs ever existed.

## **2.4 What Did CMHCS Do and Whom Did They Serve?**

While these centers were originally viewed as an alternative to mental hospitals, most centers devoted their attention to the less severely mentally ill by offering preventative services, counseling and crisis interventions; ultimately, the centers served a drastically different pur-

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<sup>6</sup>Rather than providing twelve services in one center, the Systems act funded a phased-in system of services and rather than providing direct federal funding, the system called for providing money to states for distribution through individual state departments of mental health.

<sup>7</sup>\$1,552.3 million on staffing and construction grants combined and the rest on other various grants including distress grants for centers that could not obtain alternative funding and consultation and education grants which were the only "permanent" grants that did not decline on a sliding scale.

pose than originally intended (Grob, pg 249). Figure 1 shows the number of patient care episodes reported annually from 1971 to 1975. By 1971, just under 300 centers existed that treated a total of 797,000 patient care episodes. By 1975, over 500 centers existed that treated over 1,961,000 patient care episodes. In general, most episodes were treated with outpatient services, although inpatient and partial services were also provided. While we don't have individual level information about patients, statistical notes compiled by the National Institute of Mental Health indicate that, in 1975, about 42% of patients were under the age of 25 and 39% were between the ages of 25 and 45.<sup>8</sup> We also know that whites made up a majority of patients in CMHCs, although the ratio of nonwhite to white patients is larger than the ratio of nonwhites to whites within the population.

### 3 Data

The data used in this project was compiled from various sources. The locations of CMHCs were identified by digitizing the Mental Health Directories and the Directories of Federally Funded Community Mental Health Centers. These directories document the addresses of CMHCs and were published every other year from 1971-1981. The variation in centers across subsequent editions of these publications allows us to document the roll-out of community mental health centers nationwide over the 1970s<sup>9</sup>. The locations and roll-out of CMHCs can be seen geographically in Figure 2, which shows the first year a CMHC was established in a county, with the earlier centers shown with a lighter color.

We supplement these directories with data obtained from State Mental Health Planning reports, which were required before a county could be granted funding for community mental

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<sup>8</sup>Furthermore, females made up about 53% of the patient pool, although, males made up 53% of the patients under the age of 25.

<sup>9</sup>Between 1966 and 1971 there is data that includes community mental health centers, though it is unclear from the documentation whether these centers were a part of the CMHA and were expected to follow the guidelines as such. In 1971 and later there are mental health locations called community mental health centers that were not included under the official category of federally funded community mental health centers, throwing doubt on whether those CMHCs in pre-1971 documents actually are CMHCs as defined and funded by the federal government.

health centers. These planning reports defined catchment areas serving 75,000 to 200,000 people and, in a subsample of states, aggregated multiple counties into one planning area. Each planning area was ranked according to relative need<sup>10</sup>. We collect and digitize planning area and relative rankings for each state that defined planning areas using county boundaries.

Our primary outcome variables are age-adjusted mortality rates. Mortality data was obtained from the Multiple Cause of Death Vital Statistics published by the National Center for Health Statistics and contains the universe of civilian deaths reported by cause, age, and the decedent's county residence. We compute age-adjusted mortality rates from 1969 to 1988 using annual county population estimates from the Surveillance, Epidemiology, and End Results Program.

We consider numerous types of mortality due to their relationship in the literature to mental illness: suicide, homicide, and deaths caused by alcoholism.<sup>11</sup> We expect mental health treatment to affect homicide rates for two reasons: violent and criminal behavior is associated with untreated mental illness (Link et al 1992, Torrey 1994, Steadman et al 1998), so greater access to treatment would likely decrease these behaviors and thus homicide; and mental illness, particularly severe mental illness, make people more vulnerable to being victims of all types of crimes, including homicide (Torrey 1997, Hiday et al 1999, Hiroeh et al 2001, Teplin et al 2003, Maniglio 2009). We use an alternative measure of suicide which combines suicide deaths with accidental gun deaths; in the time-frame considered here, mental illness and suicide were still stigmatized in much of the country, and coroners would often mislabel suicides as accidental deaths to protect the family from the knowledge of the real cause of death or from the scrutiny of the community.

The age-adjusted mortality measures for our outcome variable of interest are shown graphically in Figure 3. The suicide rate remains at about 16 deaths per every 100,000 people over our time period of interest, with our alternative suicide definition trending similarly

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<sup>10</sup>These reports were maintained by the National Institute of Mental Health and are available at the National Archives in Maryland.

