

Saving Babies, Strengthening Care: Cervical Cerclage to Optimize Pregnancy Outcomes in Indian Women with PCOS

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Abstract

Background & context. Polycystic ovary syndrome (PCOS) is common among Indian women and is associated with higher risks of miscarriage, gestational diabetes, hypertensive disorders, and **preterm birth**. India bears the world's largest burden of preterm births, making prevention strategies a public health priority. ([PMC](#), [BioMed Central](#), [The Lancet](#))

Objective. To synthesize global and India-specific evidence on optimizing pregnancy outcomes in women with PCOS, with a focus on **when, for whom, and how** cervical cerclage (history-, ultrasound-, or exam-indicated; transvaginal vs transabdominal) should be integrated into Indian antenatal pathways. ([PubMed](#))

Methods (scoping review). We searched medical databases and gray literature (2020–2025) for peer-reviewed studies, professional guidelines, government documents, credible podcasts/YouTube explainers, and relevant press/industry reports. Inclusion prioritized India-centric data or globally authoritative sources; exclusion removed pre-2000 primary studies unless historically pivotal (e.g., Shirodkar's work). ([missionmrcog.com](#))

Key findings.

1. **PCOS elevates obstetric risk:** meta-analyses show increased odds of preterm birth; hyperandrogenic phenotypes and ART/twin gestations further amplify risk. ([PMC](#), [MDPI](#))
2. **Cerclage is effective in defined subgroups:** strongest evidence supports cerclage when a woman with prior spontaneous preterm birth or late miscarriage has a **short cervix ≤ 25 mm** in the mid-trimester; universal cerclage or use in twins without dilation is **not** recommended. ([missionmrcog.com](#), [NICE](#))

3. **India-specific gaps:** variable ultrasound access, sociocultural barriers to transvaginal scanning, uneven ANC quality, and regional PCOS heterogeneity (e.g., high prevalence in Kashmir) complicate equitable implementation. ([Nature](#), [Pew Research Center](#), [PubMed](#))
4. **Integrated care works:** combining **risk-based cervical-length surveillance**, **progesterone** (where indicated), **judicious cerclage**, and **GDM screening** within national programs (PMSMA/LaQshya) is feasible and impactful; 17-OHPC is no longer advised, while vaginal progesterone remains appropriate for selected patients. ([PMSMA](#), [BioMed Central](#), [acog.org](#))

Conclusions & recommendations. India should embed targeted cervical-length screening (16–24 weeks) for at-risk women with PCOS, ensure referral to preterm-prevention clinics, and standardize cerclage pathways aligned with RCOG/SMFM/NICE guidance—adapted to Indian realities (urban-rural, linguistic, and resource diversity). ([missionmrcog.com](#), [publications.smfm.org](#), [NICE](#))

Keywords: PCOS; preterm birth; cervical cerclage; cervical length; India; antenatal care.

1. Introduction

Global context and definition. PCOS is a chronic, heterogeneous endocrine disorder affecting 6–13% of reproductive-aged women globally (depending on criteria), with metabolic, reproductive, and psychological sequelae across the lifespan. The **International PCOS Guideline (2023)** harmonizes diagnosis and care and highlights pregnancy risks requiring proactive management. ([PMC](#))

India’s epidemiology. Indian estimates vary by region and diagnostic criteria. A 2022 systematic review found a **pooled prevalence ≈11%** using Rotterdam criteria. A 2024 JAMA Network Open analysis emphasizes wide Indian heterogeneity, with Kashmir reporting **~29–35%** prevalence in community cohorts. These figures exceed many global estimates and underscore the need for India-specific programs. ([PMC](#), [PubMed](#), [JAMA Network](#))

Preterm birth in India. In 2020, **3.02 million** Indian babies were born preterm (≈13% rate)—**the highest absolute number worldwide**—with South Asia carrying a disproportionate burden. Preventing spontaneous preterm birth (SPTB) is therefore central to India’s RMNCH+ A agenda. ([The Lancet](#), [PMC](#))

