

# Proposal of Using Claims-Based Diagnoses and Prenatal Examinations to Identify Pregnancy in Taiwan: National Health Insurance Research Database

Hung-Wei Lin<sup>1\*</sup>, Yu-Hsuan Kuo<sup>1\*</sup>, Kai-Pei Chou<sup>1</sup>, Yuan-Liang Wen, PhD candidate<sup>2,4</sup>, Sheng-Yin To, PhD<sup>2,4</sup>, Hui-Wen Yang, PhD<sup>2,4</sup>, Li-Ting Kao, PhD<sup>2,3,5</sup>

<sup>1</sup> Real-World Solutions, IQVIA Solutions Taiwan, Taipei, Taiwan <sup>2</sup> Graduate Institute of Life Sciences, College of Biomedical Sciences, National Defense Medical University, Taipei, Taiwan; <sup>3</sup> School of Pharmacy, College of Pharmacy, National Defense Medical University, Taipei, Taiwan; <sup>4</sup> School of Public Health, College of Public Health, National Defense Medical University, Taipei, Taiwan; <sup>5</sup> Department of Pharmacy Practice, Tri-Service General Hospital, Taipei, Taiwan. \*These authors contributed equally to this work. **CORRESPONDENCE** Kai-Pei Chou <Patrick.Chou@iqvia.com>.

TOP 5% FINALIST

## BACKGROUND & OBJECTIVES

### Background

In Taiwan, the Birth Reporting Database (BRD) captures nationwide records of live births and stillbirths (defined as birth weight  $\geq 500$  g or gestational age  $\geq 20$  weeks). These records are reported by the person who delivers the baby, making the BRD a reliable source for case ascertainment in pregnancy and birth outcomes.

However, for pregnancies not recorded in the BRD, such as miscarriage or abortion, additional data sources including relevant diagnoses or medical services are required. In a previous study, the record of *abortion surgery* has been used as a proxy for miscarriage [1].

Additionally, the 14 government-funded prenatal examinations are claimed using distinguish payment codes in the National Health Insurance Research Database (NHIRD), which may serve as an alternative approach to identify pregnancies beyond the BRD.

### Objective

This study aims to evaluate the feasibility of using diagnosis of pregnancy and government-funded prenatal care as supplementary data sources to identify pregnancies which were not captured by the BRD.

## METHODS

### Data Source

- Medical claims data were obtained from the population-based NHIRD, which covers up to 99.6% of the Taiwanese population [2] and the data can be linked to the BRD using encrypted personal IDs [3].
- Data period was from 1<sup>st</sup> January 2022 to 31<sup>st</sup> December 2023.

### Study design

- Individuals diagnosed with pregnancy or coded with prenatal examination visit during 1<sup>st</sup> January 2022 to 31<sup>st</sup> December 2023 were identified.
- Individuals recorded with live births or stillbirths in the BRD were identified as reference cases.

### Study population

- Pregnant women of all ages, identified using three approaches:
  - Database-specific codes from the BRD (reference cases)
  - Diagnosis codes (ICD-10-CM) from NHIRD (Table 1)
  - NHI payment codes for routine prenatal examinations from the NHIRD (Table 2)

**Table 1. Codes for pregnancy outcomes**

| Pregnancy outcomes | ICD-10-CM                               |
|--------------------|---|
| Live birth         | Z37.0, Z37.2, Z37.3*, Z37.5, Z37.6, Z38 |
| Stillbirth         | Z37.1, Z37.3*, Z37.4, Z37.6, Z37.7      |
| Cesarean section   | O82                                     |
| Termination        | O02.1, O04, O20.0                       |
| Miscarriage        | O03                                     |

\*Z37.3: Twins, one liveborn and one stillborn.

**Table 2. Schedule of government-funded prenatal examinations**

| Gestational Weeks | 8               | 12              | 16              | 20              | 24              | 28              | 30              | 32              | 34              | 36               | 37               | 38               | 39               | 40               |
|-------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|------------------|
| Before Jul. 2021  |                 | 1 <sup>st</sup> | 2 <sup>nd</sup> | 3 <sup>rd</sup> |                 | 4 <sup>th</sup> |                 | 5 <sup>th</sup> | 6 <sup>th</sup> | 7 <sup>th</sup>  |                  | 8 <sup>th</sup>  | 9 <sup>th</sup>  | 10 <sup>th</sup> |
| After Jul. 2021   | 1 <sup>st</sup> | 2 <sup>nd</sup> | 3 <sup>rd</sup> | 4 <sup>th</sup> | 5 <sup>th</sup> | 6 <sup>th</sup> | 7 <sup>th</sup> | 8 <sup>th</sup> | 9 <sup>th</sup> | 10 <sup>th</sup> | 11 <sup>th</sup> | 12 <sup>th</sup> | 13 <sup>th</sup> | 14 <sup>th</sup> |

### Study outcomes

- The proportion who had a pregnancy diagnosis or received any prenatal examination among pregnant women identified in the BRD.
- The proportion who also had a recorded pregnancy diagnosis among those who received prenatal examinations.