<sup>11</sup>We do not include deaths caused by drug dependence because, as seen in Figure A1 in the Appendix, there were very few deaths caused by drug dependence during our sample period.

around 18 deaths per every 100,000 people. The homicide rate remains at about 8 deaths per every 100,000 people although it drops to about 6 deaths per every 100,000 around 1984. Lastly, deaths caused by alcoholism remain stable at about 2 deaths per every 100,000 over our sample period.

Lastly, we use county level controls such as educational attainment, labor force participation, and income measures from the decennial censuses. We use 1960 and 1970 data and linear interpolate values for non-census years. Table 1 shows averages of our variables of interest in 1960 in counties that would eventually receive a CMHC and counties that would not. We see that counties receiving a center had higher population rates and tended to be more urban. The distribution of educational attainment across counties is similar, although counties that would eventually receive a CMHC had a slightly higher unemployment rate. Due to differences along these dimensions, we include linear trends of percent less than high school education, percent with high school education, percent of the population living in an urban area (split into 5 categories), unemployment rate, labor force participation rate as controls in each of our main specifications.

## 4 Identification Strategy

Our primary identifying assumption is that, if any difference between treated and untreated counties existed, CMHCs were more likely to be placed in counties with higher levels of pre-treatment mental health mortality rates or relative need. Thus, any selection bias would mitigate our results toward zero. This allows us to identify a lower-bound on the effects of CMHC on age-adjusted mortality by directly comparing counties that received a center to counties that did not.

We support this identifying assumption in multiple ways. First, we utilize state preliminary planning reports that rank catchment areas by relative need to test if centers were being placed in areas based on predetermined need.<sup>12</sup> These rankings were established by

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<sup>12</sup>We have these planning reports for 29 states: Alabama, Arkansas, Delaware, Florida, Idaho, Indiana,

mental health professionals familiar with the need of mental health services across the state. While each state had its own ranking algorithm, states were required to target especially needy populations and, as such, priority rankings were largely determined by demographics correlated with the need for mental health services including median family income, the infant mortality rate, and alcoholism rates. We calculate z-scores for priority ranking for each state to determine if higher rankings correspond with an increased likelihood of receiving a CMHC or with the timing of CMHC rollout. Table 2 presents the results of this analysis and shows that having a higher priority ranking does not increase the probability that a county would receive a center or, conditional on receiving a center, that higher priority areas would receive centers sooner. This is consistent with a 1971 report issued to Congress by the Comptroller General of the United States that found evidence of considerable discrepancy between funding guidelines and actual spending (Kenig, pg. 82).

Furthermore, we show the extent to which mortality rates predict if a county would eventually receive a CMHC. We regress pre-treatment age-adjusted mortality rates of interest on a binary variable which equals 1 if a county would eventually receive a CMHC using a probit regression model. The results of this regression are presented in Column 1 of Table 3. Only homicide rates predict treatment and roll-out, with higher mortality counties being more likely to receive a center and to receive a center earlier. However, these pre-trends on homicide are entirely driven by homicides of white people, while our results are primarily on homicides of non-white people, so we are less concerned about the effect this will have on the interpretability of our results.

Lastly, we show that pretreatment mortality trends are not statistically different between counties that would eventually receive a center and those that would not. We show this result

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Kansas, Louisiana, Maryland, Mississippi, Missouri, Montana, Nebraska, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, and Wisconsin. In some instances, particularly in rural areas, centers were designed to treat multiple counties. Due to the large geographic catchment areas, we find it likely that CMHCs were not accessible to everyone they were meant to target. Thus, our preferred specification uses counties to characterize treatment status.

by estimating the following equation

$$y_{cst} = \alpha + \beta_1 Year + \beta_2 CMHC_c + \beta_3 Year * CMHC_c + \epsilon_{cst} \quad (1)$$

where  $y_{cst}$  is an outcome for county  $c$  in state  $s$  for year  $t$  and  $CMHC_c$  is a binary variable indicating if county  $c$  ever received a CMHC. The coefficient of interest is  $\beta_3$  which identifies any differential trends in age-adjusted mortality between treat and untreated counties during the pretreatment period. These results are presented in Table 4 which shows that  $\beta_3$  is statistically insignificant across all specifications.

