

Prenatal Risk Assessment for Preterm Birth in Low-Resource Settings: Demographics and Obstetric History



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1 Background

The pregnancy booking (registration) visit affords health-care professionals an opportunity to assess a pregnant woman's risk of PTB among other potential adverse pregnancy outcomes. PTB is multifactorial, with the highest rates seen in sub-Saharan Africa and Asia. This guidance facilitates early identification of women likely to experience PTB in LMICs. The following risk factors for PTB should ideally be explored at booking to enable pregnancy risk stratification and inform future care planning.

2 Evidence Statement

Interventions known to mitigate PTB should be offered at pregnancy booking following a risk assessment. There is evidence of increased risk of PTB with extremes of maternal age and black ethnicity (exclusively US data). Identified domestic abuse should trigger a referral for psychosocial support and safeguarding where services are available.

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D. O. Anumba, S. M. Jayasooriya (eds.), *Evidence Based Global Health Manual for Preterm Birth Risk Assessment*,

https://doi.org/10.1007/978-3-031-04462-5_3

Women with a previous history of spontaneous preterm birth or mid-trimester miscarriage, particularly when this occurs before 32 weeks, should be referred to specialist PTB services or a health-care professional with additional expertise in managing PTB where available. Surveillance at such specialist services should include, where resources permit, serial surveillance by cervical ultrasound and foetal fibronectin estimation. If there is capacity, individualised support that may include cervical cerclage or progesterone prophylaxis may be offered.

Other risk factors for which women should be referred for specialist preterm birth risk assessment and care include women who have had a caesarean section at full cervical dilatation and women with congenital uterine abnormalities.

3 Synopsis of best Evidenced Obstetric and Demographic Risk Factors for Preterm Birth

These, together with the interventions known to mitigate the risk of PTB, are also shown in Table 1.

3.1 *Maternal Demographics*

(i) *Maternal Age.*

Risk of preterm birth determined by maternal age follows a “U”-shaped distribution. Women over 40 yrs. (OR 1.20, 95% CI 1.06, 1.36) [2] and adolescents, 13–19 yrs., have an increased risk of very preterm (<32 w, aOR 2.12, 95% CI 1.06 to 4.25) and extremely preterm (<28 w, aOR 5.06, 95% CI 1.23 to 20.78) delivery [3], as do first (OR = 1.21, [95% CI: 1.01–1.45]) and second (OR = 1.93, [95% CI: 1.38–2.69]) time mothers aged 14–17 yrs. when compared with 20–29 yrs. [4]. A meta-analysis of 14 cohort studies conducted exclusively in LMICs found that nulliparous women below 18 years of age had the highest risk of PTB of all age/parity (OR: 1.52, 95% CI: 1.40–1.66) [26].

(ii) *Domestic Abuse.*

Rates of PTB are higher (OR 1.91, 95% CI 1.60–2.29) as is low birth weight, LBW (OR 2.11, 95% CI 1.68–2.65) [9].

(iii) *Race.*

Black women in the USA have a fourfold increased risk of PTB (16–18%) compared to White women (5–9%) [5–8]. However, the reason for this is unclear, and its implications for risk assessment in LMICs with predominant black populations are unclear.