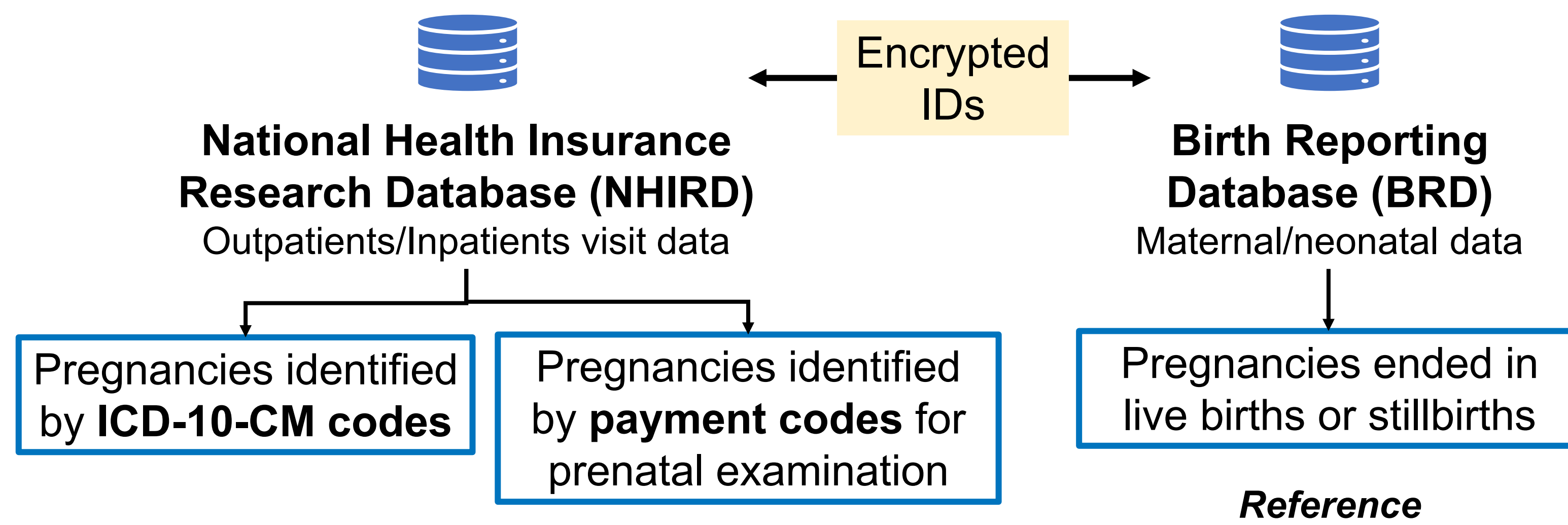
### Statistical analyses

- Descriptive statistics summarized the proportions of pregnancies identified through diagnosis codes and prenatal examinations.

## ACKNOWLEDGEMENT

The authors gratefully acknowledge Jui-Yun Hsu for her support in medical writing and poster preparation.

