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Research paper

The impacts of the global financial crisis on hospitalizations due to depressive illnesses in Taiwan: A prospective nationwide population-based study

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ABSTRACT

Background: In the third quarter of 2008, a major financial crisis hit many developed countries. Taiwan suffered its own share: a rise in unemployment and a severe decline in gross domestic product. This study is to address the health consequences of this crisis on different socioeconomic populations in Taiwan.

Methods: A sample of 6,225,766 men and 5,417,651 women, was obtained and their admissions data over 2007–2012 were retrieved. Stratified into three income levels, the sample was examined on the 147,921 episodes of hospitalization due to depressive illnesses (DIs) over that period by an *interrupted time series analysis* for monthly incidence rates of DI hospitalizations

Results: The adjusted incidence rates of hospitalization (AIRH) for DIs among the low income were 10 times that of the high income group. The AIRHs were generally higher in all of three female income groups than they were in the three male income groups. The low income men and women showed increases (of 18.0% and 14.2%, respectively) beginning in April 2008 that sustained for two years. The high income women exhibited a 5.0% monthly rise in the rate of DI hospitalizations.

Limitations: Our time series models can control some confounding factors, but the ecological fallacy remained.

Conclusions: This study provides evidence that the economic recession resulted in increased rates of DI hospitalization in Taiwan, especially among the low income population. Women of higher incomes may have suffered a more enduring impact.

1. Introduction

Beginning in the third quarter of 2008, a major global financial crisis struck many developed industrial countries. By April 2009, the International Monetary Fund estimated that banks and other financial institutions around the world had lost four trillion US dollars (IMF, 2009). The World Bank also estimated a consequent rise in global unemployment of around 30 million, which in turn resulted in additional deaths during the recession period (World Bank, 2009). Taiwan was heavily affected by this economic recession because it relies heavily on exports (National Statistics, 2016a). The total amount of exports in 2007 decreased by 4% from the amount in 2006, while the amount of exports in 2008 decreased by 16.8% from the amount in 2006 (National Statistics, 2016b). Taiwan has been known for its “economic miracle” largely over the 1970s and 1980s, which featured not just fast economic growth but improving income distribution. But the decades before and after the turn of the 21st Century saw a faltering trend in Taiwan's economy. Prior to the financial crisis of 2008, Taiwan's economic growth had lost much of the steam, and the income distribution started to worsen (National Statistics, 2017). And the unemployment rates, while lower compared with that of the western nations, were no longer comforting (from the average of 2.17% between 1991 and 2000 to 4.45% between 2001 and 2007)(DGBAS, 2016a). These ominous economic outlooks might have set the stage for the financial crisis to take heavier tolls.

The financial crisis could have affected health, including physical health (Modrek and Cullen, 2013) and mental health (Bacigalupe et al., 2016; Chang et al., 2016; Dunlop and Mletzko, 2011; Economou et al., 2013; Lee et al., 2010; Paul and Moser, 2009), by affecting alcohol consumption (Bor et al., 2013; Dee, 2001), smoking behaviors (McClure et al., 2012), and physical activities (Colman and Dave, 2013). Suicide attempts (Córdoba-Doña et al., 2014) and realized suicides (Chang

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et al., 2009; Stuckler et al., 2009) may also have increased. Mental disorders are therefore among the most concerning effects of economic recession on health. Margerison-Zilko (2016) conducted a systematic and critical review of the health impacts of the 2007 and 2009 recessions and found that, among 118 review papers, 42 addressed mental health, 24 addressed adult physical health, 20 addressed health behaviors, and 7 addressed reproductive and early-life health. The World Health Organization (WHO) also emphasized the impact of economic crises on mental health because such crises can potentially lead to higher suicide and alcohol death rates; hence, the WHO advocated, most importantly, for the feasibility and effectiveness of taking preventative measures to help reduce the adverse effects of such crises on vulnerable people (WHO-EURO, 2011). Relatedly, evidence has suggested that, in some European countries, undesirable health effects can be ameliorated by strong social safety nets (Margerison-Zilko et al., 2016). However, public health authorities often fail to respond aggressively to economic crises (Karanikolos et al., 2013).

A good amount of research has revealed that financial crises are positively related to increased rates of common mental disorders, substance-related disorders, and suicidal behaviors through mediators such as unemployment, income decline, and unmanageable debts (Frasquilho et al., 2016). In Greece, the one-month prevalence of major depression increased from 3.3% in 2008 to 8.2% in 2011, and this significant increase was found in the majority of the population subgroups (Economou et al., 2013). In the Basque Country of Spain, the percentage of males with poor mental health increased from 10.0% in 2007 to 14.7% in 2013, with a 1.44% incremental prevalence ratio (IPR) (95% CI: 1.23–1.69), while the percentage of females with poor mental health increased from 18.2% to 22.0%, with an IPR of 1.19% (95% CI: 1.07–1.34) (Bacigalupe et al., 2016). In the Andalusia region of southern Spain, the adjusted rate of suicide attempts for males aged between 15 and 64 increased from 33.2 per 100,000 persons when the male unemployment rate was 9.48% in 2007 to 63.7 per 100,000 people when the male unemployment rate was 33.58% in 2012; the same rate for females increased from 38.4 per 100,000 when the female unemployment rate was 17.61% in 2007 to 79.0 per 100,000 people when the female unemployment rate was 35.84% in 2012 (Córdoba-Doña et al., 2014). In Hong Kong, The twelve-month prevalence of DSM-IV major depressive episodes significantly increased from 8.5% in 2007 to 12.5% in 2009, and this significant increase held true both for men and women (Lee et al., 2010). In Taiwan, the incidence of postpartum depression was found to be positively related to yearly unemployment rates (Chang et al., 2016).