Why PCOS matters in pregnancy. Meta-analyses (2024) confirm that PCOS increases risks of **preterm delivery**, **GDM**, **hypertensive disorders**, and **low birthweight**. Hyperandrogenism appears to confer particularly elevated risk; ART and multiple gestation can add further risk. Mechanisms likely include insulin resistance, low-grade inflammation, androgen excess, and

higher rates of obesity—traits especially prevalent in South Asian phenotypes. ([PMC](#), [BioMed Central](#))

Cervical insufficiency and cerclage. Cervical insufficiency (CI) refers to painless cervical dilation leading to **second-trimester loss or early preterm birth**. Cerclage—a suture to reinforce the cervix—dates back to 1955, when **Dr. V.N. Shirodkar (Mumbai)** described the eponymous technique; the McDonald modification followed in 1957. Cerclage remains a cornerstone prevention strategy for **defined high-risk** groups. ([PMC](#), [Obstetrics & Gynecology](#))

“In women with a singleton pregnancy and a history of second-trimester loss or preterm birth, **cerclage is beneficial when mid-trimester cervical length ≤ 25 mm.**” — RCOG Green-top 75 (2022) ([missionmrcoq.com](#))

Indian sociocultural context. India’s antenatal landscape shows progress and gaps: **≥ 1 ANC visit** is $>90\%$, four-plus visits $\sim 59\%$, and **ultrasound in $\sim 78\%$** of pregnancies nationwide (with **urban–rural and wealth-education gradients**). Acceptance of **transvaginal ultrasound (TVUS)**—essential for accurate cervical-length (CL) measurement—can be limited by modesty, privacy, and local norms, necessitating sensitive counseling, female sonographers where possible, and multilingual materials. ([PMC](#), [Pew Research Center](#), [Nature](#))

Problem statement. Despite high PCOS prevalence and India’s preterm-birth burden, **cerclage is under-used in the right women and over-used in the wrong settings**. System-level barriers (variable CL screening, uneven access to high-quality TVUS, late booking) and **PCOS-specific risks** are not consistently addressed in public or private care. The goal is to **operationalize** guideline-concordant pathways suited to Indian realities, focusing on **who should be screened, when to offer cerclage**, and **how to integrate with progesterone and GDM protocols**. ([PMSMA](#), [BioMed Central](#))

Scope & limitations. This article centers on **singleton pregnancies** in Indian women with PCOS, the group with the most robust evidence base for CL-guided cerclage algorithms. Twins and higher-order gestations are addressed only where evidence intersects with PCOS care. We synthesize evidence through August 2025, privileging guideline-grade summaries, India-specific data, and high-quality meta-analyses; heterogeneity of PCOS definitions and limited Indian RCTs on cerclage remain constraining factors. ([missionmrcoq.com](#))

2. Methodology

Research design & approach. We conducted a structured scoping review of **clinical guidelines, systematic reviews/meta-analyses, Indian epidemiology and policy documents, and practice resources** (professional magazines, press releases, and credible educational podcasts/YouTube) from **2020–2025**, plus historically pivotal items (e.g., Shirodkar). ([PMC](#))

Database & web search strategy. Searches combined terms for *PCOS, preterm birth, cervical insufficiency, cervical length, cerclage, India, FOGSI, ICMR, MoHFW, PMSMA, and LaQshya*. We queried PubMed, Cochrane, BJOG/Wiley, JAMA Network, PLOS, AJOG/AJOG-MFM, and official portals of **RCOG, SMFM, ACOG, NICE, WHO, FOGSI, MoHFW/NHM, and UNICEF**; gray literature included **FICCI/KPMG** reports and selected media that summarized peer-reviewed findings. ([PubMed](#), [publications.smfm.org](#), [NICE](#), [UNICEF DATA](#), [National Health Mission](#))