Given that centers appear to be constructed with little regard to pre-existing mental health mortality trends or relative need as determined by mental health professionals within each state, we identify the effect of receiving a CMHC on county level measures of age-adjusted mortality using a generalized difference-in-difference empirical specification. Our outcomes of interest include age-adjusted mental health related mortality, including suicides, homicides, and deaths caused by alcohol dependence. We estimate the following regression equation:

$$y_{cst} = \alpha + \beta CMHC_{ct} + \theta_c + \gamma_t + \lambda_s * t + X_{ct} + \epsilon_{cst} \quad (2)$$

where  $y_{cst}$  is an outcome for county  $c$  in state  $s$  for year  $t$ ,  $CMHC_{ct}$  is a binary variable indicating if county  $c$  received a CMHC by year  $t$ ,  $\theta_c$  are county fixed effects,  $\gamma_t$  are year fixed effects,  $\lambda_s * t$  is a state specific linear time trend, and  $X_{ct}$  is a vector of controls<sup>13</sup>. The coefficient of interest is  $\beta$  which estimates the average intention to treat effect. We also use subgroup analysis to explore if CMHCs were effective in mitigating mental health related mortality within certain demographics of the population, including race and age.

Mortality may be serially correlated within a county across years so we cluster our standard errors at the county level.<sup>14</sup> However, there is evidence that clustering standard errors

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<sup>13</sup>Controls include linear trends of percent less than high school education, percent with high school education, urban category, unemployment rate, labor force participation rate.

<sup>14</sup>See Bertrand et al (2004) for more information about serial correlation and see Abadie et al (WP 2017) for more information about clustering standard errors.

(and even robust standard errors) will result in too-conservative standard error estimates in this environment.<sup>15</sup> We present clustered standard errors and highlight that we are likely being over conservative in our estimation strategy.

#### 4.1 The Expected Effects of CMHCs on Mortality Rates

The expected effects of CMHCs on mortality rates depends both on the incidence of causes CMHCs might prevent and the effectiveness/availability of CMHCs' care relative to alternatives. Figure 4 show age-adjusted mortality trends for different subgroups of the populations. This figure shows our outcome variables of interest broken down by the following age groups: 15-24 years old, 25-44, 45-64, and 65 and older. We see that suicide rates are highest among people over the age of 45, although rates are increasing for the young population over our sample period. Furthermore, the young adult population is the most likely to be murdered and the adult population has the highest rate of deaths caused by alcoholism. Given the differences in the baseline mortality rates of different demographic groups across each cause of death, we expect the effects of access to a CMHCs to differ along these dimensions.

We know that a disproportionate number of patients were between the ages of 15 and 24. Furthermore, educational and prevention outreach programs, consisting mostly of outreach to schools, was the only permanent funding provided to centers. Thus, we would expect to see a greater impact on this segment of the population.

We expect rural CMHCs to have a greater effect in their community than urban centers. Centers in urban counties may have been more accessible, since rural counties are often large and have less extensive public transportation, leading to greater effects for urban counties. However, rural counties probably didn't have as many other mental health resources as urban areas did, meaning that a CMHC entering a rural community could have a greater effect. This conjecture is supported by statistical notes compiled by the National Institute of Mental

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<sup>15</sup>See Abadie et al (WP 2017) for more details about why clustering may be too-conservative. Furthermore, see Goodman-Bacon for a discussion about the interpretation of generalized Difference-in-Difference coefficients.

Health: admissions to rural CMHCs were less likely to have had any prior mental health treatment compared to admissions to more urban centers, and those that had treatment were more likely to have had it from a non-mental health professional, such as a primary care doctor (Bachrach 1974). Additionally, more current evidence shows that closures of (general) hospitals in rural areas causes a larger increase in mortality than closures in urban areas (Gujral and Basu WP 2019), pointing towards rural areas as being more strongly affected by the opening or closing of new health care facilities.

## 5 Results

Our first set of results are shown in Table 5. Each entry presents the results for a different regression, with the outcome variables corresponding to suicide rates, homicide rates, and deaths caused by alcoholism. These results indicate that, on average, CMHCs did not mitigate suicide rates or deaths caused by alcoholism. We do find evidence that CMHCs caused a decrease in the homicide rate by approximately 4%. Due to the differing baseline mortality rates across demographic groups for our causes of death, we analyze subsamples of the population and find that CMHCs were particularly effective on certain demographic groups. Panel B and C explore mortality rates for the white and nonwhite population respectively. We see that the decrease in homicide rates are primarily driven by the nonwhite population.

