Determining Factors and Recommendations to Reduce Perinatal Mortality: A Retrospective Study at a Rural Hospital in Bikita District, Zimbabwe

Eveline Muvirimi,[1a] Kudakwashe Madzeke,[1] Kudzai Masinire,[2] Thalia Mungwari,[2] Alvin Ng,[3b] Andrei Karlsson,[4] Cameron Costello,[5c] Laura Ruckstuhl[6]

[1]SolidarMed, Masvingo, Zimbabwe; [2]Ministry of Health and Child Care, Harare, Zimbabwe; [3]Costello Medical, Singapore, Singapore; [4]Costello Medical, London, United Kingdom; [5]Costello Medical, Boston, United States; [6]SolidarMed, Lucerne, Switzerland.

[a]Eveline Muvirimi is no longer affiliated to SolidarMed, Masvingo, Zimbabwe. [b]Alvin Ng is no longer affiliated to Costello Medical, Singapore, Singapore. [c]Cameron Costello is now affiliated to Costello Medical, London, United Kingdom.

Objective

To identify factors associated with perinatal death (PND) at Silveira Mission Hospital, Zimbabwe, and to provide recommendations to reduce PND in the region.

Background

- Perinatal death (PND), including stillbirths and early neonatal deaths (ENNDs), predominantly affects developing countries, with sub-Saharan Africa experiencing rates as high as 58 per 1,000 births.[1–3]

- Despite World Health Organisation targets to reduce PND to ≤12 per 1,000 in every country by 2030, progress remains slow.[4]

- This study explores determinants of PND in the rural Silveira Mission Hospital in Zimbabwe, and potential strategies to reduce PND rates, which may provide a foundation for recommendations in similar rural settings with high perinatal mortality rates.

Methods

- Data from patient registers and case notes for all deliveries recorded between 1st January 2018–31st December 2019 at Silveira Mission Hospital, Bikita district, Zimbabwe, were analysed.

- Data extracted included patient characteristics and demographics of mothers, labour-related factors, healthcare-related factors and neonatal outcomes.

- Crude PND rates were summarised for each variable of interest, further stratified by PND type (ENNDs, fresh stillbirths [FSBs] and macerated stillbirths [MSBs]).

- Multivariable logistic regression determined associations between variables of interest and PND.

Results

- 2,284 births were studied: 2,195 live births, 89 of which resulted in PND.

- The characteristics and demographics of the mothers included in this study are summarised in **Table 1**.

- The perinatal mortality rate was 39.0 deaths per 1,000 births; the most common type being MSBs (39.3%), then FSBs (31.5%) and ENNDs (29.2%) (**Figure 1**).

- Antepartum or preterm complications (50.6%) and intrapartum complications (30.3%) were the most commonly reported PND causes (**Figure 1**).

- Mothers who attended <5 antenatal care (ANC) visits had two times increased PND odds compared with mothers who attended ≥5 ANC visits (**Figure 2**).

- Mothers who delivered at <37 weeks pregnant had five times increased PND odds compared with those who delivered at ≥37 weeks (**Figure 2**).

- Partograph use during labour was associated with a threefold reduction in PND odds (**Figure 2**).