Inclusion criteria. (i) Guidelines and consensus statements (RCOG Green-top 75; SMFM Consult #70 (2024); NICE NG25; ACOG progestogen advisory (2023)), (ii) meta-analyses/systematic reviews on PCOS and pregnancy outcomes, cerclage effectiveness, pessary vs cerclage, (iii) Indian policy (PMSMA, LaQshya) and NFHS-5 indicators, (iv) India-specific PCOS/ANC/preterm epidemiology, (v) educational podcasts/webinars (SMFM, MRCOG tutorials) and professional newsletters (FOGSI) aligned with primary sources. ([missionmrcog.com](#), [AJOG](#), [NICE](#), [acog.org](#), [PMSMA](#))

Exclusion criteria. Non-peer-reviewed blogs; single-center case series without relevance to Indian practice; pre-2000 primary literature (except historical background). ([PMC](#))

Data extraction & synthesis. We abstracted: (1) **risk estimates** (e.g., OR for preterm birth in PCOS), (2) **cerclage indications** and technique/timing recommendations, (3) **national program elements** (screening, referral), and (4) **implementation barriers** (access, culture, language). Findings were organized under biological/technical evidence, sociocultural challenges, system response, and innovative solutions. ([PMC](#), [missionmrcog.com](#))

Timeline & scope. Most sources were 2020–2025 to reflect current policy and evidence (e.g., SMFM 2024 CL guidance; ACOG 2023 progestogen update; 2023–2025 analyses of PCOS pregnancy risks). India-specific data included NFHS-5 (2019–21), PMSMA/LaQshya documents, ICMR PCOS Task Force outputs, and FOGSI practice points (2024–2025). ([AJOG](#), [acog.org](#), [PMSMA](#), [National Health Mission](#), [PMC](#))

3. Discussion

A) Biological & technical factors: what the evidence says

PCOS and heightened obstetric risk. Contemporary meta-analyses confirm that PCOS increases odds of **preterm birth** (pooled OR ~1.3), GDM, and hypertensive disorders; risk may be higher in **hyperandrogenic** phenotypes. Elevated BMI, insulin resistance, and inflammation likely mediate risk—and are particularly pronounced in South Asian women. ([MDPI](#), [PMC](#), [Oxford Academic](#))

Cervical biology in PCOS. While cervical insufficiency is not universal in PCOS, small studies suggest **higher androgens correlate with greater cervical shortening** across the second trimester, possibly expediting preterm remodeling. Metformin does **not** lengthen the cervix *per se*, though it may modestly reduce late miscarriage/preterm birth as a composite in pooled analyses. ([Oxford Academic](#), [The Lancet](#))

Cervical cerclage: indications and magnitude of benefit.

- **History-indicated** (typically at 11–14 weeks): consider for women with **≥3 prior** second-trimester losses/preterm births, per RCOG Green-top 75. ([missionmrcog.com](#))
- **Ultrasound-indicated**: for women with **prior sPTB/late loss** and **CL ≤ 25 mm** at 16–24 weeks; benefit is larger when **CL < 15 mm**. ([missionmrcog.com](#))
- **Exam-indicated (rescue)**: in painless dilation with exposed membranes up to ~24–27 weeks, emergency cerclage **delays birth ~34 days** and can halve birth <34 weeks vs expectant care in suitable cases, though neonatal benefit depends on context and expertise. ([missionmrcog.com](#))

Who should *not* receive cerclage? Major guidelines discourage routine cerclage in **singletons with incidentally short cervix** and **no prior sPTB**, and in **twins** without dilation; evidence favors **vaginal progesterone** for some short-cervix scenarios instead. ([missionmrcog.com](#), [NICE](#))

Technique & timing. Evidence comparing **Shirodkar vs McDonald** suggests the Shirodkar may reduce early preterm birth in some cohorts; however, surgical expertise and placement **as high as practical** are key, and overall comparative data are mixed and low-quality. **Transabdominal cerclage (TAC)** is reserved for failed/contraindicated transvaginal cases (often pre-pregnancy or early pregnancy in specialized centers). ([PubMed](#), [Obstetrics & Gynecology](#))

Adjuncts & comparators.