We explore the impact of CMHCs across different age and racial groups in Table 6 and Table 7. Table 6 focuses on different age groups within the white population. Each panel of this table shows the regression results for different segments of the population. Panel A limits our sample to only deaths among 15-24 year olds, Panel B to 25-44 year olds, Panel C to 45-64 years and Panel D to those who died at an age of 65 or older. Panel A shows how CMHCs decreased suicide rates of the young white population by approximately 4%. We find no effects of CMHCs on homicide rate or deaths caused by alcohol across any ages in

the white population. Thus, while there is no statistical impact of CMHCs on county level mental health mortality for those over the age of 25, CMHCs were particularly effective of reducing suicide rates among the younger white population. This age group made up the highest patient share among CMHCs and was likely to benefit from low or no-cost treatment, providing further evidence that CMHCs were effective at decreasing the mortality rates of people visiting centers.

Table 7 presents the same specifications for different age groups within the nonwhite population. While we see little effect on suicide rates among the nonwhite population, we see a decline in homicide rates among those over the age of 25, particularly among 25-44 year olds who experienced a 6% decline in homicide rates and those 65 and older who experienced an 11% decline. We also see a decline in deaths caused by alcohol among the adult nonwhite population. Having a community mental health center in one's county reduced the number of deaths caused by alcohol dependence among this population by 11%.

In addition to differential effects based on demographic characteristics, we could expect that urban and rural counties could have different outcomes.<sup>16</sup> Table 8 shows the results for non-white mortality are primarily driven by substantial decreases in homicide and alcoholism-related mortality rates in rural counties. Homicide rates among nonwhites decreased by 13% in rural counties, compared to a statistically insignificant 1% in urban counties. Additionally deaths caused by alcoholism declined by 28% among non-whites in rural counties compared to a statistically insignificant 1% decline in urban counties. This is despite there being similar pre-treatment rates of homicide and alcoholism-related deaths for non-whites in urban and rural counties.<sup>17</sup>

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<sup>16</sup>Urban and rural counties are defined as having above and below the median percent of the population in the county living in an urban area, respectively

<sup>17</sup>Figure A2 in the appendix graphs our mortality rates by the full population across urban and rural counties. Also note that we do not see any difference across urban and rural mortality rates within the white population. See Table A1 in the appendix.

## 6 Conclusion

Mental illness is a pervasive and growing problem in the United States and around the world (WHO 2001, NIMH 2017). The World Health Organization's suggested solution is for community care, despite a lack of evidence as to its efficacy in managing mental health. The United States' experiment with community care in the 1950s through 1980s provides a context within which to test whether community care could be an effective means of handling the mental health problem in the United States and the rest of the world.

Since CMHCs were not equipped to treat the seriously mentally ill who were being deinstitutionalized during this time and less than half of the planned centers were ever built, Community Mental Health Centers have gone down in history as being completely ineffectual for treating the mentally ill. However, our results suggest that this is not the case.

We use the rollout of CMHCs over the course of 10 years - 1971 to 1981 - to identify the effect of implementing a CMHC in a community on mortality rates. While priority rankings were created by states to establish which areas had the greatest need for a CMHC, we show that these rankings do not predict which communities ever got CMHCs, nor do they predict the rollout of CMHCs. This apparent lack of correlation between state priority rankings and treatment allows us to directly compare treated and untreated counties in identifying the effect of a CMHC on county level mortality rates. We further show that our pretreatment outcome variables of interest had similar levels and were experiencing similar trends before treatment.

We find evidence that CMHCs reduced suicide rates among whites between the ages of 15 and 24 by 4%. CMHCs were particularly effective in reducing deaths from homicide and alcohol in the nonwhite population, with nonwhites experiencing a 5% decline in homicide rates and nonwhite adults experiencing an 11% decline in deaths caused by alcohol. The effect on mortality for nonwhite people is focused in rural areas. These results suggest CMHCs were effective in reducing mental illness related mortality, especially in populations with the greatest need and least access to alternative forms of treatment.

Death is the most extreme outcome of unmanaged mental illness; other outcomes, such as unemployment, labor force participation rates, poverty, and divorce rates, all contribute to the decreased quality of life for those suffering from mental illness. We see our results as a lower bound on the overall impact of CMHCs on the mentally ill and their communities, and find that, just considering this lower bound, we see substantial improvements in outcomes due to the implementation of CMHCs.

