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Midwifery-derived doula reducing cesarean section rate in China: a comprehensive retrospective cohort study

Zhihua Qiu

zhihuaqiu421@163.com

Southern Medical University

Qin Liu

The Affiliated Wuxi People's Hospital of Nanjing Medical University, Nanjing Medical University

Cuilan Liu

Guangzhou Medical University

Zhuoxin Fu

Guangzhou Medical University

Lanzhen Zhang

Guangzhou Medical University

Zhijian Wang

Southern Medical University

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Abstract

Background

The rising global cesarean delivery rate is a major public health concern. Support from typical doula is known to reduce cesarean births, but in settings such as China, policy restrictions often limit non-medical personnel in the delivery room. Midwifery-derived doula (MidiDoula), an experienced midwife who combines clinical expertise with doula-style support, has emerged.

Object

This study evaluates the impact of MidiDoula-assisted childbirth on cesarean delivery rates in China.

Study design

We conducted a retrospective cohort study in two centers between January 1, 2024, and June 30, 2025. Participants were categorized into a MidiDoula group (n = 518) and a standard care group (n = 1679). The primary outcome was the mode of delivery (cesarean vs. vaginal). Secondary outcomes included durations of labor stages, postpartum blood loss, and perineal outcomes.

Results

The cesarean delivery rate was lower in the MidiDoula group (9.5%, 49/518) compared to the routine care group (51.0%, 857/1679, odds ratio [OR] 0.15, 95% CI 0.11–0.21, $P < 0.001$). MidiDoula-assisted parturient experienced less postpartum blood loss at 2 hours (mean difference − 52 mL, $P < 0.05$) and 24 hours (mean difference − 88 mL, $P < 0.05$), but experienced a longer second stage of labor (mean difference + 15 minutes, $P < 0.001$) and a higher incidence of episiotomy (40.0% vs. 20.0%, $P < 0.001$). As for nulliparous women, MidiDoula support (OR 6.57, 95% CI 4.65–9.29) was independently associated with vaginal delivery.

Conclusions

In this study, MidiDoula-assisted childbirth was strongly associated with a lower likelihood of cesarean delivery across diverse maternal populations. These findings provide observational evidence supporting the integration of MidiDoula into standard maternity care as a potentially effective strategy to optimize birth outcomes and reduce unnecessary surgical interventions.

1. Introduction

Cesarean section (C-section) is a critical obstetric intervention for resolving dystocia and safeguarding maternal and neonatal well-being[1]. However, inappropriate or excessively high rates of C-section are associated with increased maternal postoperative complications including infection, hemorrhage, and pelvic adhesions, and may adversely affect neonatal respiratory development[2]. Over the past decade, China has implemented numerous local, regional, and national initiatives aimed at reducing C-section rate. Despite these efforts, the national rate has continued to rise, increasing from 28.8% in 2008 to 34.9% in 2014, and reaching 36.7% in 2018[3]. Marked geographic disparities persist, with rates exceeding 60% in some metropolitan areas. These trends underscore the ongoing need for effective interventions to safely lower unnecessary cesarean deliveries.

Doula-assisted childbirth, characterized by continuous one-to-one support provided by a professionally trained non-medical person throughout labor, has been shown to offer physiological and psychological benefits, alleviate labor pain, reduce anxiety, and promote vaginal delivery[4]. Although evidence suggests that doula support can lower C-section rate, its implementation in China faces practical challenges. Typical doula care is provided by non-medical personnel; however, policy restrictions often limit the presence of non-medical support persons in delivery rooms in China, and such providers may struggle to gain broad public trust.

In response, a hybrid model has emerged: the Midwifery-derived doula (MidiDoula), experienced midwives who integrate clinical expertise with continuous doula-style emotional and physical support. This model presents two notable advantages in the Chinese context. First, as the birth rate declines in the recent years, midwives may have greater capacity to provide sustained labor support. Second, in several major cities such as Guangzhou, doula services are partially covered by medical insurance, potentially enhancing accessibility and acceptability.

This retrospective study aims to examine the effect of MidiDoula-assisted childbirth on the C-section rate in a Chinese tertiary hospital setting, with the goal of informing strategies to optimize obstetric care and support physiologic birth.