- **Progesterone:** After FDA withdrawal of 17-OHPC (Makena), ACOG/SMFM endorse **vaginal progesterone** for selected short-cervix scenarios; it can be offered **in addition** to cerclage when both are indicated. ([acog.org](#))

- **Cervical pessary:** High-quality RCTs (TOPS) show **no benefit** in singletons with CL $\leq$ 20 mm and **higher perinatal mortality**, cautioning against routine use. ([PubMed](#))

Where PCOS intersects. Because women with PCOS are more likely to (a) conceive with **higher BMI** and **insulin resistance**, (b) need **ovulation induction/ART** (raising twin risk), and (c) show **greater CL shortening with high androgens**, they are **over-represented** among those who benefit from **risk-based CL surveillance** and **timely cerclage**. The key is **phenotype-informed triage** rather than blanket cerclage. ([PMC](#), [Oxford Academic](#))

Preterm-birth prevention bundle for PCOS in India (technical core).

- **Early booking + baseline risk assessment** (prior sPTB/late loss, cervical surgery, uterine anomalies).
- **Transvaginal CL screening** 16–24 weeks for those at risk; **threshold $\leq$ 25 mm** triggers action; **<15 mm** indicates stronger cerclage benefit.
- **Choose the right tool:** progesterone alone (short cervix, no prior sPTB), **cerclage** (prior sPTB + short cervix or rescue), or combined, per shared decision-making. ([missionmrcog.com](#), [NICE](#))

B) Sociocultural challenges specific to India

1. **Diversity & disparities.** India's **regional, linguistic, and socioeconomic** diversity shapes antenatal pathways. NFHS-5 reveals improved coverage, yet quality remains uneven; **ultrasound** use is high overall but shows **large wealth- and education-related gaps** (absolute inequality $\sim$ 30 percentage points). Rural women often present later, and **female providers** are not uniformly available—barriers that particularly affect acceptance of **TVUS**. ([PMC](#), [Nature](#))
2. **Cultural sensitivity with TVUS and cerclage counseling.** Concerns about modesty, fear of pain, and myths surrounding “stitches in the womb” can deter uptake. Best practices include: **privacy-assured spaces**, chaperones, **female sonographers**, **vernacular counseling materials** (Hindi, Bengali, Tamil, Telugu, Marathi, Kannada, Malayalam, Gujarati, Punjabi, Assamese, Odia, Urdu), and inclusion of family decision-makers when the woman prefers. Evidence from LMIC reviews identifies **training and equipment** as major ultrasound barriers. ([SpringerOpen](#))
3. **PCOS stigma and mental health.** Indian women report **stigma around infertility and body hair/weight**, delayed diagnosis, and inconsistent counseling—factors that can delay antenatal engagement and risk-based screening. Integrating **mental-health support** and **peer groups** (including online) can improve adherence to surveillance and follow-up. ([PMC](#))
4. **Regional heterogeneity in PCOS.** Kashmir's extraordinarily high PCOS prevalence highlights the need for **state-tailored protocols** (e.g., lower threshold for CL screening and earlier referral). Urban centers may see higher ART use and twin pregnancies; rural belts face access gaps. **Lean PCOS** phenotypes in South Asia also warrant attention:

insulin resistance and adverse outcomes can occur **despite lower BMI**. ([PubMed](#), [Oxford Academic](#))

C) Current system response in India—and the gaps

What's in place.

