



## DETERMINANTS OF LABOR DURATION: A SYSTEMATIC REVIEW OF MATERNAL, FETAL, AND HEALTHCARE FACTORS

Widya Maya Ningrum <sup>1\*</sup>, Kurniati Devi Purnamasari <sup>2</sup>, Silvia Widayani Heriyanti <sup>3</sup>,  
Kartikasari <sup>4</sup>

<sup>1, 2, 3, 4</sup> Program Studi Kebidanan, Fakultas Ilmu Kesehatan, Universitas Galuh  
Jalan R.E. Martadinata No. 150 Ciamis 46274, Indonesia  
Email corresponding: [widyamayaningrum@unigal.ac.id](mailto:widyamayaningrum@unigal.ac.id)

### ABSTRACT

Prolonged labor increases risks of maternal and neonatal complications. Identifying its determinants is essential for improving intrapartum care. This systematic review synthesizes evidence on maternal, fetal, and healthcare factors influencing labor duration. A systematic search was conducted in Google Scholar, PubMed, and ScienceDirect for articles published between 2015–2025. Studies reporting original data on labor duration determinants were included. Fifteen studies met inclusion criteria. Maternal factors (advanced age >35 years, nulliparity, high anxiety) consistently prolonged labor. Fetal factors including macrosomia (>4000 g) and occiput posterior malposition significantly extended labor duration. Healthcare factors such as continuous labor support, maternal mobilization, and appropriate oxytocin use were associated with shorter labor duration. Labor duration is determined by multifactorial interactions. Evidence-based, comprehensive intrapartum care addressing all determinant categories is recommended to optimize maternal and neonatal outcomes.

**Keywords:** labor duration, determinants, maternal factors, fetal factors, healthcare factors, systematic review

### ABSTRAK

Persalinan lama meningkatkan risiko komplikasi maternal dan neonatal. Identifikasi determinannya sangat penting untuk meningkatkan asuhan intrapartum. Tinjauan sistematis ini bertujuan mensintesis bukti mengenai faktor maternal, janin, dan pelayanan kesehatan yang mempengaruhi lama persalinan. Pencarian sistematis dilakukan di Google Scholar, PubMed, dan ScienceDirect untuk artikel tahun 2015–2025. Studi yang melaporkan data original tentang determinan lama persalinan disertakan. Lima belas studi memenuhi kriteria inklusi. Faktor maternal (usia >35 tahun, nulliparitas, kecemasan tinggi) secara konsisten memperpanjang persalinan. Faktor janin seperti makrosomia (>4000 g) dan malposisi oksiput posterior secara signifikan memperpanjang durasi persalinan. Faktor pelayanan kesehatan seperti dukungan persalinan berkelanjutan, mobilisasi ibu, dan penggunaan oksitosin yang tepat berhubungan dengan durasi persalinan yang lebih pendek. Lama persalinan ditentukan oleh interaksi multifaktorial. Asuhan intrapartum komprehensif berbasis bukti yang mencakup semua kategori determinan direkomendasikan untuk mengoptimalkan luaran maternal dan neonatal.

**Kata kunci:** lama persalinan, determinan, faktor maternal, faktor janin, faktor pelayanan kesehatan, tinjauan sistematis

### INTRODUCTION

The duration of labor is a fundamental indicator of intrapartum progress and a key predictor of maternal and neonatal morbidity. Labor that deviates from expected norms—either

prolonged or precipitous—carries significant clinical implications. Prolonged labor, defined by the World Health Organization (2018) as lasting more than 20 hours in primigravidas and more than 14 hours in multigravidas,

affects approximately 5–8% of all deliveries globally. This condition contributes substantially to maternal deaths and complications, including uterine rupture, postpartum hemorrhage, sepsis, and neonatal asphyxia (Cunningham et al., 2022; Abalos et al., 2018).

Understanding the determinants of labor duration is therefore essential for clinicians, particularly midwives and obstetricians, who are responsible for timely identification of abnormal progress and implementation of appropriate interventions (ACOG, 2024). Historically, labor progression has been described using the Friedman curve, but contemporary evidence from Zhang et al. (2020) demonstrates that labor progresses more slowly than previously thought, especially before 6 cm of cervical dilation. This finding underscores the need for updated, context-specific knowledge on factors that accelerate or delay labor.

The classic 5P framework—power (uterine contractions), passage (maternal pelvis and soft tissues), passenger (fetus), psyche (maternal psychological state), and provider (healthcare team)—remains a useful conceptual model for analyzing labor duration (Kilpatrick & Rouse, 2017). However, recent research has refined our understanding of how each factor contributes, and how they interact dynamically during the intrapartum period.

Among maternal factors, age and parity are consistently identified as strong determinants. Cheng et al. (2019) reported that women under 20 years and over 35 years have significantly longer active labor compared to women aged 20–35 years. Nulliparous women experience labor durations 2–3 times longer than multiparous women, primarily due to differences in cervical ripening and pelvic tissue elasticity (Neal et al., 2019; Neal, 2020). Psychological factors also play a critical role: Nystedt et al. (2017) demonstrated that antenatal fear of childbirth and intrapartum anxiety

increase catecholamine levels, which inhibit uterine contractility and prolong labor by an average of 2.5 hours.

