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ORIGINAL RESEARCH – QUANTITATIVE

## Caesarean delivery before 39 weeks associated with selecting an auspicious time for birth in Taiwan

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## ABSTRACT

**Background:** Caesarean delivery before 39 weeks of gestation increases the risk of morbidity among infants. Taiwan has one of the highest caesarean rates in the world, but little attention has been paid to this issue. This study aimed to describe the rate of caesarean delivery before 39 weeks gestation among women who did not have labour signs and had a non-emergency caesarean delivery in Taiwan and to examine whether the phenomenon was associated with the Chinese cultural practice of selecting an auspicious time for birth.

**Methods:** We recruited women at 15–28 weeks of pregnancy at 5 hospitals in northern Taiwan and followed them at 4 or 5 weeks after delivery using structured questionnaires. This analysis included 150 primiparous mothers with a singleton pregnancy who had a non-emergency caesarean delivery without the presence of labour signs.

**Results:** Ninety-three of these women (62.0%) had caesarean deliveries before 39 weeks of gestation. Logistic regression analysis showed that women who had selected an auspicious time for delivery (OR = 2.82, 95% CI: 1.15–6.95) and delivered in medical centres (OR = 5.26, 95% CI: 2.25–12.26) were more likely to deliver before 39 weeks of gestation.

**Conclusion:** Non-emergency caesarean delivery before 39 weeks of gestation was common among the study women, and was related to the Chinese cultural practice of selecting an auspicious time for birth. Further studies are needed to examine the risks and benefits associated with timing of caesarean delivery in Taiwan in order to generate a consensus among obstetricians and give pregnant women appropriate information.

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## 1. Introduction

Infants who are delivered by caesarean delivery at term are at increased risk for admission to neonatal intensive care units and neonatal morbidity compared with those born by vaginal

delivery.<sup>1–3</sup> The risk of neonatal morbidity among term infants delivered by caesarean delivery increases with decreasing gestational age at birth.<sup>4</sup> A cohort study in the Netherlands showed that neonates who were born by elective caesarean delivery before 39 weeks gestation were at significantly higher risk for neonatal mortality and morbidity than neonates born at  $\geq 39$  weeks.<sup>5</sup> Based on these results, improved neonatal health could be achieved if planned caesarean deliveries were performed after 39 weeks of pregnancy if possible. Despite this, a significant proportion of neonates born by elective caesarean delivery are born before 39 weeks gestation.<sup>5</sup>

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During the past two decades, the trends of late fertility and a low fertility rate have been observed in Taiwan. In 2013, the average number of children born to a woman of reproductive age in Taiwan was 1.07 and the mean maternal age at first birth was 30.4 years.<sup>6,7</sup> The caesarean delivery rate in Taiwan was between 32% and 34% from 2002 to 2009<sup>8–10</sup> and rose to 37.56% in 2012,<sup>11</sup> among the highest rates in the world. A significant proportion of caesarean deliveries in Taiwan are done without medical indications or upon maternal request or both.<sup>12</sup> One study reported that about 20% of caesarean deliveries in Taipei, Taiwan had no medical indications, based on mothers' reports.<sup>13</sup>

Taiwan is a modern Chinese society. One Chinese cultural belief is that a person's fate, to a large extent, is determined by the hour, date, and year that they are born.<sup>14–16</sup> In Taiwan, many people believe that an auspicious time of birth has beneficial effects on a child's fate and may also ensure the safety of mothers and children.<sup>17,18</sup> Therefore, choosing the time for birth is a common practice in Chinese society. A study analyzing Taiwanese birth certificate data showed that caesarean deliveries were more likely to be performed on an "auspicious day" and less likely on an "inauspicious day".<sup>16</sup> A study in a remote population in China showed that a mother's wish to give birth on a date or at a time believed to be particularly auspicious was among the most common indications for elective caesarean delivery.<sup>19</sup> In Chinese culture, a desire to deliver at a lucky time could increase the risk for delivery before 39 weeks gestation among women who plan a caesarean delivery.

A scheduled caesarean delivery allows a choice of the time and date of delivery. Chinese cultural traditions have a strong effect on the timing of caesarean delivery in Taiwan.<sup>20</sup> To our knowledge, little attention has been paid to caesarean delivery before 39 weeks gestation in Chinese society. We could find no studies which reported the rate of planned caesarean delivery before 39 weeks in Taiwan. The objective of this study was to describe the rate of caesarean delivery before 39 weeks of gestation among women who did not have labour signs and had a non-emergency caesarean delivery in Taiwan and to examine whether the phenomenon was associated with the Chinese cultural practice of selecting an auspicious time for birth.