2. Methods

2.1 Study Design and Participants

This retrospective cohort study was conducted at two centers (the Second Affiliated Hospital of Guangzhou Medical University and Wuxi Medical Center, Wuxi People's Hospital) between January 1, 2024, and June 30, 2025. The research protocol was reviewed and approved by the ethics committees of each center (No. LYZX-2025-144-01) according to the principles of the Declaration of Helsinki. Written consent was obtained from the patients or their authorized representatives before enrollment.

The inclusion criteria were as follows: (1) singleton pregnancy; (2) full-term delivery (gestational age 37–41 weeks plus 6 days); (3) complete clinical data. The exclusion criteria included: (1) multiple gestation; (2) severe pregnancy comorbidities (e.g., severe cardiac disease, preeclampsia with severe features

accompanied by organ dysfunction); (3) fetal anomalies or fetal distress requiring emergent cesarean delivery; (4) transfer to another hospital during labor or incomplete medical records.

2.2 Study Intervention

2.2.1 MidiDoula Group

Participants in this group received continuous one-to-one support from a MidiDoula-an experienced midwife who also received professional doula training and certification. To ensure a consistent standard of expertise, all MidiDoula had assisted in at least 100 deliveries annually for the preceding five years. The first 20 cases enrolled in this group were excluded from the final analysis to mitigate potential learning curve effects associated with the initiation of the service.

Doula support commenced upon the onset of regular uterine contractions occurring at 5-minute intervals. For vaginal deliveries, support continued until 2 hours after the completion of delivery. For C-section, support was provided until 2 hours after the surgical procedure.

Standardized doula support included: 1) Physical support: assistance with non-pharmacological pain management (e.g., breathing techniques, position changes), hydration, and comfort; 2) Psychological support: continuous presence, emotional reassurance, and verbal encouragement; 3) Informational support: explanation of the labor process and facilitation of communication with the clinical team.

2.2.2 Standard care Group

Subjects in this group received routine obstetric care from the midwifery and medical staff, which included standard labor monitoring, nursing care, and medical interventions as indicated, without the presence of a dedicated doula.

2.3 Outcomes

The primary outcome was the rate of C-section. Secondary outcomes included: durations of the first, second, and third stages of labor; postpartum hemorrhage volume at 2 and 24 hours; hemoglobin levels after delivery; amniotic fluid characteristics; incidence of episiotomy lacerations; blood transfusion rate; neonatal birth weight; and Apgar scores at 1, 5, and 10 minutes.

2.4 Statistical analysis

Statistical analyses were performed using SPSS version 25.0. Continuous variables with normal distribution were presented as mean ± standard deviation (SD) and compared using the independent samples t-test. Non-normally distributed continuous variables were presented as median (interquartile range) and compared using the Mann–Whitney U test. Categorical variables were expressed as number (percentage) and compared using the Chi-square test or Fisher's exact test, as appropriate. Multivariate logistic regression analysis was conducted to identify independent factors associated with vaginal delivery, adjusting the variables with statistical significance in univariate analysis. A two-sided *P*-value < 0.05 was considered statistically significant.

3. Results

3.1 Baseline characteristics

As shown in Fig. 1, a total of 2235 parturients were screened and 2197 were finally enrolled, comprising 518 women who received continuous doula support (MidiDoula group) and 1679 women who received standard care without a dedicated doula (standard care group).

No statistically significant intergroup differences were observed in pre-pregnancy weight, weight at delivery, ethnicity, incidence of premature rupture of membranes, prevalence of pregnancy-related comorbidities/complications (e.g., hypertension, diabetes mellitus, thyroid disorders), or duration of the third stage of labor ($P > 0.05$, Table 1). There were statistically significant differences between the MidiDoula group and the standard care group in maternal baseline characteristics including height, age, pre-pregnancy BMI, educational attainment, parity, gestational age at delivery, fetal position, and utilization of labor analgesia ($P < 0.05$, Table 1).