Conclusions

The perinatal mortality rate at Silveira Mission Hospital is considerably higher than the World Health Organization's target (<12 deaths per 1,000 births). Recommendations for Silveira Mission Hospital include increasing ANC attendance, encouraging appropriate use of labour monitoring tools, and preventing/managing preterm births. Similar rural centres may also consider these recommendations, where appropriate.
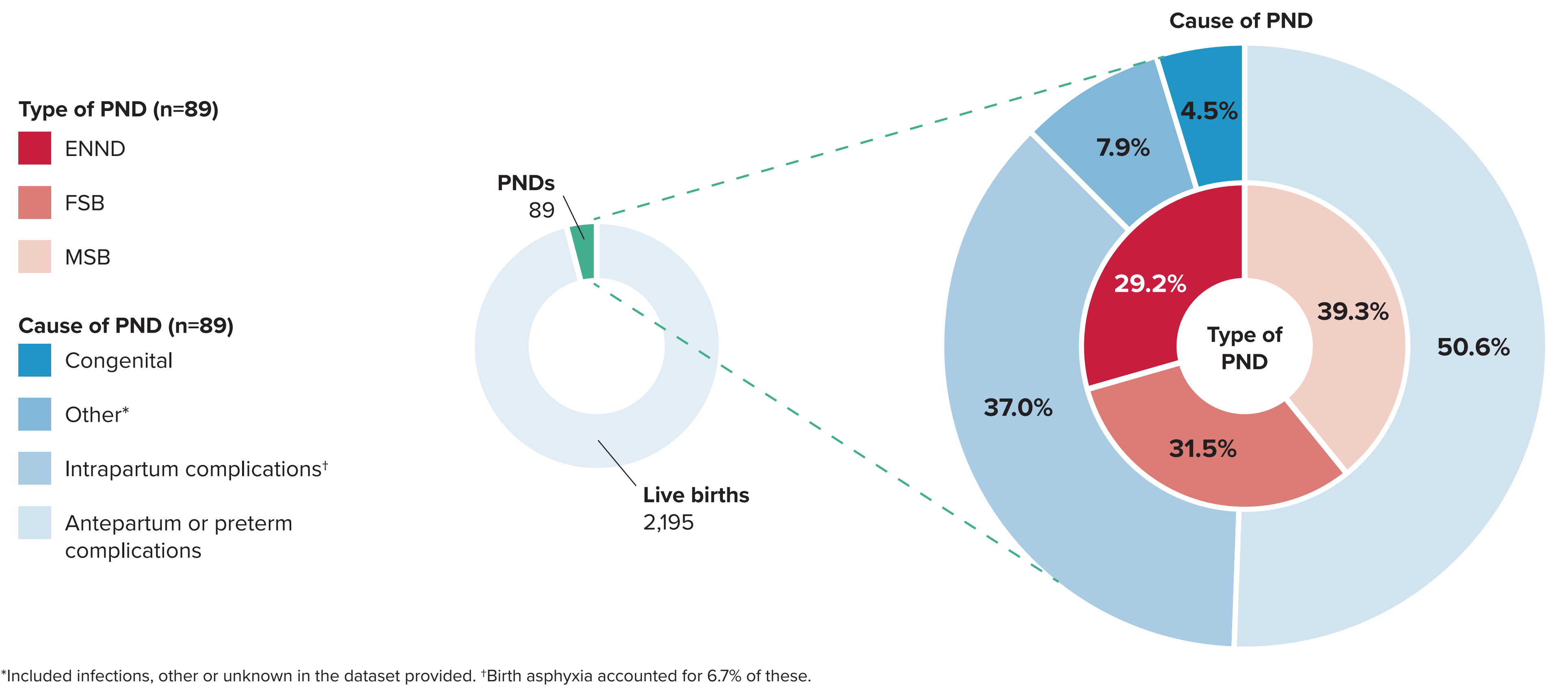
Summary

PERINATAL MORTALITY RATE

12 per 1,000 — WHO target

39 per 1,000 — Silveira Mission Hospital

ASSOCIATED FACTORS WITH PND IDENTIFIED

Delivered at <37 weeks of gestation — **5x** increased odds of PND

Attended <5 antenatal visits — **2x** increased odds of PND

Received partograph monitoring during labour — **3x** reduced odds of PND

Figure 1: Types and causes of PND

Type of PND (n=89)
- ENND
- FSB
- MSB

Cause of PND (n=89)
- Congenital
- Other*
- Intrapartum complications†
- Antepartum or preterm complications

PNDs 89

Live births 2,195

Cause of PND: 4.5%, 7.9%, 50.6%, 37.0%

Type of PND: 29.2%, 31.5%, 39.3%

*Included infections, other or unknown in the dataset provided. †Birth asphyxia accounted for 6.7% of these.

Table 1: Maternal characteristics and demographics

Variable	Live birth (n=2,195)	PND (n=89)	Total (N=2,284)
Maternal age (years), mean (SD)	25.1 (7.4)	26.4 (7.0)	25.1 (7.4)
Marital status, n (%)			
Married†	2,145 (97.7)	84 (94.4)	2,229 (97.6)
Not Married	40 (1.8)	1 (1.1)	41 (1.8)
Education level, n (%)			
Primary school	270 (12.3)	6 (6.7)	276 (12.1)
Secondary school or above	1,540 (70.2)	55 (61.8)	1,595 (68.9)
Occupation, n (%)			
Housewife	1,807 (82.3)	40 (44.9)	1,847 (80.9)
Employed	158 (7.2)	22 (24.7)	180 (7.9)
Student	2 (0.1)	0 (0.0)	2 (<0.1)
Unemployed	45 (2.1)	0 (0.0)	45 (2.0)
Parity, n (%)			
0	1,109 (50.5)	31 (34.8)	1,140 (49.9)
1–2	629 (28.7)	37 (41.6)	666 (29.2)
3–4	372 (16.9)	12 (13.5)	384 (16.8)
5+	76 (3.5)	7 (7.9)	83 (3.6)
Pregnancy type, n (%)			
Multiple	53 (2.4)	13 (14.6)	66 (2.9)
Singleton	2,137 (97.4)	75 (84.3)	2,212 (96.8)
Previous PND, n (%)			
No	2,154 (98.1)	82.0 (92.1)	2,236 (97.9)
Yes	36 (1.6)	3 (3.4)	39 (1.7)
Referral, n (%)			
No	2,160 (98.4)	49 (55.1)	2,209 (96.7)
Yes	4 (0.2)	35 (39.3)	39 (1.7)

†Including those under civil marriages, customary law and those cohabiting. Due to missing data, the sum of individual n values may not equal the group total.