## 2. Literature review

In Taiwan, as the fertility rate has decreased, women have fewer children and higher expectations about the health and well-being of their children.<sup>21</sup> Caesarean delivery is believed to be more modern and safer for maternal and child health in Chinese society.<sup>22</sup> One study showed that 19.9% of women preferred caesarean delivery in Taiwan,<sup>13</sup> which was higher than that in Western societies (America 7.4%, Finland 8.1%).<sup>23</sup> Previous study showed that cultural–behavioural interactions may contribute to the unique pattern of medical practice in a specific ethnic region, such as Taiwan.<sup>24</sup> Taiwanese women believe giving birth at an auspicious time affords the newborn baby a better life and obstetric providers are prepared to honour women's preference for a caesarean delivery even though there is an increased risk of an adverse outcome.<sup>24</sup> Researchers have reported that caesarean deliveries were more common on days deemed auspicious in the Chinese lunar calendar and were less likely on days deemed inauspicious. Several studies have reported that the desire to have a child born on an auspicious date and time may be one major reason for caesarean deliveries on maternal request in Taiwan.<sup>24,25</sup> The phenomenon reflects a cultural preference for auspicious days for birth among women who plan a caesarean delivery for both medical and non-medical reasons.<sup>26</sup> If the fertility rate continues to decline, it is plausible that parents would be more inclined to request caesarean delivery at an auspicious time to give their

baby a bright future and to bring harmony to both the family and the baby.<sup>21</sup>

Previous studies in Taiwan have reported that increased maternal or paternal age, lower educational level, and having private health insurance were positively associated with caesarean deliveries.<sup>10,13,24</sup> The rate of first caesarean section in medical centres was higher than that in other hospitals in Taiwan.<sup>11</sup>

To the best of our knowledge, there is no study on the reported rate of planned caesarean delivery before 39 weeks or factors associated with early caesarean deliveries in Taiwan. Previous studies mostly concerned cultural beliefs about auspicious times and caesarean sections. This study extended previous observations and explored whether cultural practices influence not only having a caesarean section but also the timing of a caesarean section.

## 3. Methods

### 3.1. Study participants and setting

The study participants were recruited from five hospitals (3 medical centres, 1 regional hospital, and 1 district hospital) in Taipei, Taiwan. The hospital level was accredited by the Taiwan Ministry of Health and Welfare, which includes four levels from high to low: medical centre, regional hospital, district hospital, and primary medical clinic. In general, higher level hospitals provide more specialised medical care, have more beds, and assume more responsibility for teaching, research, and specialist training than lower level ones. Patients can freely choose which hospital they want to receive care.

We approached pregnant women when they applied for a mother's manual at the hospitals (usually before the end of the second trimester). The inclusion criteria were being an adult primiparous woman, having an uncomplicated prenatal course at the time of recruitment, and being able to communicate in Mandarin Chinese. We explained the study purpose and invited women to participate in this study. Those women who agreed to participate signed a consent form and left their contact phone numbers and addresses for the research personnel. We approached 1296 women who met the inclusion criteria, 1037 (80%) women completed the questionnaire during the second trimester and 966 (93%) women filled out the questionnaire at one month postpartum. Of the 966 primiparas who completed the study questionnaires, 375 eventually had caesarean deliveries. We further excluded women with multiple gestations ( $n = 42$ ) and women who did not have information about birth gestational age ( $n = 14$ ). Of the 319 remaining caesarean deliveries, 62 (19.4%) were emergency caesarean deliveries, 107 (33.5%) were non-emergency caesareans after the presence of labour signs, and 150 (47.0%) were non-emergency caesareans without the presence of labour signs. This analysis included the 150 primiparous singleton women who had a non-emergency caesarean delivery without the presence of labour signs. Ethical approval for this study was obtained from 3 institutional review boards (Numbers: 2010101OR, 10MMHIS136, and 99IRB002M). Each participant signed an informed consent before filling out the questionnaire. Details of the study design are presented elsewhere.<sup>27</sup>

### 3.2. Sample size considerations

In the logistic regression model, when the odds ratio was 2 and two-tailed alpha was .05, a sample size of 150 would yield a power of .90. Therefore we considered that the sample size of the study was adequate.

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