Table 1
Baseline characteristics

Characteristics	MidiDoula	Standard care	*P*
Number	518	1679	
Age (y)	30.90 ± 3.85	31.66 ± 4.50	< 0.001
Pregestational BMI (kg/m^2)	21.63 ± 3.16	22.16 ± 3.53	0.01
Excess weight gain during pregnancy (kg)	11.47 ± 4.49	11.42 ± 4.46	0.525
Gravida (%)			< 0.001
1	294 (56.8)	656 (39.1)	
2	129 (24.9)	534 (31.8)	
3	69 (13.3)	283 (16.9)	
4	14 (2.7)	131 (7.8)	
>4	12 (2.3)	75 (4.5)	
Para			< 0.001
1	353 (68.1)	845 (50.3)	
2	125 (24.1)	631 (37.6)	
3	37 (7.1)	175 (10.4)	
> 3	3 (0.6)	27 (1.7)	
Gestational age (weeks)	39.25 ± 1.21	38.92 ± 1.47	0.274
Fetal position (%)			< 0.001
LOA	517 (99.8)	1596 (95.1)	
Non-LOA	1 (0.2)	83 (4.9)	
PROM (%)	121 (23.4)	345 (20.5)	0.171
IVF (%)	13 (2.5)	44 (2.6)	0.89
Complications			
GDM (%)	90 (17.4)	298 (17.7)	0.845
Pregestational hypertension (%)	6 (1.2)	16 (1.0)	0.682
Hyperthyroid (%)	7 (1.4)	26 (1.5)	0.747

LOA, left occipitoanterior; PROM, premature rupture of membrane; IVF, in vitro fertilization; GDM, gestational diabetes; ICP, Intrahepatic cholestasis of pregnancy; G-6-PD, glucose-6-phosphate dehydrogenase; SLE, systemic lupus erythematosus.

Characteristics	MidiDoula	Standard care	*P*
Hypothyroid (%)	43 (8.3)	115 (6.8)	0.264
Thalassemia (%)	48 (9.3)	110 (6.6)	0.037
ICP (%)	7 (1.4)	17 (1.0)	0.517
G-6-PD deficiency (%)	7 (1.4)	14 (0.8)	0.29
SLE (%)	1 (0.2)	8 (0.5)	0.625

LOA, left occipitoanterior; PROM, premature rupture of membrane; IVF, in vitro fertilization; GDM, gestational diabetes; ICP, Intrahepatic cholestasis of pregnancy; G-6-PD, glucose-6-phosphate dehydrogenase; SLE, systemic lupus erythematosus.

3.2 MidiDoula-assisted childbirth reducing the C-section rate

The C-section rate in the MidiDoula group was 9.5% (49/518, Table 2), which was significantly lower than the rate of 51.0% (856/1679, Table 2) observed in the standard care group ($P < 0.001$, Table 2). Following multivariable adjustment for height, age, pre-pregnancy BMI, educational attainment, parity, gestational age at delivery, fetal position, and utilization of labor analgesia, doula support provided by a MidiDoula remained an independent factor associated with vaginal delivery (Table 3).

Table 2
Outcome of MidiDoula-assisted childbirth

Number	**MidiDoula**	**Standard care**	***P***
	518	**1679**	
Primary outcome			
C-section rate (%)	49 (9.5)	856 (51.0)	< 0.001
Secondary outcome			
Duration of the first stage labor (h)	5.98 ± 3.53	3.04 ± 3.95	< 0.001
Duration of the second stage labor (h)	41.86 ± 37.79	17.7 ± 27.98	< 0.001
Duration of the third stage labor (h)	7.38 ± 5.29	4.02 ± 5.32	< 0.001
Postpartum hemorrhage volume at 2h (ml)	288.59 ± 142.86	315.19 ± 145.47	0.784
Postpartum hemorrhage volume at 24h (ml)	362.09 ± 146.85	413.09 ± 181.97	0.034
Hemoglobin levels after delivery (g/L)	107.08 ± 13.73	105.24 ± 13.88	0.965
Amniotic fluid characteristics (%)			0.119
Clear	450 (86.9)	1508 (89.8)	
I°	22 (4.2)	40 (2.4)	
II°	16 (3.1)	44 (2.6)	
III°	30 (5.8)	87 (5.2)	
Incidence of perineal lacerations (%)	437 (84.4)	744 (44.3)	< 0.001
Blood transfusion rate (%)	6 (1.2)	39 (2.3)	0.102
Weigt of fetus (g)	3156.84 ± 384.19	3127.02 ± 445.16	0.03
Apagar1	9 (9–9)	9 (9–9)	< 0.001
Apagar5	10 (10–10)	10 (10–10)	0.159
Apagar10	10 (10–10)	10 (10–10)	0.028
C-section, cesarean section			