Further attention should be paid to socioeconomic disparities in mental health disorders as a result of financial downturns. Women generally have a higher percentage of depression than men do regardless of the status of economic development (Bacigalupe et al., 2016; Economou et al., 2013; Lee et al., 2010; Moya et al., 2015). Nevertheless, a critical review concluded that men are more vulnerable than women to recessions when it comes to mental health (Margerison-Zilko et al., 2016). Moya et al. (2015) found that regional economic conditions appear to directly influence depression among Spanish men, while this effect did not hold for women. Córdoba-Doña et al. (2014) found that unemployment is significantly related to growing suicide attempt rates among men but not women. Furthermore, economic recessions might bring different effects for people in different economic strata. For example, individuals in the lowest income groups, when faced with financial distress, such as household unemployment and mortgage payment difficulties, were found to be more likely to become mentally unwell (Economou et al., 2013; Gili et al., 2013; Lee et al., 2010). However, Lee et al. (2010) found that people in the high-middle income groups in Hong Kong also had higher risks of suffering depression during a recession.

In light of the differential effects on various socio-economic groups, further inquiry addressing the differential effect on health outcomes will help identify the most vulnerable subgroups, thus allowing for the development of effective prevention strategies (Margerison-Zilko et al., 2016). Therefore, this study sought to evaluate the impacts of the 2008 financial crisis on different socioeconomic subgroups in Taiwan.

2. Methods

2.1. Data source and collection

Data were drawn from the National Health Insurance Research Database (NHIRD) released by Taiwan's National Health Insurance Administration (NHIA), Ministry of Health and Welfare. Taiwan launched a single-payer National Health Insurance Program (NHIP) in March of 1995. Approximately 99% of Taiwan's 23 million people have subsequently been enrolled in this program (NHIA, 2015). The admissions data analyzed in this study was retrieved from the NHIRD claims files, including the “registry for beneficiaries” (RB) database for the year of 2007, the “2007–2012 inpatient expenditure by admissions” (IEA) database, and the “2007–2012 monthly claims summary for inpatient claims” database. The personal identification number (PIN), gender, causes of diseases, date of birth, dates of admissions, and insurance premium information for each study subject was retrieved from the aforementioned databases. Access to research data has been agreed to by the Review Committee of the National Health Research Institutes and approved by the Research Ethics Committee, National Taiwan University (NTU-REC 201505ES037).

2.2. Study population

In Taiwan, the ranks of people insured by the NHIP through their workplace are dominated by those aged 24–64 years. By selecting all the registered insured with birth years from 1948 to 1983 (i.e., those aged 24–59 years old in 2007), a total of 6,225,766 men and 5,417,651 women were included as the subjects of the study. The primary diagnoses for each admission are coded in the NHIRD database according to the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) codes. Data for all the participants with a psychiatric diagnosis were selected for our analysis in order to estimate the effects of the economic downturn on mental health. We specifically counted the number of admissions for depressive illnesses (DIs) including bipolar disorder (i.e. manic depression), depressive disorder, affective disorder, and neurotic depression (ICD = 296, 311, 300.4) (Lee et al., 2007). Data for all the admissions involving a primary diagnosis of one of the above psychiatric disorders were collected. Because of the high accessibility of hospitals and nearly universal coverage in Taiwan, it was possible to include almost all the patients in Taiwan with severe psychiatric disorders in our study. Data from the IEA database for 2007–2012 showed a total of 147,921 episodes of hospitalization due to DIs in the cohort. Using individual PINs, we also linked the study cohort to the 2007 RB database to retrieve personal information regarding insurance premiums. For each participant, we used the paid insurance premium level in 2007 as a surrogate for personal income (incomes fall into one of the brackets of the premium schedule, and serve as the bases upon which paid premiums are calculated), which in turn allowed us to categorize all the participants into low, middle, and high income groups, i.e., those with monthly incomes lower than 17,280 New Taiwan Dollars (the first quartile), those with monthly incomes of 17,280–33,300 (the second and third quartile), and those with monthly incomes of > 33,300 (the fourth quartile).

2.3. Measurement

The number of admissions was counted for every month according to the admission date of hospitalization. The sex-age-income-specific populations were used as the denominator to calculate the monthly incidence rates of hospitalization according to the RB database information. As an outcome variable, each monthly adjusted incidence