Figure 2: Logistic regression analysis of factors associated with perinatal mortality

Reduced odds of PND ← → Increased odds of PND

Factor		aOR for PND	95% CI
Partograph use	Yes	0.34	95% CI: 0.18–0.63 p<0.05
Gestational age at delivery (weeks)	<37	5.27	95% CI: 2.87–9.66 p<0.05
ANC visits	<5	2.09	95% CI: 1.05–4.53 p<0.05
Previous PND	Yes	3.86	95% CI: 0.82–13.2 p=0.05
Parity	0–2	1.18	95% CI: 0.58–2.62 p=0.66

aOR for PND
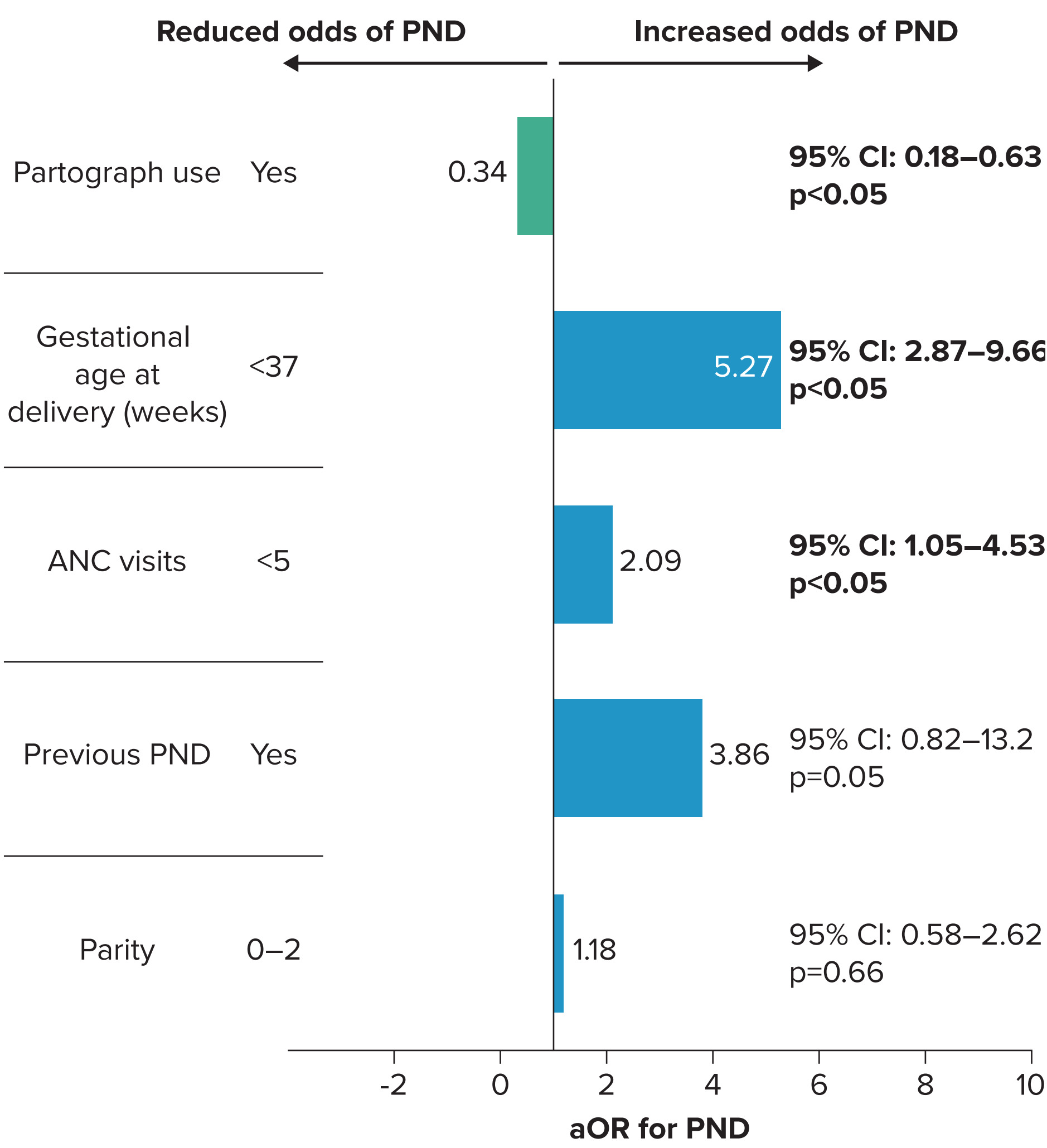
Logistic regression analysis (N=1,708) included the mutual adjustment of: parity (0–2; 3+), previous PND (yes; no), number of ANC visits (<5 visits; ≥5 visits), gestational age at delivery (<37 weeks; ≥37 weeks) and partograph use (yes, no). Bars greater than 1.0 indicate increased odds of PND, bars less than 1.0 indicate reduced odds of PND.