While CMHCs were implemented in a particular context, being in the United States and the results of a federal policy with numerous deployment issues, the effects that they had can be informative to our more general understanding of community care. In particular, it seems that community care is most likely to work in environments that are low in alternative mental health services, as was the case with rural counties in this paper, and for people who have the highest rates of mental illness-related issues. Additionally, they may be effective at helping not only the mentally ill, but also their communities, as the results on homicide rates suggest. While it is outside the scope of this paper to compare community care with other forms of care, the results suggest that community care does provide some benefits for the most extreme outcomes, and cautiously indicate that community care is worth considering as a viable option for public mental health.

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# Figures

Figure 1: Patient Care Episodes

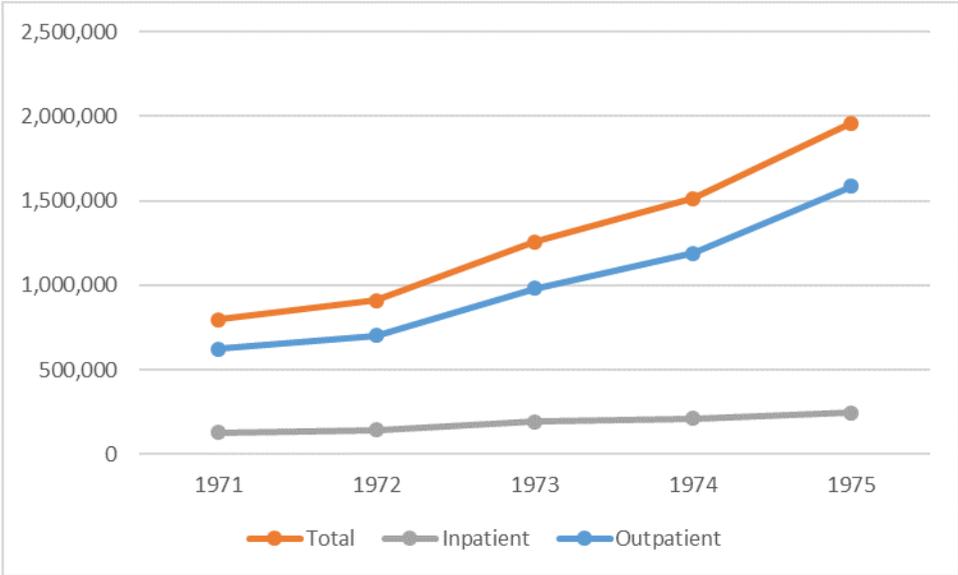


Figure 2: Rollout of CMHCs

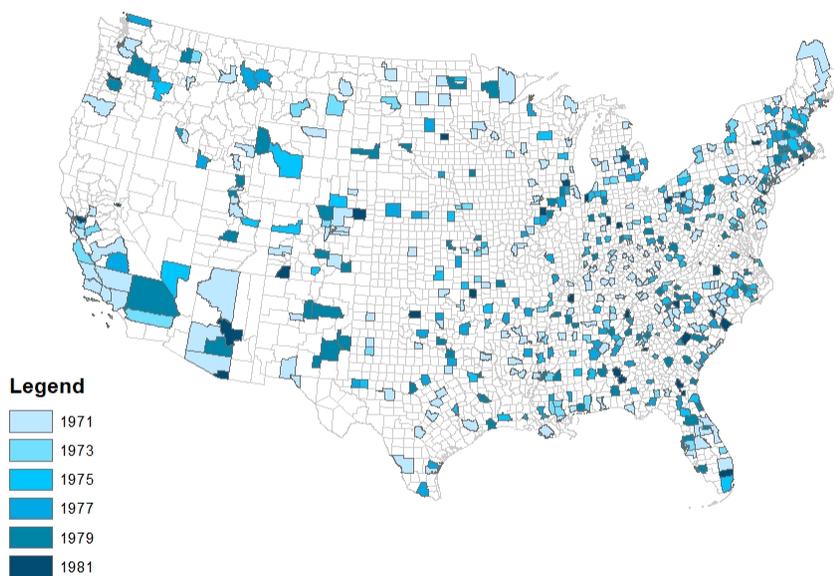


Figure 3: Age-Adjusted Mortality Summary Statistics

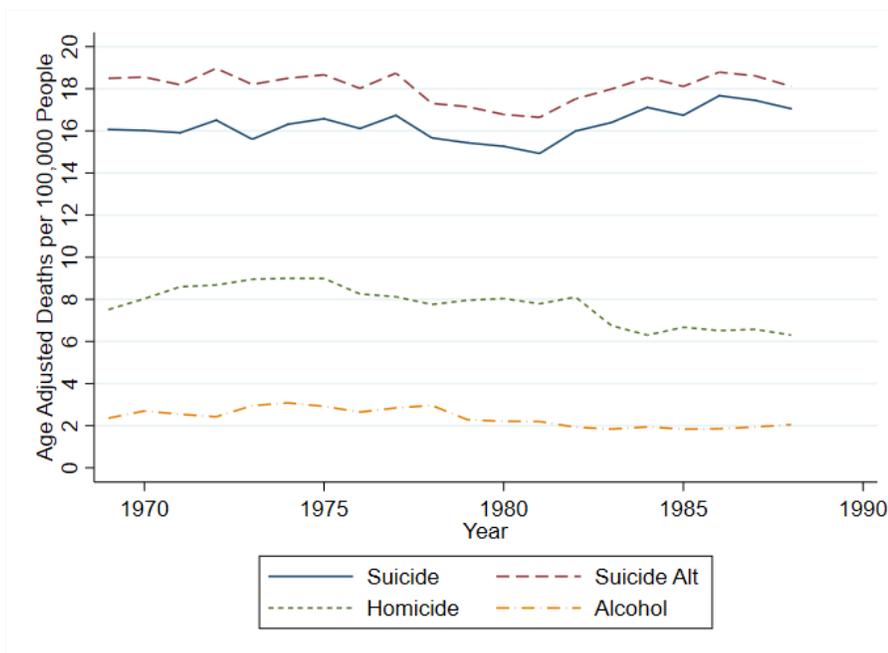
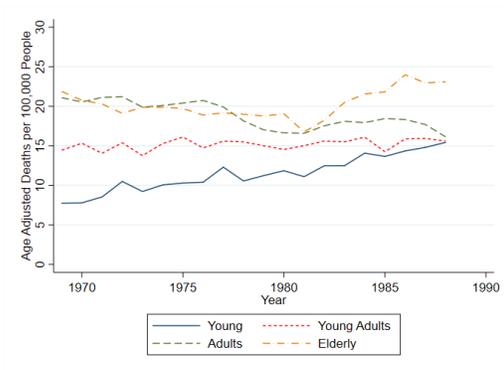
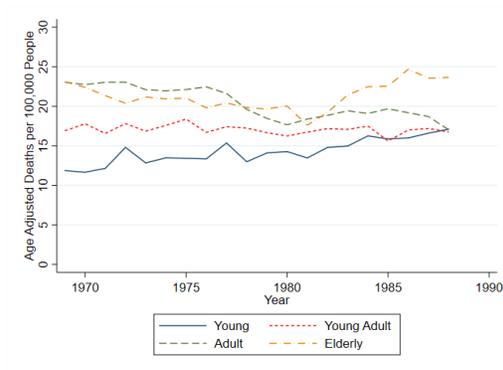