Table 1 Summary of interventions for evidenced risk factors of preterm birth

Evidenced risk factor for preterm birth	Evidence of risk	Recommended action for evidenced risk factors for preterm birth
Generic increased risk		Generic interventions of possible or clear benefit [1]
Maternal age • 40 yrs. • <19 yrs.	Low certainty evidence [2] Low to moderate certainty evidence [3, 4]	<ul style="list-style-type: none"> • Largely none, generic support through pregnancy. • Smoking cessation advice— Substance use Chapter “Evaluating Alcohol, Tobacco and Other Substance Use in Pregnant Women”. • Ca, Fe and folic acid supplementation—Nutrition Chapter “Nutritional Status and the Risk of Preterm Birth”. • Refer for psychosocial support— Substance use Chapter “Evaluating Alcohol, Tobacco and Other Substance Use in Pregnant Women”. • Nutrition advice and supplementation—Nutrition Chapter “Nutritional Status and the Risk of Preterm Birth”.
Black race	Moderate certainty evidence [5–8]	
Domestic abuse	Moderate certainty evidence [9]	
Smoking	Low certainty evidence [10, 11]	
Multiple pregnancy	High certainty evidence [5, 8]	
Intermediate or high risk		Surveillance and intervention pathways (unclear benefit)
Previous preterm birth or mid-trimester loss (16 to 34 weeks)	Moderate to high certainty of evidence [12–14]	<p>Surveillance</p> <ul style="list-style-type: none"> • Further risk assessment based on history +/- examination as appropriate in secondary care with identification of women needing referral to tertiary. • Offer transvaginal cervix scanning as a secondary screening test to more accurately quantify risk at least twice (usually 2–4 weekly) between 16 and 24 weeks. • Additional use of quantitative foetal fibronectin in asymptomatic women may be considered where centres have this expertise. <p>Intervention</p> <ul style="list-style-type: none"> • Referral to secondary/tertiary preterm prevention (PP) or high-risk pregnancy service at 12–16 weeks. • Cervical cerclage. • Progesterone as deemed appropriate. • Cervical pessary.
Previous preterm prelabour rupture of membranes <34 weeks	Moderate to high certainty of evidence [15]	
Known uterine variant (such as unicornuate, bicornuate uterus, or uterine septum)	Moderate evidence [16]	
Intrauterine adhesions (Asherman’s syndrome)	Low certainty of evidence [17]	
History of trachelectomy (for cervical cancer)	Low to moderate certainty of evidence [18, 19]	
Previous delivery by caesarean section at full dilatation	Low certainty of evidence [20]	
History of cervical excision - LLETZ where >10 mm depth removed, or > 1 LLETZ, cone biopsy	Low certainty of evidence [21–23]	
Interpregnancy interval < 6 months	Low certainty of evidence [24, 25]	

LLETZ large loop excision of the transformation zone

3.2 *Obstetric and Gynaecological History*

(i) *History of PTB.*

Previous PTB is a strong risk factor for repeat PTB (recurrence risk is 15–50% depending on the gestation at previous delivery and birth order [12, 13]). The earlier the gestation at previous PTB or mid-trimester miscarriage, the higher the chance of recurrence [27]. None of the studies in the main systematic review included data from an LMIC setting.

- Twin pregnancy PTB has an absolute risk of recurrence of 57.0% (95% CI 51.9–61.9%) vs 25% (95% CI 24.3–26.5%) after a previous term singleton.
- Singleton PTB has an absolute recurrence risk of 10% (95% CI 8.2–12.3%) vs 1.3% (95% CI 0.8–2.2) after a previous term twin.

(ii) Singleton PTB after a PTB singleton has an absolute recurrence risk of 20% (95% CI 19.9–20.6) [14]. *Preterm Prelabour Rupture of Membranes (PPROM).*

(iii) Previous PPRM is associated with increased rates of PPRM (OR 20.6; 95% CI, 4.7–90.2) and PTB (OR 3.6; 95% CI, 2.1–6.4) [28]. *Previous Stillbirth.*

(iv) A prior stillbirth is associated with a fourfold increased risk of PTB (OR, 4.2; 95% CI, 1.8–9.9) in the index pregnancy [15], attributable in part to ischaemic placental disease. *Cervical Trauma:* Caesarean section delivery at full cervical dilatation is associated with an increased risk of PTB in the subsequent pregnancy (RR 3.06, 95% CI 1.22–7.71) [20]. *Cervical Surgery.*

- Previous history of cervical surgery increases the risk of PTB.
- Previous cold knife conisation (<37 weeks; RR 2.59, 95% CI 1.80–3.72 [14%] vs [5%]).
- Large loop excision of the transformation zone (LLETZ) (RR 1.70, 1.24–2.35, [11%] vs [7%]) [21–23].
- Trachelectomy: preterm birth rates of 30–60% [18, 19].

(v) Interpregnancy interval < 6 months is associated with a twofold increased risk of PTB [24, 25]. *Known Uterine Variants and Intrauterine Synechiae (Asherman's Syndrome).*

(vi) Known uterine variants are associated with two- to fivefold increased risk [16], while Asherman's syndrome increases the risk of prematurity delivery two- to threefold to 29.4% (95% CI: 17.0, 35.3%) [17]. *Multiple Pregnancy.*

Multiple pregnancy contributes to 2–3% of pregnancies but accounts for 15–20% of all PTBs [5]. Risk of PTB in twins after previous singleton PTB (56.9 versus 20.9%; OR 5.0; 95% CI 3.8–6.6) [8].

