Adverse pregnancy outcomes before and during the COVID-19 pandemic in Ulaanbaatar, Mongolia – a retrospective cohort study

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1. Background

- Some studies have shown a **global increase** in **adverse pregnancy outcomes (APOs)** during the **COVID-19 pandemic**, particularly within **Low- and Middle-Income Countries (LMICs)**, although global evidence varies.[1]
- **Mongolia**, an ex-socialist **LMIC in central Asia**, was praised for its **prompt pandemic responses**, including those implemented in the capital, **Ulaanbaatar** (urban population of 1.5+ million).[2]
- However, the **indirect impact of the COVID-19 pandemic** on **maternal and perinatal health outcomes in Mongolia remains unclear.**

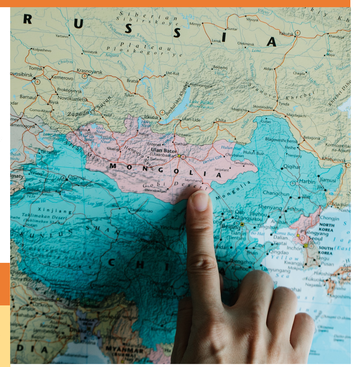


Figure 1 *– Map of Mongolia (CC0)*

2. Research Aims

To characterise, compare, and identify significant differences in adverse pregnancy outcomes prior to and during the COVID-19 pandemic in Ulaanbaatar, Mongolia.

3. Methods

Study Design: **Population-based retrospective cohort study** as part of a **secondary quantitative analysis**.[3]

Study population: **Singleton pregnancies** delivered at **three maternity hospitals** in **Ulaanbaatar.**

Study periods: Pre-pandemic (1st June 2016 – 5th January 2020) and **Intra-pandemic (6th January 2020 - 31st May 2021).**

Baseline characteristics/covariates: Maternal age, maternal weight, gravida, para, employment status, education status, smoking status, adverse outcome during previous pregnancy, newborn gender.

Study outcomes: Gestational hypertension, pre-eclampsia, eclampsia, HELLP Syndrome, gestational diabetes, Caesarean delivery, preterm birth, low birthweight, macrosomia.

Figure 2 *– Statistical analysis methods.*

Data extracted by **Mongolian National University of Medical Sciences** research team.

Data analysed in **STATA 17.**

Population characteristics stated as **mean and SD** (continuous data) or **counts and proportions** (categorical).

Population characteristics compared using **a two-sample T-test** (continuous data) or a **chi-squared test** (categorical).

Multivariate logistic regression used to generate **unadjusted** and **adjusted Odds Ratios**.

P-value significant at **<0.05**.

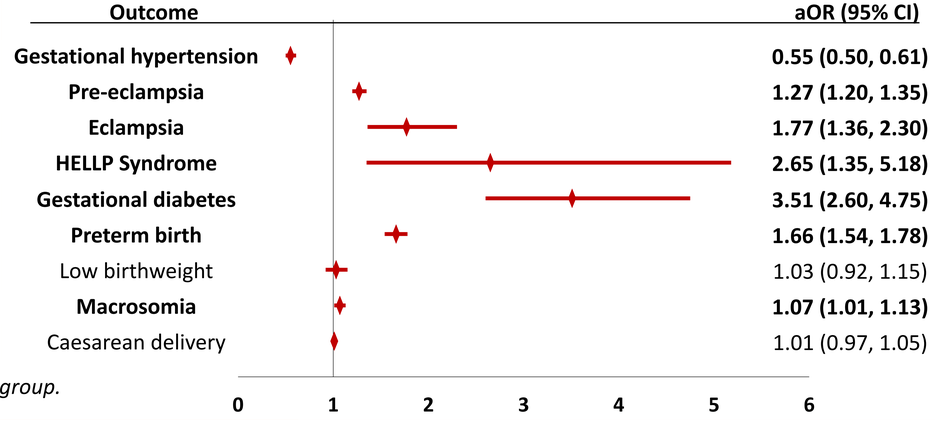
4. Study Findings

- Study population of **101,449; Pre-pandemic = 75,999, Intra-pandemic = 24,716.**
- **Covariate differences** – significantly **increased mean maternal age, gravidity, parity, employment, and a medium or low education level** in the intra-pandemic group.

Pre-pandemic count (%)	Intra-pandemic count (%)
4,174 (5.49)	810 (3.28)
6,509 (8.57)	2,254 (9.12)
166 (0.22)	108 (0.44)
22 (0.03)	20 (0.08)
104 (0.14)	123 (0.50)
3,692 (4.91)	1,883 (7.62)
1,964 (2.58)	705 (2.85)
8,336 (10.97)	2,899 (11.73)
22,802 (30.05)	7,773 (31.46)

Table 1 *– Outcomes by pandemic group.*

Figure 3 *– A Forest Plot of the adjusted Odds Ratios.*



5. Discussion

- **Several significant intra-pandemic APO increases** observed including **pre-eclampsia, eclampsia, HELLP Syndrome**, **gestational diabetes**, **preterm birth**, and **macrosomia.**
- However, **gestational hypertension significantly decreased** during the pandemic, with **low birthweight** and **Caesarean delivery** showing no difference.
- The **paradoxical increase in hypertensive complications despite a precursor decrease** represents a **novel finding**; this may be due to **intra-pandemic changes to antenatal screening provision and utilisation.**
- Whilst being the **first study of its kind in central Asia, confounders** such as **population differences** and **temporal outcome patterns** also require consideration.

6. Further Research

Undertake an **interrupted time-series study** using available data to explore temporal outcome changes.

Investigate adverse outcomes within Mongolia's rural populations to explore **urban-rural differences**.

Conduct **qualitative research** to explore women's experiences of accessing maternal health services during the COVID-19 pandemic.

References: 1. Chmielewska B, Barratt I, Townsend R, Kalafat E, van der Meulen J, Gurol-Urganci I, et al. Effects of the COVID-19 pandemic on maternal and perinatal outcomes: a systematic review and meta-analysis. Lancet Glob Health. 2021. **2.** Erkhembayar R, Dickinson-Craig E, Badarch D, Narula I, Warburton D, Thomas GN, et al. Early policy actions and emergency response to the COVID-19 pandemic in Mongolia: experiences and challenges. Lancet Glob Health. 2020.. **3.** Dickinson-Craig E, Badarch J, Bartington S, Hemming K, Thayakaran R, Manaseki-Holland S, et al. Impact assessment of a raw coal ban upon maternal and child health outcomes in Ulaanbaatar: a protocol for an interrupted time series study. BMJ Open. 2023.