- **PMSMA** (monthly specialist ANC) and **LaQshya** (labor-room quality improvement) provide national scaffolding for standardized antenatal and intrapartum care; **GDM screening** is now national policy (DIPSI-based). These initiatives are critical for embedding **risk-based CL screening** and referral pathways. ([PMSMA](#), [National Health Mission](#))
- **FOGSI** has issued focused practice points for PCOS (lifestyle, obesity, infertility) and has begun publishing **preterm-labour algorithms** that reference **CL < 25 mm** thresholds and discussion of **cerclage** and **progesterone**—a pivot toward guideline-concordant prevention. ([FOGSI](#))

What's missing.

- **Standardized CL screening:** No national requirement to perform **TVUS CL** for at-risk singletons (16–24 weeks). Many programs specify “ultrasound” but not **how** to measure cervix or **what to do** when short. ([National Health Mission](#))
- **Clinical pathways for high-risk PCOS:** PCOS is not consistently coded as a **risk flag** for targeted CL surveillance within public platforms, despite meta-analytic evidence of risk. ([PMC](#))
- **Workforce and equipment:** Gaps in trained sonographers, **female providers**, and maintenance of TVUS probes in rural/tribal areas limit coverage; quality audits seldom include **CL measurement fidelity**. ([SpringerOpen](#))
- **Coverage and affordability:** While many states reimburse cerclage in public facilities, **transabdominal cerclage (TAC)** requires referral to tertiary centers and may not be uniformly covered; package catalogs are complex and opaque to patients. ([National Health Authority](#))

D) Innovative solutions & best practices (India-ready)

1) Make CL screening simple & scalable.

- **Who:** women with PCOS **plus** any of: prior sPTB/late miscarriage, prior second-trimester painless dilation, cervical surgery, or suspected uterine anomaly; **ART conceptions** and **multifetal** pregnancies warrant specialist review, though routine cerclage in twins is not recommended. ([missionmrcog.com](#))
- **When/how:** **TVUS CL** at **16–24 weeks**, measured per standard technique (empty bladder; endocervical canal seen; three measurements; shortest used). **≤25 mm** triggers algorithm. ([publications.smfm.org](#))

- **Algorithm (singleton):**

- Prior sPTB/late loss + **CL $\leq$ 25 mm** → **Cerclage** (stronger effect if **<15 mm**); discuss adding **vaginal progesterone**. (missionmrcog.com)
- No prior sPTB, **CL $\leq$ 25 mm** → **Vaginal progesterone**, not routine cerclage; re-scan in 1–2 weeks. (publications.smfm.org)
- **Rescue scenario** (painless dilation with membranes) → **Emergency cerclage** by experienced team after counseling; consider amnioreduction/tocolysis per unit protocol. (missionmrcog.com)

2) PCOS-specific pregnancy optimization.

- **Preconception:** align with 2023 PCOS Guideline and FOGSI practice points—**weight management**, physical activity, letrozole-led ovulation induction, and metabolic risk control. ([PMC](#), [FOGSI](#))
- **In pregnancy:** universal **GDM screening** (DIPSI) and tight glycemic control; **vaginal progesterone** when indicated for short cervix; **avoid routine pessary** in singletons; consider **metformin** continuation selectively (evidence suggests reduced late miscarriage/preterm in pooled analyses, but not consistent across trials). ([National Health Mission](#), [PubMed](#), [The Lancet](#))

3) Cultural & linguistic tailoring.

- Introduce “**cervical support stitch**” as a plain-language term in counseling leaflets translated into **major Indian languages**; emphasize that stitches are **temporary** (vaginal cerclage removed at 36–37 weeks) and meant to **prevent early opening**—not to “tighten” in a harmful way. (acog.org)
- Offer **female sonographers** and privacy options; use **illustrated flip-charts** to demystify TVUS and cerclage.

4) Service delivery models.

