



Research paper

The relationship between economic conditions and postpartum depression in Taiwan: a nationwide population-based study



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ABSTRACT

Background: Understanding mothers' economic conditions and postpartum depression (PPD) is important for determining how they will take care of themselves and their infants during the postnatal period, especially for low-income families. This study examined the relationship between economic conditions and PPD to elucidate the effect of economic contraction on PPD.

Methods: Our population-based nationwide study used 2000–2013 the National Health Insurance Research Database of Taiwan. A total of 1240 newly diagnosed PPD patients were recruited. We used the database of the Directorate General of Budget, Accounting, and Statistics of Executive Yuan of Taiwan for national economic indicators. The correlation between economic indicators and PPD was examined.

Results: The PPD incidence was positively correlated with yearly unemployment rate, consumer price index, and gross domestic product. During the great recession of 2008–2009, PPD was positively correlated with inflation rate. Consumer price index had a positive correlation with PPD incidence per month when comparing PPD in 2010 with the economic indicators during the great recession.

Limitations: As this retrospective study evaluated macroeconomic indicators, it is unclear whether the macroeconomic indicators' effect on PPD totally reflects the effect of true personal economic status on PPD.

Conclusions: There was a significant association between PPD and economic conditions. This study shows that mothers' familial environment plays an important role in the development of PPD. The impact of the worldwide economic downturn of the great recession on women is persistent. This useful finding may give health policy planners a hint of early discovering and dealing with PPD when worldwide economic downturn

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Abbreviations: CPI, consumer price index; GDP, gross domestic product; ICD-9-CM, International Classification of Diseases; 9th Revision, Clinical Modification; PPD, postpartum depression; TAIEX, Taiwan Stock Exchange Capitalization Weighted Stock Index; NHIRD, National Health Insurance Research Database

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1. Introduction

Postpartum depression (PPD) is an international public health priority because it is the most common cause of postnatal morbidity. The prevalence of PPD in high-income countries is approximately 13%, and it presents a challenging target for prevention (Almond, 2009; Dennis and Creedy, 2004; Stocky and Lynch, 2000). Postpartum mental health problems are recognized as a suitable focus for preventive approaches with the potential to avert the burden on women, and their children and families, as well as the social and economic costs (Pope et al., 1999).

Economic performance affects the daily life of almost every person in modern society. Economic conditions also have a great impact on mental disorders, including major depressive disorder and anxiety. For example, employment status and personal income are associated with major depressive disorder (Andersen et al., 2009; Zimmerman and Katon, 2005). The stock market is an indicator of economic conditions, and falling stock prices have been reported to increase hospitalizations for mental disorders (Lin et al., 2015).

In the past, most studies assessed the relationship between the economic status and mental disorders by unemployment rate (Catalano et al., 2000; Mandal and Roe, 2008), very few have discussed the effects of other macroeconomic indicators, such as consumer price index (CPI), inflation rate, GDP, and the stock market index, on mental disorders. These macroeconomic indicators reflected other aspects of economic status and might provide a comprehensive assessment of the effect of economic performance on mental disorders.

The increase of mental disorders during economic contraction has been widely discussed (Catalano, 2009; O'Dowd, 2009). A sudden onset of economic crisis occurred in the United States in 2008, called "the great recession." The great recession started with rising foreclosures and mortgage payments (Blumberg and O'Neal, 2010) and caused widespread economic decline cause worldwide economic downturn. In addition, Lehman Brothers Holdings Inc. announced bankruptcy in the United States in September 2008, which was followed by a worldwide economic downturn with a dramatic fall in the stock markets, and the crisis spread globally to industrialized and most developing countries. Most of the Far Eastern countries also suffered the impact of the economic recession. The worldwide economic downturn increased the risk of depression in Eastern and Western countries. In Hong Kong, the 12-month prevalence of major depressive disorder was significantly higher in 2009 (12.5%) than in 2007 (8.5%) in both males and females (Lee et al., 2010). In Greece, the 1-month prevalence rate of major depression was also significantly higher in 2011 (8.2%) than in 2008 (3.3%) (Economou et al., 2013).