Table 3
Comparison between subjects with and without MidiDoula

	C-section	No C-section	Univariate Logistics analysis			Multivariate Logistics analysis		
	N = 905	N = 1292	OR	*P*	95% CI	OR	*P*	95% CI
Age (y)	32.17 ± 4.51	31.00 ± 4.20	1.064	< 0.001	1.043–1.085	1.051	< 0.001	1.027–1.075
Pregestational BMI (kg/m^2)	22.64 ± 3.69	21.61 ± 3.21	1.092	< 0.001	1.064–1.121	1.103	< 0.001	1.070–1.136
Excess weight gain during pregnancy (kg)	11.73 ± 4.59	11.22 ± 4.36	1.026	0.008	1.007–1.046	1.073	< 0.001	1.048–1.099
Gravida (%)			1.063	0.122	0.984–1.147			
1	388 (42.9)	562 (43.5)						
2	267 (29.5)	396 (30.7)						
3	139 (15.4)	213 (16.5)						
4	64 (7.1)	81 (6.3)						
>4	47 (5.2)	40 (3.1)						
Para (%)			0.909	0.113	0.807–1.023			
1	510 (56.4)	688 (53.3)						
2	302 (33.4)	454 (35.1)						
3	83 (9.2)	129 (10.0)						
> 3	10 (1.1)	21 (1.6)						
Gestational age (weeks)	38.76 ± 1.59	39.17 ± 1.26	0.812	< 0.001	0.761–0.866	0.868	< 0.001	0.806–0.935

C-section, cesarean section; LOA, left occipitoanterior; PROM, premature rupture of membrane; IVF, in vitro fertilization; GDM, gestational diabetes; ICP, Intrahepatic cholestasis of pregnancy; G-6-PD, glucose-6-phosphate dehydrogenase; SLE, systemic lupus erythematosus.

	C-section	No C-section	Univariate Logistics analysis			Multivariate Logistics analysis		
	N = 905	N = 1292	OR	*P*	95% CI	OR	*P*	95% CI
Fetal position (%)			64.265	< 0.001	15.765-262.025	40.797	< 0.001	9.933-167.559
LOA	823 (90.9)	1290 (99.8)						
Non-LOA	82 (9.1)	2 (0.2)						
PROM (%)	175 (19.3)	291 (22.5)	0.825	0.072	0.668–1.018			
IVF (%)	37 (4.1)	20 (1.5)	2.711	< 0.001	1.563–4.703	2.554	0.005	1.337–4.878
Complications								
GDM (%)	171 (18.9)	217 (16.8)	1.154	0.204	0.925–1.440			
Pregestational hypertension (%)	12 (1.3)	10 (0.8)	1.723	0.206	0.741–4.005			
Hyperthyroid (%)	12 (1.3)	21 (1.6)	0.813	0.571	0.398–1.662			
Hypothyroid (%)	66 (7.3)	92 (7.1)	1.026	0.878	0.739–1.425			
Thalassemia (%)	61 (6.7)	97 (7.5)	0.890	0.493	0.639–1.241			
ICP (%)	10 (1.1)	14 (1.1)	1.020	0.962	0.451–2.307			
G-6-PD deficiency (%)	10 (1.1)	11 (0.9)	1.301	0.549	0.550–3.077			
SLE (%)	8 (0.9)	1 (0.1)	11.514	0.021	1.438–92.218	20.835	0.013	1.905-227.846
MidiDoula (%)	49 (5.4)	469 (36.3)	0.100	< 0.001	0.074–0.137	0.110	< 0.001	0.080–0.152

C-section, cesarean section; LOA, left occipitoanterior; PROM, premature rupture of membrane; IVF, in vitro fertilization; GDM, gestational diabetes; ICP, Intrahepatic cholestasis of pregnancy; G-6-PD, glucose-6-phosphate dehydrogenase; SLE, systemic lupus erythematosus.