- **Preterm-prevention clinics** within district hospitals (LaQshya-certified) with dedicated **CL measurement logs, checklists**, and **direct referral** to cerclage-capable OBGYN teams. ([National Health Mission](#))
- **Task-sharing & simulation:** short modules on CL measurement/cerclage selection for obstetricians and radiologists; simulation-based training improves TVUS proficiency. ([BioMed Central](#))
- **Digital nudges:** PMSMA day (9th of each month) to target **16–24 week** PCOS patients for CL scans; SMS reminders in local languages.

5) Quality, audit, and safety.

- **Data dashboards:** percent of at-risk PCOS women with CL measured; time-to-cerclage when indicated; **sPTB <34 w** rates; rescue cerclage outcomes.
- **Antibiotics & tocolysis:** follow institutional protocols; avoid unnecessary bed rest; align with RCOG/NICE/SMFM good-practice points. (missionmrcog.com)

- **Twin pregnancies:** avoid routine cerclage; consider **rescue cerclage** when dilation is present after specialist discussion. (missionmrcog.com)

6) Policy integration.

- Add “**PCOS with prior sPTB/late loss**” and “**PCOS with CL $\leq$ 25 mm**” to high-risk flags in PMSMA ANC cards; include **CL fields** and **referral prompts**.
- Include **cerclage eligibility** and **post-cerclage follow-up** in LaQshya quality standards. ([National Health Mission](http://NationalHealthMission.gov))

4. Conclusion

Summary of key findings. PCOS confers an increased risk for **adverse pregnancy outcomes** including **preterm birth**. **Cervical cerclage** offers clear benefit in **well-defined singleton subgroups**—particularly women with **prior sPTB/late loss** who develop a **short cervix ≤ 25 mm** in the mid-trimester, with stronger effects when **<15 mm**. Routine cerclage in twins or in singletons without prior sPTB is **not** supported; **vaginal progesterone** is appropriate in selected short-cervix scenarios. ([PMC](#), [missionmrcog.com](#), [NICE](#))

Implications for stakeholders.

- **Clinicians:** Standardize **risk-based CL screening** for high-risk PCOS patients (16–24 weeks). Use **shared decision-making** to select cerclage vs progesterone, and refer promptly for **rescue cerclage** when indicated. Document technique and plan for **timely removal** (36–37 weeks). ([missionmrcog.com](#))
- **Hospitals & health systems:** Build **preterm-prevention clinics**, ensure **TVUS capability**, female staff options, and **audit** CL measurement quality. Integrate checklists into PMSMA/LaQshya workflows. ([PMSMA](#), [National Health Mission](#))
- **Public health & policymakers:** Recognize PCOS as a **risk marker** in ANC registers; add **CL fields** and **cerclage triggers**; expand training and equipment in **rural/tribal** facilities; ensure **coverage** for cerclage (including TAC at referral centers) and streamline pathways under PM-JAY and state schemes. ([National Health Authority](#))
- **Communities & advocates:** Promote **stigma-free** conversations on PCOS; provide **multilingual** education materials about TVUS and cerclage; support mental health and partner engagement.

Future research. India needs **prospective registries** and **pragmatic trials** to: (1) evaluate **PCOS-specific** CL trajectories and androgen-linked cervical remodeling, (2) compare **Shirodkar vs McDonald** outcomes by skill level and setting, (3) test **combined progesterone+cerclage** strategies in high-risk PCOS phenotypes, and (4) quantify cost-effectiveness of **universal vs risk-based** CL screening in Indian districts. Concurrent efforts by the **ICMR PCOS Task Force** can embed pregnancy outcomes modules and inform national policy. ([PMC](#))

Policy recommendations.