3.3 Factors Not Yet Shown to be Associated with Increased Risk of PTB in LMIC Settings

- The influence of social determinants on risk of PTB is complex to determine and evaluate but is probably critical to outcomes. Low maternal education has been associated with PTB in a meta-analysis of 12 cohorts, all from European settings [29].
- Socioeconomic disadvantage has also been associated with PTB: a systematic review and meta-analysis demonstrated a significant increase in risk of PTB in those living in the most deprived neighbourhood quintiles compared to the least deprived quintile, OD: 1.23 (95% CI: 1.18–1.28) [30]. All studies were from high-income settings (the UK, Canada, the Netherlands, the USA, Spain, Sweden, and Australia).
- There are currently no data from LMICs, likely due to the lack of routine record-keeping and major complexities around assessing differing contexts. Assessment of education level and socioeconomic status across a heterogeneous range of contexts is challenging, and while of relevance for individual patient care, this cannot currently be utilised to predict risk of PTB.

4 Practical Clinical Risk Assessment Instructions for PTB

- Although evaluation of the past obstetric history is routinely carried out during antenatal booking and registration in most contexts, information obtained is seldom employed to undertake a formal risk assessment for PTB. We therefore highlight below routine data collected to enable formal evaluation and categorisation of a women's risk of PTB in to low or high.

The health-care worker who conducts the booking assessment should systematically review the demographics of the woman to determine risk factors for PTB. Enquiry should address the following:

- Maternal age: Risk is higher for pregnant women older than 40 and adolescents.
- Past obstetric history for previous experience of PTB or mid-trimester miscarriage. The earlier the pregnancy stage (gestation) of the previous PTB, the higher the risk of recurrence: women whose prior pregnancy ended between 16 and 20 weeks have a risk of recurrent PTB that equals or exceeds the recurrence risk for women whose prior PTB occurred after 20 weeks.

- Short interpregnancy interval (< 6 months), previous cervical surgery, and intra-partum caesarean section at full cervical dilatation, which can damage the fibres of the cervix in the region of the cervical internal os.
- A history of domestic abuse should be sensitively and tactfully sought.
- Behavioural risk factors such as cigarette smoking and other substance misuse should be elicited.

These enquiries should ultimately lead to categorisation of risk of preterm birth and the signposting of the woman to appropriate care.

5 Interventions for Evidenced Risk Factors for PTB

These are outlined in Table 1.

6 Summary of Generic Health Systems ANC Interventions to Reduce PTB (Likely to Mitigate PTB Risk from Demographic and Obstetric Factors)

These are shown in Table 2.

7 Research and Clinical Practice Recommendation

Most of the evidence describing demographic and clinical historical risk factors for PTB is from high-income settings (HICs). Although some of these may apply to an LMIC setting, there is clear need for further research regarding the risk factors for PTB in LMIC settings where the contribution of factors such as infection and

Table 2 Benefits statements of generic health systems ANC interventions to reduce PTB

Moderate (clear) benefit [1].

- Continuity of care vs other models of care for all women.
- Screening for lower genital tract infections <37wks without signs of labour, bleeding, Or infection
- Zn supplementation (see nutrition Chapter “Nutritional Status and the Risk of Preterm Birth”).
- Cerclage for singleton pregnancy + high risk of PTB.

Low (possible) benefit [1]

- Group ANC for all pregnant women.
 - Antibiotics for pregnant women with asymptomatic bacteriuria.
 - Pharmacological interventions for smoking cessation.
 - Vitamin D alone for women without pre-existing conditions, e.g. diabetes.
-

nutrient deficiencies may play a more crucial role. There is also a paucity of low-cost interventions and risk mitigation interventions accessible to health-care providers in LMIC settings. However, improved antenatal risk assessment can promote advice regarding lifestyle modifications such as smoking cessation, nutrient supplementation, and judicious use of indicated cervical cerclage, all of which could reduce the risk of spontaneous premature birth as well as of indicated preterm birth from conditions such as pre-eclampsia and placental insufficiency causing small for gestational age. Given the variable skills and competencies of providers of antenatal care (ANC) and birth in LMIC settings, further research is required to define care models and advocate for practitioners that may reduce incidence or severity of preterm birth in LMIC settings.

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