



Health insurance coverage and healthcare utilization among infants of mothers in the national methadone maintenance treatment program in Taiwan



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ABSTRACT

Background: Children of heroin-using women have a higher risk of unfavorable health and developmental outcomes. Although methadone maintenance treatment (MMT) has been widely used to treat heroin-using pregnant women, potential effects on accessibility and utilization of healthcare service for their offspring are less explored.

Methods: We used four national registry and health insurance datasets in Taiwan from 2004 to 2009 to form a population-based matched retrospective cohort study. A total of 1056 neonates born to women in the MMT program (857 born before mother's enrollment in the MMT program [BM], 199 born after mother's enrollment in the MMT program [AM]) was established; 10 547 matched non-drug [ND] exposed neonates were identified for comparison. Outcome variables included offspring's health insurance coverage and utilization of preventive, outpatient, and emergency room cares in the first year after birth.

Results: Infants born to mothers on MMT were more likely to have no or incomplete insurance coverage (BM: adjusted odds ratio [aOR] = 1.29, 95% CI: 1.10–1.53; AM: aOR = 1.56, 95% CI: 1.14–2.13) as compared with the socioeconomic status-matched ND group. The BM infants appeared to have fewer preventive care visits (adjusted relative risk [aRR] = 0.85, 95% CI: 0.80–0.90), whereas the AM infants utilized outpatient and emergency room services more frequently (outpatient: aRR = 1.11, 95% CI: 1.01–1.23; emergency: aRR = 1.46, 95% CI: 1.11–1.90).

Conclusions: Addiction treatment and harm reduction programs for women of childbearing ages should be delivered in the coordinated framework that ensures comprehensiveness and continuity in healthcare and social services.

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1. Introduction

Substance use during pregnancy is an important health and social problem. To date, it is estimated that less than 1% of pregnant women aged 15–44 in the United States and nearly 6% in South Australia used illegal drugs during pregnancy, with heroin being one of the most commonly reported drugs (Kennare et al., 2005; Substance Abuse and Mental Health Services Administration,

2012). Adverse effects of opioid use and abuse during pregnancy can be manifested in pregnancy process (e.g., placental abruption and miscarriage; Hulse et al., 1998a; Kennare et al., 2005), or in trans-generational unfavorable perinatal outcomes on offspring (e.g., preterm birth, low birth weight, and neonatal death; Burns et al., 2006; Hulse et al., 1998b; Kennare et al., 2005). In many countries, methadone maintenance treatment (MMT) is the first line of management to help pregnant women with heroin addiction ameliorating intoxication and withdrawal. Cumulative evidence suggests that methadone is beneficial to heroin-dependent pregnant women in terms of pregnancy outcomes; however, there is still a great concern about the adverse effects of methadone on neonates' health outcomes (Hulse et al., 1998a, b; Kennare et al., 2005; Webster et al., 1996). Some clinical

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observational studies have found that certain unfavorable neonatal outcomes, such as growth retardation, low birth weight, preterm delivery, and neonatal abstinence syndrome [NAS], were very common (e.g., NAS: 40–75%) among the offspring of women enrolled in the opioid substitute therapy (Burns et al., 2010; Chen et al., 2015; Cleary et al., 2012; Dryden et al., 2009; Hulse et al., 1997, 1998b; Kakko et al., 2008). Relative to infants of non-drug using mothers, the needs in healthcare for children born to women on an opioid substitute therapy are expected to be higher (Johnson et al., 2003; Jones et al., 2010; Kakko et al., 2008), and as such their access to quality and regular well child services is especially important.

Health insurance coverage and healthcare utilization have been conceptualized as two important dimensions when evaluating children's access to health care. Insurance coverage is often identified as the most crucial determinant for health care utilization, especially in countries without universal coverage (Abdus and Selden, 2013; Cummings et al., 2009; Dietz et al., 2012; Holl et al., 1995; Kogan et al., 2010). Evidence from the United States consistently indicates that none- or discontinuously insured children, as compared with fully insured ones, were more likely to experience delays in receiving needed health services and to have difficulties in accessing a usual source of care, including preventive healthcare (Cummings et al., 2009; Holl et al., 1995; Olson et al., 2005). Given the importance of health insurance coverage, some strategies have been implemented at national, state, or local levels to reduce the access barriers (e.g., universal health care, social insurance, and special program), yet the related benefits can still be underutilized. For example, studies on children eligible for the public health insurance program in the US have shown that over one in ten children were still uninsured (DeVoe et al., 2008, 2011). Factors influencing children's insurance status and health service use included parents' insurance status, employment, educational attainment, copayment, rural residence, among others (DeVoe et al., 2008, 2011; Quimbo et al., 2008).

The first year of life is the period with the greatest need for healthcare. Evidence indicates that having up-to-date pediatric preventive care (e.g., well-child visits) was associated with reduced avoidable hospitalization among poor and near-poor children (Hakim and Bye, 2001), and that having better access to primary health care may lower children's visits to emergency department (Piehl et al., 2000). Therefore, to monitor growth/development and to provide timely treatment, pediatric preventive and primary health care visits are crucial (Magnani et al., 1996), and this is especially true for those infants in poor health and disadvantaged families. Prior studies have shed light on health care utilization in the first year of life in a variety of subpopulations, such as children of low income families and children with special needs (Dietz et al., 2012, 2013; Farr et al., 2013; Holl et al., 2012). However, information is generally scant on offspring of heroin-addicted or methadone-treated mothers even though this group of children often experienced more health and developmental problems due to in utero heroin or substitute medication exposure, maternal unfavorable lifestyle, and disadvantaged socioeconomic condition.