1. **Adopt a national CL-screening directive** for high-risk pregnancies (including PCOS with prior loss/sPTB) at 16–24 weeks, with standardized technique and referral. (publications.smfm.org)
2. **Codify cerclage indications** in PMSMA and LaQshya manuals, aligned with RCOG/SMFM/NICE, and ensure procurement of TVUS probes. (missionmrcog.com, NICE)
3. **Train and credential providers** (including simulation) for CL measurement and cerclage selection; create **regional centers of excellence** for TAC. (BioMed Central)
4. **Embed PCOS** as a high-risk ANC flag; integrate **GDM and hypertensive disorder pathways** to address overlapping metabolic risks in PCOS. (National Health Mission)

Bottom line: With **culturally sensitive, evidence-aligned** deployment of **cervical-length screening** and **cerclage**, India can measurably reduce sPTB among pregnant women with PCOS—honoring a century-old Indian surgical innovation (Shirodkar) and advancing equitable maternal-newborn outcomes. (PMC)

5. References

Guidelines & consensus (global/India):

1. RCOG. *Cervical Cerclage: Green-top Guideline No. 75* (2022). ([missionmrcog.com](https://www.missionmrcog.com))
2. SMFM Consult Series #70 (2024): *Management of short cervix in individuals without a history of sPTB*. ([AJOG](https://www.ajog.org))
3. NICE NG25 (updated): *Preterm labour and birth—recommendations incl. cerclage vs progesterone*. ([NICE](https://www.nice.org.uk))
4. ACOG (2023). *Practice Advisory: Updated guidance on progestogen supplementation (17-OHPC withdrawal)*. ([acog.org](https://www.acog.org))
5. International PCOS Guideline (2023). Monash/ASRM/ESHRE network. ([PMC](https://www.ncbi.nlm.nih.gov/pmc))
6. FOGSI Focus – PCOS: Lifestyle, Obesity, Infertility Practice Points (2024). ([FOGSI](https://www.fogsi.org))
7. FOGSI *Pre-term Labour Practice Algorithms* (2025). ([FOGSI](https://www.fogsi.org))
8. SA Perinatal CL/Cerclage Guideline (2024) – technique thresholds (supportive). (sahealth.sa.gov.au)

Epidemiology & risk (PCOS, India & global):

9. Bharali MD, et al. *Cureus* (2022): Pooled **PCOS prevalence ≈11%** in India. ([PMC](https://www.ncbi.nlm.nih.gov/pmc))
10. Ganie MA, et al. *JAMA Netw Open* (2024): Indian prevalence heterogeneity; Kashmir high. ([JAMA Network](https://jamanetwork.com))
11. Ganie MA, et al. Kashmir community study: **~29–35% PCOS prevalence**. ([PubMed](https://pubmed.ncbi.nlm.nih.gov))
12. Ohuma EO, et al. *Lancet* (2023): India had 3.02 M preterm births in 2020. ([The Lancet](https://www.thelancet.com))
13. WHO. *Preterm birth fact sheet* (2023). ([World Health Organization](https://www.who.int))
14. UNICEF/WHO. *Born Too Soon* (2023) global report. ([UNICEF DATA](https://data.unicef.org))
15. NFHS-5 key indicators (2019–21): ANC & ultrasound coverage. ([PMC](https://www.ncbi.nlm.nih.gov/pmc))
16. Pew Research (2022): Ultrasound done in **≈78%** of pregnancies (NFHS-5). ([Pew Research Center](https://www.pewresearch.org))
17. Nature Sci Rep (2024): Inequalities in ANC quality and ultrasound. ([Nature](https://www.nature.com))

PCOS and pregnancy outcomes:

18. Khomami MB, et al. *Nat Commun* (2024): PCOS associated with ↑ preterm, GDM, HDP. ([Nature](https://www.nature.com))
19. Chang YT, et al. (2024): **Hyperandrogenic PCOS** with higher preterm risk. ([PMC](https://www.ncbi.nlm.nih.gov/pmc))
20. Mogos R, et al. (2024): Meta-analysis—**OR ≈1.29** for preterm delivery in PCOS. ([MDPI](https://www.mdpi.com))

Cervical insufficiency & cerclage evidence:

21. StatPearls (2023–2024): Overview of cervical insufficiency/cerclage. ([NCBI](https://www.ncbi.nlm.nih.gov/pmc))
22. Shennan AH, et al. *BJOG* (2022): Green-top 75 details. ([PubMed](https://pubmed.ncbi.nlm.nih.gov))
23. Biggio J, et al. *AJOG* (2024): SMFM Consult #70 (short cervix, no prior sPTB). ([AJOG](https://www.ajog.org))
24. D’Antonio F, et al. *PLOS Med* (2023): Emergency cerclage—benefits when **CL < 15 mm** or dilation. ([PLOS](https://www.plos.org))
25. *AJOG-MFM* (2023): Emergency cerclage meta-analysis—↑ survival; delay to delivery. ([ajogmfm.org](https://www.ajogmfm.org))

- 26. AAFP (2022) summary of guideline evidence—cerclage vs progesterone. ([AAFP](#))
- 27. McAuliffe L, et al. (2023): Shirodkar vs McDonald—signal toward lower PTB with Shirodkar (low-quality body). ([PubMed](#))
- 28. Ramesh B, et al. (2024): Indian series—laparoscopic TAC outcomes. ([PubMed](#))
- 29. Zhu J, et al. (2024): Twins—use cerclage cautiously; benefit mainly with **dilation**. ([Nature](#))

Cervical pessary:

- 30. Hoffman MK, et al. *JAMA* (2023) TOPS RCT: no benefit; higher perinatal mortality. ([PubMed](#))

Progesterone & progestogens:

- 31. ACOG (2023) Practice Advisory after 17-OHPC withdrawal. ([acog.org](#))
- 32. IJGO (2024) global quality assessment: only **vaginal progesterone and cerclage** have consistent support. ([Obstetrics & Gynecology](#))

PCOS care & India-specific guidance:

- 33. International PCOS Guideline (2023, Monash/ASRM/ESHRE). ([PMC](#))
- 34. FOGSI Focus—PCOS Lifestyle & Obesity (2024). ([FOGSI](#))
- 35. FOGSI Focus—PCOS & Infertility (2024). ([FOGSI](#))
- 36. ICMR PCOS Task Force outputs & national survey protocol (2018–2024). ([PMC](#), [JMIR Public Health and Surveillance](#))

Government programs & ANC quality (India):

- 37. PMSMA implementation note (MoHFW). ([PMSMA](#))
- 38. LaQshya labor-room quality initiative. ([National Health Mission](#))
- 39. NFHS-5 analyses of ANC quality and ultrasound inequalities. ([Nature](#))
- 40. GDM national guidelines (2018 update) & commentary. ([National Health Mission](#), [PMC](#))

Barrier & implementation literature:

- 41. Ultrasound barriers in LMICs: lack of training/equipment. ([SpringerOpen](#))
- 42. Simulation training improves pelvic US performance. ([BioMed Central](#))

Sociocultural/mental-health & India-focused perspectives:

- 43. Global survey of ethnic Indian women with PCOS—stigma, QoL, delays. ([PMC](#))
- 44. NFHS-5 trend briefs on ANC (four-plus visits). ([PMC](#))

Press/industry/policy context (used sparingly):

- 45. FICCI press: women’s health initiatives & system partnerships. ([ficci.in](#))
- 46. Abbott India communication on under-diagnosis (awareness context). ([abbott.in](#))
- 47. KPMG–FICCI report on new healthcare models (tele-enabled pathways). ([KPMG Assets](#))

Educational podcasts/YouTube (to complement, not replace, primary sources):

- 48. SMFM podcast: Transabdominal Cerclage (2024). ([Spotify](#))
- 49. MRCOG/YouTube lectures explaining Green-top 75. ([YouTube](#))
- 50. SMFM “cerclage & progesterone” explainer (podcast). ([Apple Podcasts](#))

(Additional supporting sources cited inline: (rcog.org.uk, publications.smfm.org, Obstetrics & Gynecology, onlinejima.com, Lippincott Journals))