Compared with the standard care group, the MidiDoula group demonstrated a significantly lower volume of postpartum hemorrhage at both 2 hours (288.59 ± 142.86 mL vs. 315.19 ± 145.47 mL, $P < 0.001$) and

24 hours (362.09 ± 146.85 mL vs. 413.09 ± 181.97 mL, $P < 0.001$). The MidiDoula group also exhibited a longer duration of the second stage of labor (46.24 ± 37.08 min vs. 36.11 ± 30.53 min, $P < 0.001$), a higher incidence of second-degree or more severe perineal lacerations/episiotomy (40.0% vs. 20.0%, $P < 0.001$), and higher postpartum hemoglobin levels ($P < 0.05$). No statistically significant intergroup differences were observed in the duration of the first or third stage of labor, amniotic fluid characteristics, blood transfusion rate, neonatal birth weight, or Apgar scores ($P > 0.05$).

3.3 MidiDoula-assisted childbirth reducing the C-section rate in nulliparous women

Doula support (OR 6.573, 95% CI 4.649–9.294, $P < 0.001$, Table 4) and use of labor analgesia (OR 16.444, 95% CI 12.626–21.418, $P < 0.001$, Table 4) were independent protective factors for vaginal delivery in nulliparous women. Conversely, breech/transverse fetal position (OR 18.138, 95% CI 4.393–74.898, $P < 0.001$, Table 4) and higher BMI (OR 1.062, 95% CI 1.027–1.098, $P < 0.001$, Table 4) were identified as independent risk factors for C-section.

Table 4
Comparison between nulliparous women with and without MidiDoula

	C-section	No C-section	Univariate Logistics analysis			Multivariate Logistics analysis		
	N = 510	N = 688	OR	*P*	95% CI	OR	*P*	95% CI
Age (y)	30.60 ± 3.83	29.47 ± 3.53	1.088	< 0.001	1.054–1.124	1.104	< 0.001	1.064–1.146
Pregestational BMI (kg/m^2)	22.18 ± 3.69	21.22 ± 3.19	1.087	< 0.001	1.049–1.126	1.108	< 0.001	1.064–1.155
Excess weight gain during pregnancy (kg)	12.19 ± 4.64	11.59 ± 4.33	1.030	0.024	1.004–1.058	1.068	< 0.001	1.035–1.102
Gravida (%)			1.317	0.006	1.083-1.600	1.087	0.480	0.863–1.368
1	388 (76.1)	562 (81.7)						
2	90 (17.6)	104 (15.1)						
3	24 (4.7)	16 (2.3)						
4	6 (1.2)	5 (0.7)						
>4	2 (0.4)	1 (0.1)						
Gestational age (weeks)	39.05 ± 1.64	39.20 ± 1.26	0.929	0.071	0.857–1.006			
Fetal position (%)			84.740	< 0.001	11.689-614.326	54.540	< 0.001	7.462-398.653
LOA	454 (89.0)	687 (99.9)						
Non-LOA	56 (11.0)	1 (0.1)						
PROM (%)	137 (26.9)	167 (24.3)	1.146	0.309	0.882–1.489			
IVF (%)	21 (4.1)	12 (1.7)	2.419	0.016	1.179–4.964			
Complications								

C-section, cesarean section; LOA, left occipitoanterior; PROM, premature rupture of membrane; IVF, in vitro fertilization; GDM, gestational diabetes; ICP, Intrahepatic cholestasis of pregnancy; G-6-PD, glucose-6-phosphate dehydrogenase; SLE, systemic lupus erythematosus.

	C-section	No C-section	Univariate Logistics analysis			Multivariate Logistics analysis		
	N = 510	N = 688	OR	*P*	95% CI	OR	*P*	95% CI
GDM (%)	87 (17.1)	119 (17.3)	0.983	0.914	0.726–1.332			
Pregestational hypertension (%)	5 (1.0)	8 (1.2)	0.842	0.763	0.274–2.588			
Hyperthyroid (%)	7 (1.4)	12 (1.7)	0.784	0.612	0.306–2.005			
Hypothyroid (%)	41 (8.0)	61 (8.9)	0.899	0.612	0.594–1.359			
Thalassemia (%)	34 (6.7)	48 (7.0)	0.952	0.834	0.604–1.501			
ICP (%)	6 (1.2)	9 (1.3)	0.898	0.839	0.318–2.540			
G-6-PD deficiency (%)	5 (1.0)	6 (0.9)	1.125	0.846	0.342–3.708			
SLE (%)	7 (1.4)	1 (0.1)	9.561	0.035	1.173–77.952	19.588	0.018	1.677-228.756
MidiDoula (%)	44 (12.5)	309 (87.5)	0.116	< 0.001	0.082–0.163	0.124	< 0.001	0.087–0.177