Figure 4: Age-Adjusted Mortality Rates by Age

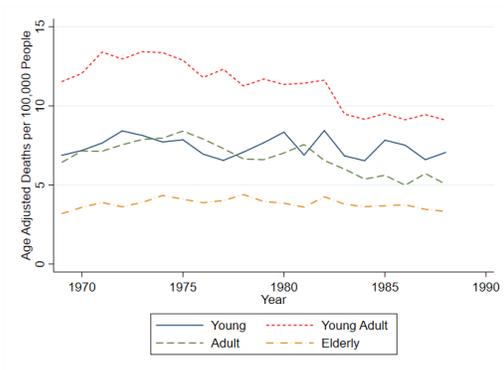
(a) Suicides



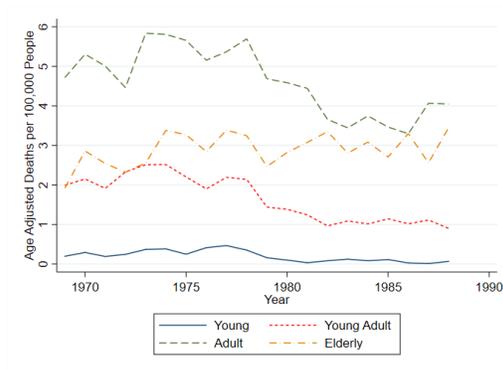
(b) Suicide Alt



(c) Homicide



(d) Alcohol



# Tables

Table 1: Pretreatment Differences in Demographics across Counties

	No CMHC	Gets CMHC	Difference
Population	21170 (971)	170757 (18601)	-149586*** (8818)
Percent Urban	0.29 (0.01)	0.65 (0.01)	-0.37*** (0.01)
Percent Less than HS	0.38 (0.00)	0.30 (0.00)	0.08*** (0.01)
Percent HS	0.55 (0.00)	0.60 (0.00)	-0.04*** (0.00)
Percent College	0.07 (0.00)	0.10 (0.00)	-0.04*** (0.00)
LFPR	0.53 (0.00)	0.56 (0.00)	-0.03*** (0.00)
Unemployment Rate	0.05 (0.00)	0.04 (0.00)	0.00 (0.00)
Number of Counties	2503	531	

Notes: Standard errors are in parentheses. \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ .

Table 2: Priority Ranking and CMHC Rollout

	Ever Gets CMHC	Rollout
Rank	-0.064 (0.064)	0.060 (0.194)
Observations	365	235
$R^2$	0.000	0.000

Notes: Standard errors are in parentheses. \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ . A higher rank means you have greater need.

Table 3: Predictors of CMHC Location

	Ever gets CMHC	Rollout
Suicide	-0.000 (0.000)	-0.017 (0.015)
Homicide	0.002*** (0.000)	-0.026** (0.015)
Alcohol	0.001 (0.001)	-0.019 (0.028)

Notes: Standard errors are in parentheses.  
 $*p < .10$ ,  $**p < .05$ ,  $***p < .01$ .

Table 4: Pretreatment Mortality Trends

	Suicide	Homicide	Alcohol
Year	-0.116 (0.504)	0.516 (0.345)	0.415* (0.181)
CMCHind	-1902.5 (2370.7)	-9.45 (1626.3)	838.6 (853.8)
Interaction	0.965 (1.204)	-0.006 (0.826)	-0.425 (0.434)
Observations	6068	6068	6068
$R^2$	0.001	0.007	0.003

Notes: Standard errors are in parentheses.  $*p < .10$ ,  
 $**p < .05$ ,  $***p < .01$ .

Table 5: Effects of CMHC on Mortality

	(1)	(2)	(3)
	Suicide	Homicide	Alcohol
<b>Panel A: Total Population</b>			
CMHC	-0.007 (0.010)	-0.038* (0.023)	0.009 (0.047)
<b>Panel B: White Population</b>			
CMHC	-0.007 (0.011)	-0.006 (0.020)	0.022 (0.052)
<b>Panel C: Nonwhite Population</b>			
CMHC	-0.001 (0.031)	-0.053* (0.031)	-0.019 (0.053)
County Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State-Specific Linear Time Trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes
Observations	60316	60316	60316

Notes: Clustered standard errors are in parenthesis \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ . Years included: 1969-1988.

Table 6: Sub-group Analysis by Age - White Population Only

	(1)	(2)	(3)
	Suicide	Homicide	Alcohol
<b>Panel A: Young</b>			
CMHC	-0.036*	0.006	0.014
	(0.022)	(0.031)	(0.169)
<b>Panel B: Middle</b>			
CMHC	0.019	-0.008	0.011
	(0.015)	(0.024)	(0.070)
<b>Panel C: Adults</b>			
CMHC	-0.008	0.020	0.024
	(0.014)	(0.032)	(0.055)
<b>Panel D: Elderly</b>			
CMHC	-0.024	-0.053	-0.020
	(0.020)	(0.044)	(0.067)
County Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State-Specific Linear Time Trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: Clustered standard errors are in parentheses \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ . Years included: 1969-1988.

Table 7: Sub-group Analysis by Age - NonWhite Population Only

	(1)	(2)	(3)
	Suicide	Homicide	Alcohol
<b>Panel A: Young</b>			
CMHC	0.035 (0.050)	-0.051 (0.052)	0.291 (0.212)
<b>Panel B: Middle</b>			
CMHC	-0.058 (0.044)	-0.058* (0.031)	0.060 (0.067)
<b>Panel C: Adults</b>			
CMHC	0.055 (0.072)	-0.041 (0.032)	-0.115* (0.070)
<b>Panel D: Elderly</b>			
CMHC	-0.019 (0.089)	-0.112* (0.062)	0.039 (0.120)
County Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State-Specific Linear Time Trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: Clustered standard errors are in parentheses \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ . Years included: 1969-1988.