*Presented at ISPOR Real-World Evidence Summit; 28-30 September 2025, Tokyo*

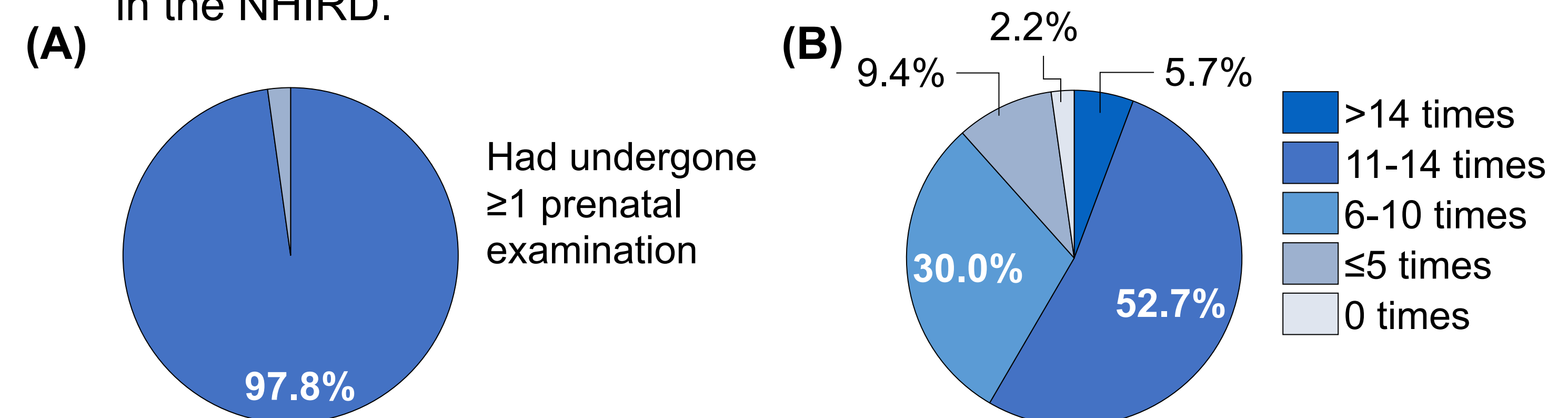


**Figure 1. The schematic data linkage between NHIRD and BRD**

## RESULTS

### Pregnant women in the BRD

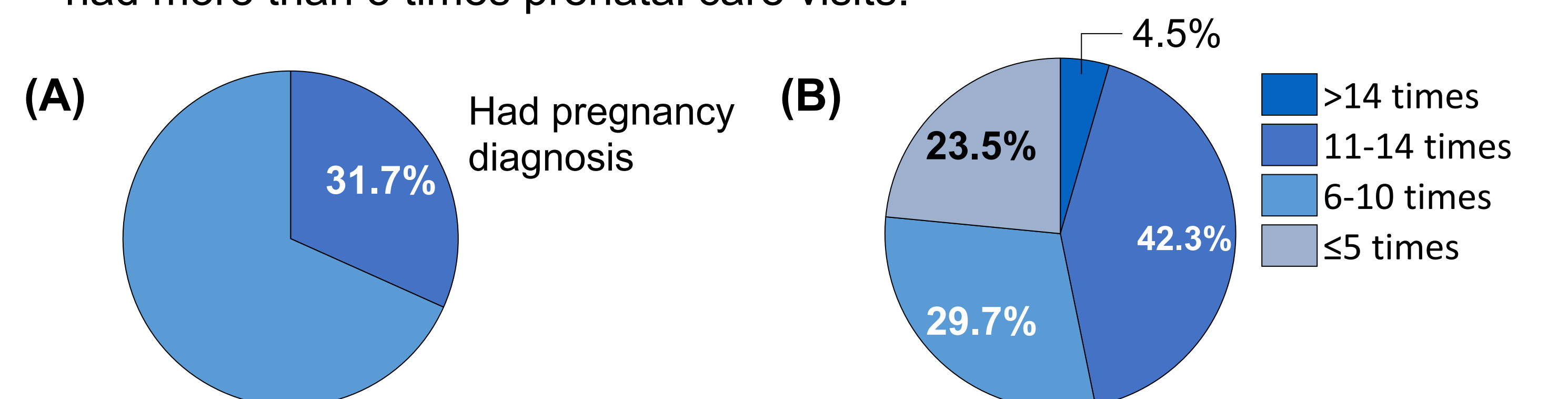
- During 2022-2023, a total of 264,844 pregnant women were identified in the BRD, with 99.1% giving live birth and 0.9% giving stillbirth.
- Among them, 97.8% had undergone at least one prenatal examination, and 74% had a relevant diagnosis (ICD-10-CM Z34). Up to 90.4% of them had more than 5 times prenatal care visits.
- In contrast, only a small proportion (8.7%) of pregnant women from the BRD were recorded with the ICD-10-CM codes for live birth or stillbirth in the NHIRD.



**Figure 2. (A) The proportion of pregnancy diagnosis and (B) the number of prenatal visits among the pregnant women from the BRD**

### Pregnant women with $\geq 1$ prenatal examination in the NHIRD

- We further identified 339,611 pregnant women who had undergone at least one prenatal examination in the NHIRD, 31.7% of which were recorded with ICD-10-CM codes for pregnancy outcomes. 76.5% of them had more than 5 times prenatal care visits.



**Figure 3. (A) The proportion of pregnancy diagnosis and (B) the number of prenatal visits among the pregnant women undergone at least one prenatal care**

## CONCLUSIONS

- The study findings suggested that the NHI payment codes for prenatal examinations could potentially identify pregnancies, especially for those not recorded in the BRD. Furthermore, the timing of routine prenatal examinations can serve as a proxy for gestational age.
- Ongoing pregnancies were not excluded in our study as they cannot be reliably distinguished in the current data, which may underestimate the number of prenatal examinations.
- Besides, since the data period spanned 2 years, multiple pregnancy episodes for one person is expected. The government funded up to 14 prenatal visit per pregnancy in the prenatal care program, women with  $\geq 14$  prenatal care visits were observed in current study. Further development of algorithm to identify the multiple pregnancy episodes is required.
- This approach, however, remains limited in detecting early pregnancy terminations occurring before the first prenatal visit at gestational weeks 8 or 10. Such cases in Taiwan mostly involve self-paid medication abortion with mifepristone, which is not captured in the NHIRD. Future research may consider additional data sources or complementary methods to improve identification of early terminations.

## REFERENCE

- Meng LC, Lin CW, Chuang HM, et al. Benzodiazepine Use During Pregnancy and Risk of Miscarriage. JAMA Psychiatry. 2024;81(4):366-373. doi:10.1001/jamapsychiatry.2023.4912
- Lin LY, Warren-Gash C, Smeeth L, Chen PC. Data resource profile: the National Health Insurance Research Database (NHIRD). Epidemiol Health. 2018;40:e2018062. doi:10.4178/epih.e2018062
- Hsieh CY, Su CC, Shao SC, et al. Taiwan's National Health Insurance Research Database: past and future. Clin Epidemiol. 2019;11:349-358. Published 2019 May 3. doi:10.2147/CLEP.S196293