C-section, cesarean section; LOA, left occipitoanterior; PROM, premature rupture of membrane; IVF, in vitro fertilization; GDM, gestational diabetes; ICP, Intrahepatic cholestasis of pregnancy; G-6-PD, glucose-6-phosphate dehydrogenase; SLE, systemic lupus erythematosus.

4. Discussion

1. **Principal finding**

Our observational study provides evidence that support from trained MidiDoula is strongly associated with improved birth outcomes, most dramatically, fewer C-sections. This fusion of roles merges the constant, empathetic support of a doula with a midwife's clinical skills and comprehensive awareness. The key synergy lies in the practitioner's dual-capability: using clinical insight to identify subtle labor patterns early and then applying hands-on, non-medical techniques as the first line of management. This proactive, low-intervention approach effectively supports physiological birth and reduces the likelihood of surgical delivery.

2) Results in the context of what is known

The most striking finding from our study is the 41.5% absolute reduction in the C-section rate among parturients receiving MidiDoula support (9.5%) compared to those receiving standard care (51.0%). This magnitude of effect is substantial and may be partially attributable to the unique advantages of MidiDoula. Unlike traditional doulas, MidiDoula possess formal clinical training that enables them to not only provide emotional and physical support but also to accurately recognize normal labor progression, effectively communicate clinical observations to the medical team using standardized terminology, and provide basic reassurance about physiological processes [5]. This can build greater trust within the obstetric team and potentially prevent unnecessary interventions triggered by misinterpretation of normal labor patterns [6]. The persistence of this association after multivariable adjustment-accounting for significant baseline differences-strengthens the argument that this integrated support model exerts an independent, beneficial effect on birth mode.

The underlying mechanism for MidiDoula is likely multifactorial, involving enhanced bridging between the psycho-emotional and clinical domains. MidiDoula can translate clinical information to the laboring woman in an accessible way while simultaneously advocating for her preferences to the medical staff in a clinically informed manner[7]. This dual competency may be particularly effective in reducing the "cascade of interventions." For instance, when a woman experiences a prolonged latent phase, a MidiDoula can provide evidence-based reassurance about its normalcy while employing effective comfort measures, potentially preventing early admission and associated interventions[8]. The observed longer duration of the second stage of labor in the MidiDoula group, without concomitant increases in neonatal morbidity, supports the hypothesis that MidiDoula help create a safe, physiological environment where labor can progress at its own pace, reducing the incidence of "failure to progress" diagnoses [9].

Subgroup analysis revealed that nulliparous women derived particularly significant benefit from MidiDoula support, with an adjusted odds ratio of 6.573 for achieving vaginal delivery. This finding is clinically crucial and may be amplified by the MidiDoula's skill set. First-time mothers often experience heightened anxiety stemming from uncertainty about bodily sensations and fear of the unknown [10]. A MidiDoula can uniquely address this by normalizing experiences with clinical context; for example, explaining that certain sensations are indicative of normal fetal descent rather than a problem. This differs from general reassurance by being rooted in clinical knowledge, potentially making it more credible and anxiety-reducing for the mother[11].

Furthermore, the MidiDoula's clinical eye allows for early identification and non-pharmacological management of common labor challenges. For example, they may recognize early signs of fetal malposition and employ specific positioning techniques (e.g., hands-and-knees, lunging) to facilitate rotation, a skill set less common among non-clinical doulas [12]. This proactive, knowledge-based support may explain the strong protective effect observed. The synergistic relationship between MidiDoula support and labor analgesia use (OR 16.444) further suggests that when effective pain relief is combined with clinically informed, continuous support, it creates a powerful package for promoting vaginal birth in first-time mothers.