Table 8: Urban vs. Rural Sub-group Analysis - NonWhite Subsample

	(1)	(2)	(3)
	Suicide	Homicide	Alcohol
<b>Panel A: Urban CMHC</b>			
CMHC	-0.006	-0.009	-0.007
	(0.032)	(0.020)	(0.056)
<b>Panel B: Rural CMHCs</b>			
CMHC	0.048	-0.133*	-0.324*
	(0.115)	(0.068)	(0.162)
County Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State-Specific Linear Time Trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: Clustered standard errors are in parentheses.\* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ . Years included: 1969-1988.

# Appendix

Figure A1: Age-Adjusted Mortality Summary Statistics

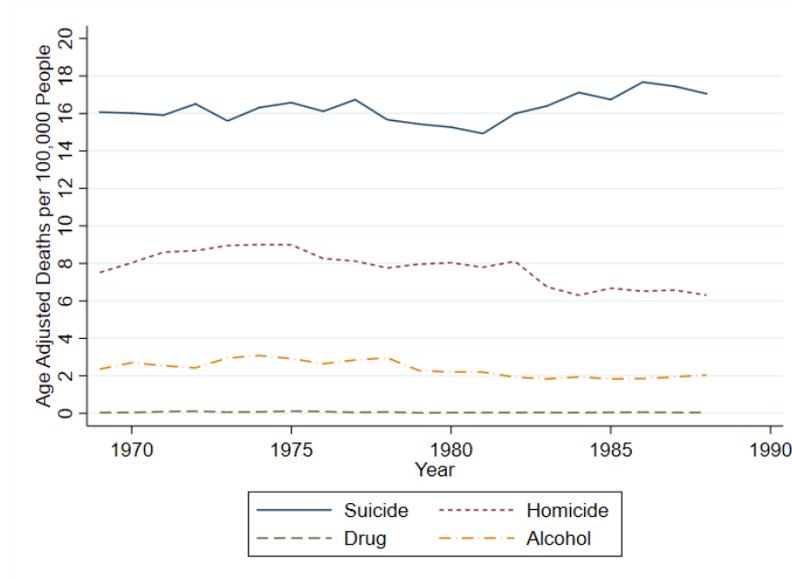
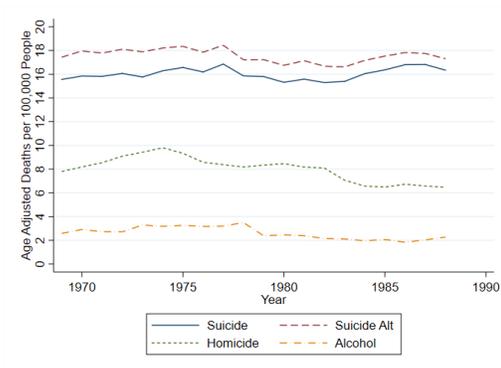


Figure A2: Age-Adjusted Mortality by Urban/Rural

(a) Urban



(b) Rural

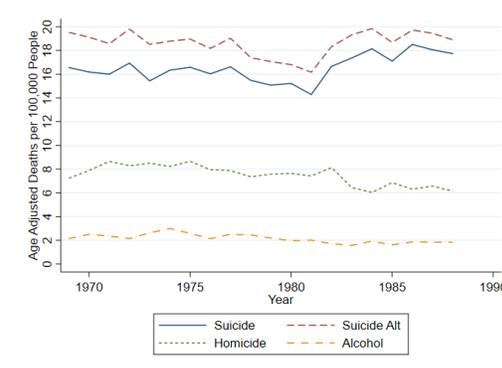


Table A1: Urban vs. Rural Sub-group Analysis - White Subsample

	(1)	(2)	(3)
	Suicide	Homicide	Alcohol
<b>Panel A: Urban CMHC</b>			
CMHC	-0.008	-0.002	0.021
	(0.010)	(0.020)	(0.054)
<b>Panel B: Rural CMHCs</b>			
CMHC	0.040	-0.034	0.058
	(0.282)	(0.053)	(0.115)
County Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
State-Specific Linear Time Trend	Yes	Yes	Yes
Controls	Yes	Yes	Yes

Notes: Clustered standard errors are in parentheses. \* $p < .10$ , \*\* $p < .05$ , \*\*\* $p < .01$ . Years included: 1969-1988.