In Taiwan, the National Health Insurance Program (NHIP) has been implemented since 1995 and has provided comprehensive and universal health insurance coverage for more than 23 million enrollees. Although the NHIP is compulsory, the coverage rate of NHIP has not reached 100% due to job loss or change or incarceration for more than two months. Since children under 18 are generally covered as dependents under their employed parents, parental unemployment and financial disadvantage may affect their insurance status and healthcare utilization. To address the abovementioned research gaps, we conducted a retrospective longitudinal study using several national datasets in Taiwan to investigate the accessibility and utilization of healthcare among children born to heroin-addicted women. Specifically, we examined (i)

whether maternal methadone treatment is an important factor when assessing children's insurance coverage in the first year of life under the universal health insurance program, and (ii) whether the utilization of preventive, outpatient, and emergency care in the first year of life is affected by maternal methadone treatment status.

2. Methods

2.1. Multiple sources of datasets

The administrative data used in this study came from (i) the 2004–2008 Birth Notification System in the Bureau of Health Promotion, (ii) the 2004–2008 Birth Registry in the Ministry of the Interior, (iii) the 2006–2009 MMT program in the Center for Disease Control and Prevention, (iv) the 2001–2009 Death Registry in the Ministry of Health and Welfare, and (v) the 2001–2009 National Health Insurance Database in the National Health Insurance Administration. The dataset was linked with each other via encrypted maternal or children's identification number (ID).

2.1.1. The Birth Notification System and the Birth Registry. In Taiwan, the Birth Notification System contains information on both live births and stillbirths, whereas the Birth Registry records only live births. Both live births and stillbirths of neonates weighing at least 500 g or beyond 20 weeks of gestation have to be reported to the Bureau of Health Promotion through the Birth Notification System within seven days of the birth. The information is recorded under the mother's name, and is managed by the Bureau of Health Promotion. For live births, the parents or relatives can register the birth with the local household registry office using the birth certificate issued by the hospital within 60 days of the birth. The local household registry office is required to forward the registration information to the central Birth Registry system. Since the ID of a child is unavailable in the Birth Notification System, we linked the Birth Notification System with the Birth Registry via encrypted maternal ID to retrieve the children's ID for subsequent analyses. Through this procedure, an estimated 88% of the 1 039 569 live births in the Birth Notification System were linked with the Birth Registry during the years 2004–2008. Important children's and maternal characteristics were retrieved from the Birth Notification System (e.g., preterm delivery and age at delivery) and the Birth Registry (e.g., maternal marital status; Chen et al., 2015).

2.1.2. The MMT dataset. To prevent the spread of HIV infection through needle sharing among heroin addicts, the Taiwanese government launched the AIDS harm reduction program in 2005 and the program has been implemented nationwide since August, 2006 by the Center for Disease Control and Prevention. In this substitute therapy program, heroin addicts were given oral methadone daily in the MMT clinics (take-home methadone is not allowed). The MMT dataset includes information pertaining to methadone treatment during 2006–2009 (e.g., entry date of treatment). Via data linkage of the Birth Notification System, the Birth Registry, and the MMT, we identified neonates born before and after maternal participation in MMT. The linkage rates between the Birth Notification System and the Birth Registry were 96.51% for the MMT group and 88.6% for the non-MMT group.

2.1.3. The National Health Insurance Database. The National Health Insurance Database was initiated by the NHIP and managed by the National Health Insurance Administration. Information concerning insurance status and health care utilization among mothers and children was retrieved from the 2001 to 2009 National Health Insurance Database.

2.2. Study population

In this study on accessibility and utilization of healthcare during the first year of life, we defined children who were born between 2004 and 2008 and have lived to the first birthday as the study population. According to the initial enrollment date in the MMT and the date of delivery, infants born to mothers in the MMT were subdivided into two groups: those born before the enrollment (BM: $n = 857$; the average interval between delivery and MMT enrollment is 2.4 years) and after (AM: $n = 199$; the third quartile compliance rate through pregnancy was estimated 60%) (see Fig. 1 for data linkage process; Chen et al., 2015). In this study, the children in the BM group are assumed to be heroin-exposed since empirical evidence indicated that average year of heroin history prior to MMT was 5 years in Taiwan (Lin et al., 2013). For comparison, non-drug exposed [ND] infants were defined as neonates born to mothers who had never had substance use problems (International Classification of Diseases, 9th Version, Clinical Modification (ICD-9-CM) code: 291–293 and 304–305) within two years before their delivery. To increase analytic efficiency, a 1:10 ratio of matching was used on the criteria of birth year and month (2004–2008), maternal age at delivery, and maternal insurance premium at delivery ($n = 10\,547$ ND infants). The Institutional Review Board (IRB) of the National Health Research Institutes approved this research (IRB No. EC0990603-E).

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