Beyond mode of delivery, the reduction in volume associated with MidiDoula care is noteworthy. The mechanism may extend beyond stress reduction. A MidiDoula, by virtue of her training, can actively promote practices known to reduce PPH, such as controlled cord traction after delivery, and can perform immediate fundal checks. She can also ensure early and effective skin-to-skin contact and breastfeeding initiation, maximizing natural oxytocin release[13]. Her presence provides an additional layer of vigilant observation in the immediate postpartum period, complementing the nursing staff.

The increased incidence of second-degree or more severe perineal trauma in the MidiDoula Group requires nuanced interpretation. While partly attributable to the higher vaginal birth rate, it may also relate to the MidiDoula's focus on maternal-directed, spontaneous pushing over Valsalva maneuvers, a practice supported by evidence to improve fetal oxygenation but sometimes associated with slower perineal stretching [14]. Importantly, a midwife-doula is trained in perineal support techniques. Her ability to physically support the perineum and guide the mother's pushing may actually modify the severity of tears, a detail our study did not capture but warrants future investigation.

3) Clinical implications

This study suggests that integrating the MidiDoula model into standard maternity care could be a highly effective and safe strategy for healthcare systems aiming to reduce unnecessary surgical interventions and promote physiologic birth, especially in settings with policy restrictions on non-medical personnel. The model leverages clinical expertise to build trust and facilitate better communication. However, given the observational nature of this study and potential for self-selection bias, these findings should be interpreted as generating strong hypothesis. Implementation on a policy level should ideally be preceded by confirmatory evidence from randomized controlled trials.

4) Research implications

Our analysis confirmed breech/transverse fetal position and higher pre-pregnancy BMI as strong risk factors for cesarean delivery[15, 16]. The presence of a MidiDoula does not eliminate these anatomical risks but may optimize outcomes within their constraints. For instance, for a woman with a higher BMI, a MidiDoula can provide specialized positional support and advocacy for the use of appropriate equipment (e.g., longer epidural needles, larger blood pressure cuffs), ensuring she receives equitable care[17]. This highlights the model's role not as a replacement for skilled obstetric management, but as a complementary layer of expertise that addresses both the psycho-social and the practical-clinical barriers to vaginal birth.

5) Strength and Limitations

A key strength is the real-world evaluation of a distinctive care model. However, the observational design limits causal claims, and self-selection bias is a concern, as women choosing this model may have

stronger preferences for vaginal birth. Future research should compare the MidiDoula model directly with standard doula care and standard midwifery care in randomized trials. Process evaluations are needed to unpack which specific components of the role-the clinical knowledge, the extended continuous presence, or the unique bridging function-are most impactful [18]. Cost-effectiveness analyses are crucial, as this model might offer savings by reducing surgery rates while requiring investment in higher-level training.

5. Conclusions

In conclusion, support from MidiDoula was associated with a dramatic reduction in C-section, lower postpartum blood loss, and improved outcomes, without compromising neonatal safety. This model leverages clinical expertise to enhance the quality and credibility of continuous support, facilitating better communication and trust within the birth team. Healthcare systems aiming to reduce unnecessary interventions and humanize care should consider developing, accrediting, and funding this integrated MidiDoula role.

Abbreviations

Cesarean section, C-section

Midwifery-derived doula, MidiDoula

postpartum hemorrhage, PPH)

Declarations

● **Ethics approval and consent to participate** The research protocol was reviewed and approved by the ethics committees of the Second Affiliated Hospital of Guangzhou Medical University (No. LYZX-2025-144-01) according to the principles of the Declaration of Helsinki.

Written consent was obtained from the patients or their authorized representatives before enrollment.

● **Consent for publication** Not applicable.

● **Availability of data and materials** The datasets used and/or analyzed during the current study are available from the corresponding authors upon reasonable request.

● **Competing Interests** The authors have no relevant financial or nonfinancial interests to disclose.

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● **Authors' contributions** The conception/design of the work was performed by Zhijian Wang and Zhihua Qiu; the acquisition of data was performed by Zhihua Qiu, Qin Liu, Cuilan Liu, and Zhuoxin Fu; the analysis and interpretation of the data was performed by Zhihua Qiu and Lanzhen Zhang; original draft preparation, Zhihua Qiu; and writing, review and editing, Zhijian Wang. All the authors have read and approved the submitted version of the manuscript and agreed to be personally accountable for the author's own contributions and questions related to the accuracy or integrity of any part of the work.