In Taiwan, the Taiwan Stock Exchange Capitalization Weighted Stock Index (TAIEX) closed down 295.83 points (4.89%) on September 16, 2008, having been affected by the bankruptcy of Lehman Brothers Holdings Inc. The TAIEX continued to decline, being at its lowest of 4242.61 on January 20, 2009. In addition, the unemployment rate rose from 3.8% (January 2008) to 5.74% at the end of 2009. The gross domestic product (GDP) was -1.91% in 2008 and -1.44% in 2009. The economic growth rate of Taiwan was 0.7% in 2008 falling to -1.57% in 2009. The great recession collapsed the Taiwanese economy from 2008 to 2009.

Pregnant women are easily affected by physical, mental, and surrounding changes that cause a depressive mood (Norhayati et al., 2015). The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) defines PPD as a depressive episode occurring during pregnancy or in the 4 weeks following delivery. It usually occurs in the first 6 months after delivery (American Psychiatric Association, 2003). A comparative study of postnatal women in the UK and Taiwan revealed that 19% of Taiwanese women

and 18% of British women had PPD (Huang and Mathers, 2001). In developed countries, there are several protective or risk factors for PPD, including marital status, quality of social support, quality of the relationships with women's mother or partner, employment stability, stressful life events, and socioeconomic status (Beck, 2001; Robertson et al., 2004). However, there is a lack of studies investigating the impact of economic change on PPD from the view of the nation's macroeconomy. In addition, there is no study for assessing the effect of economic contraction on PPD so far.

In 2009, Taiwan's economy was still suffering substantial losses and economic contraction that affected the whole population of the country. The economic contraction also had an effect on the mental health of the population. We considered that mental disorders that were affected by economic contraction would not appear immediately.

The aim of our population-based study was to (1) investigate the association between economic conditions and PPD, (2) investigate the association between PPD in 2010 with the economic indicators of 2008–2009 to elucidate the persistent impact of the economic crisis on PPD.

2. Methods

2.1. Data source and collection

The National Health Insurance program, which was launched in Taiwan in 1995, covers almost all citizens. There was a 99.9% coverage of the 23 million residents in Taiwan at the end of 2011. The National Health Insurance Research Database (NHIRD) is a national-scale medical library that holds the medical and demographic information of more than 99% of the population in Taiwan (Kang et al., 2009). The NHIRD contains detailed inpatient and outpatient medical records including admission data, admission orders, surgical procedures, and medication information. The clinical diagnoses were recorded according to the *International Classification of Diseases*, 9th Revision, Clinical Modification (ICD-9-CM) (US Department of Health and Human Services, 1978). More than 2000 studies have been published using the NHIRD (Hsing and Ioannidis, 2015). We conducted a retrospective study using the data from the Longitudinal Health Insurance Database from between January 2000 and December 2013. The Longitudinal Health Insurance Database (LHID) 2000 contains all the original claim data of 1,000,000 individuals randomly sampled from the year 2000. There are approximately 23.75 million individuals in this registry of NHIRD in 2000. (National Health Research Institutes, 2015). This retrospective study was approved by the Institutional Review Board of the Tri-Service General Hospital (no. B-104-20) and the requirement to obtain informed consent was waived.

The economic indicators were all taken from the database of the Directorate General of Budget, Accounting, and Statistics (DGBAS) of Executive Yuan of Taiwan from 2000 to 2013. This database handles the national budget, accounting, and statistical affairs. We used yearly national economic indicators including the unemployment rate, CPI, inflation rate, GDP. Monthly economic indicators, such as monthly unemployment rate, monthly CPI, and monthly inflation rate were also used in our study to evaluate monthly economic change that might affect PPD.

The CPI is used to measure changes in the prices of consumer products (Boskin et al., 1998). The inflation rate is used to measure the increase of prices of goods or services over a period of time (Parks, 1978). The GDP is the sum of production values of all residents and institutional units in a country, and it is used to measure the size of a country's economy (Dowrick and Quiggin, 1997). Personal income per capita is used to measure the average

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