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Figures

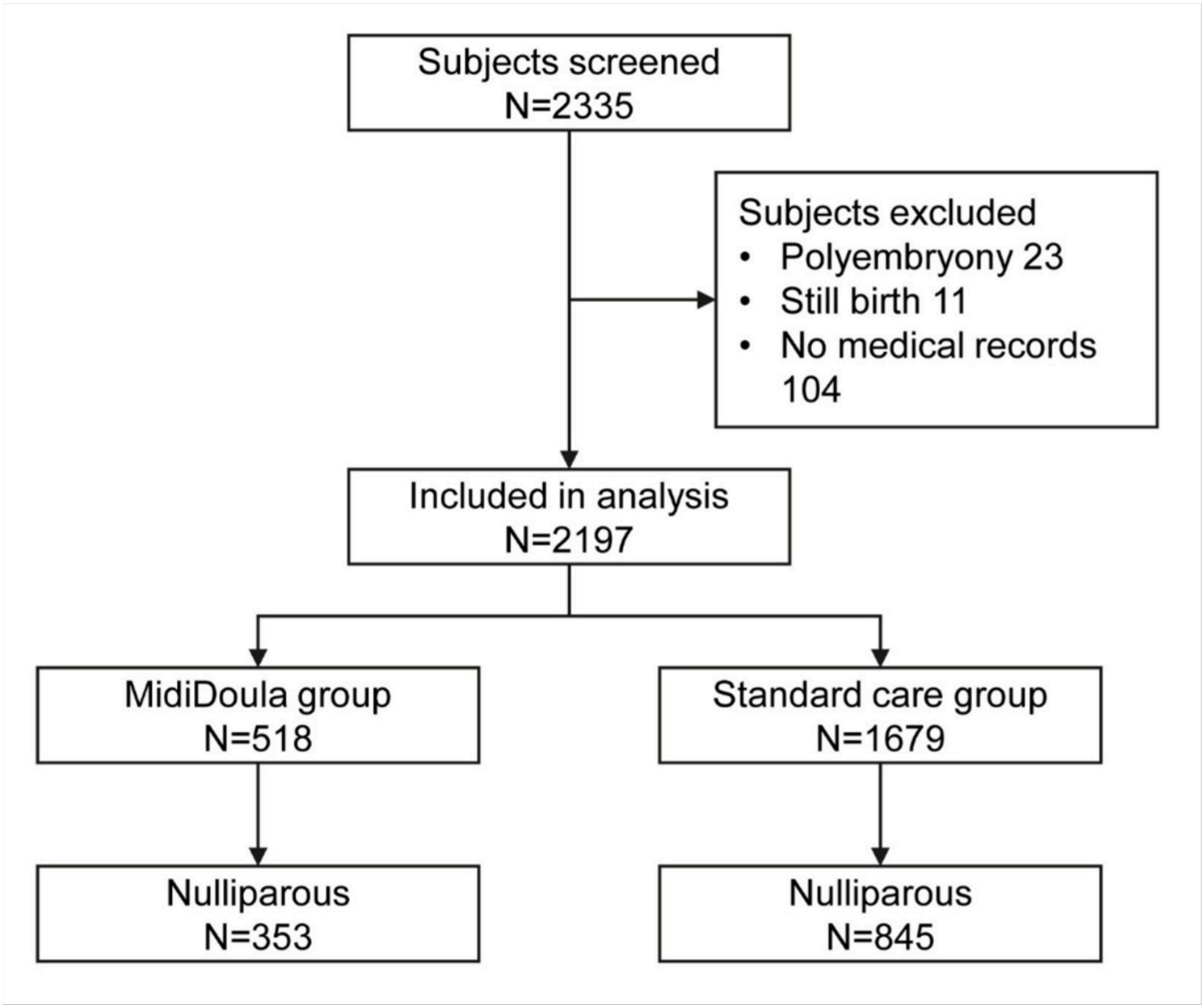


Figure 1

Flow chart of patient recruitment.