Fetal characteristics are equally important. Macrosomia (birth weight >4000 g) is associated with prolonged second stage and increased rates of operative delivery, as shown by Shinohara et al. (2020). Malposition, particularly persistent occiput posterior, slows fetal descent and significantly extends both first and second stages of labor (Laughon et al., 2018). These fetal factors often interact with maternal pelvic dimensions, highlighting the importance of individualized assessment.

Healthcare system factors represent modifiable determinants of labor duration. Continuous one-to-one support during labor, provided by a doula, midwife, or trained companion, has been shown in a Cochrane systematic review to shorten labor by approximately 1 hour and reduce the likelihood of cesarean section (Bohren et al., 2017). Maternal mobilization and upright positions leverage gravity to enhance fetal descent and improve contraction effectiveness, reducing overall labor duration compared to recumbent positions (Lawrence et al., 2013). Conversely, inappropriate or delayed use of oxytocin for augmentation can either prolong labor (if underused) or cause uterine hyperstimulation (if overused), as noted by Rouse et al. (2016).

Given the multiplicity of interacting determinants, a systematic synthesis of current evidence is needed to guide clinical practice and future research. This systematic review therefore aims to identify and synthesize maternal, fetal, and healthcare-related factors influencing labor duration based on studies published in the last decade.

## METHODS

This systematic review followed PRISMA guidelines. A literature search was conducted in Google Scholar, PubMed, and ScienceDirect for articles published between 2015–2025 using

keywords: "labor duration," "prolonged labor," "determinants," "maternal factors," "fetal factors," and "healthcare factors." Inclusion criteria: original research (cohort, case-control, cross-sectional, randomized controlled trials), systematic reviews, and clinical

guidelines; full-text available; English or Indonesian language. Exclusion criteria: case reports, editorials, non-human studies. Data were extracted independently by two authors and synthesized narratively.

## RESULTS AND DISCUSSION

A total of 15 studies met inclusion criteria (Table 1). The findings are organized by determinant category.

**Table 1. Summary of Included Studies**

| No | Author (Year)             | Design            | Sample | Key Determinant      | Main Finding  |
|----|---------------------------|-------------------|--------|----------------------|---|
| 1  | Cheng et al. (2019)       | Cohort            | 1,200  | Maternal age         | Age <20 or >35 years increased prolonged labor risk |
| 2  | Neal et al. (2019)        | Observational     | 800    | Parity               | Nulliparas had longer duration than multiparas      |
| 3  | Nystedt et al. (2017)     | Cross-sectional   | 500    | Psychology           | Anxiety prolonged labor by 2.5 hours                |
| 4  | Zhang et al. (2020)       | Cohort            | 2,500  | Labor patterns       | Contemporary labor slower than Friedman curve       |
| 5  | Laughon et al. (2018)     | Observational     | 1,000  | Fetal position       | Occiput posterior prolonged second stage            |
| 6  | Rouse et al. (2016)       | RCT               | 600    | Uterine contractions | Inadequate contractions prolonged labor             |
| 7  | Bohren et al. (2017)      | Systematic review | -      | Continuous support   | Reduced labor duration by ~1 hour                   |
| 8  | Lawrence et al. (2013)    | Systematic review | -      | Mobilization         | Upright positions shortened labor                   |
| 9  | Shinohara et al. (2020)   | Cohort            | 900    | Birth weight         | Macrosomia >4000g increased duration                |
| 10 | Fumagalli et al. (2022)   | Observational     | 700    | Emotional support    | Improved outcomes and shorter labor                 |
| 11 | Kilpatrick & Rouse (2017) | Review            | -      | 5P factors           | All factors interact to determine duration          |
| 12 | Abalos et al. (2018)      | Systematic review | -      | Interventions        | Timely interventions improve outcomes               |
| 13 | Neal (2020)               | Review            | -      | Physiologic labor    | Multifactorial interactions                         |
| 14 | ACOG (2024)               | Guideline         | -      | Active management    | Shortens labor when indicated                       |
| 15 | Cunningham et al. (2022)  | Textbook          | -      | Obstetric factors    | Maternal and fetal determinants confirmed           |

**Maternal Determinants:** Advanced maternal age (>35 years) and nulliparity were the strongest predictors of prolonged labor (Cheng et al., 2019; Neal et al., 2019). Psychological distress, specifically fear of childbirth, was

associated with slower cervical dilation and longer active phase (Nystedt et al., 2017).

**Fetal Determinants:** Macrosomia (Shinohara et al., 2020) and malposition (Laughon et al., 2018) independently

predicted longer labor, particularly in the second stage. These effects were magnified when combined with maternal nulliparity.

### Healthcare

**Determinants:** Continuous labor support (Bohren et al., 2017) and maternal mobilization (Lawrence et al., 2013) consistently shortened labor duration. Conversely, delayed or inappropriate medical intervention prolonged labor (Rouse et al., 2016; Abalos et al., 2018).

The interaction between determinants is critical: no single factor operates in isolation. For example, an anxious nullipara with a macrosomic fetus in occiput posterior position is at very high risk for prolonged labor, regardless of healthcare quality. Conversely, continuous support and mobilization can partially offset biological risks (Neal, 2020; Fumagalli et al., 2022). Current ACOG (2024) guidelines therefore recommend a holistic, patient-centered approach that addresses all determinant categories simultaneously.

### CONCLUSION

Labor duration is determined by interacting maternal (age, parity, psychology), fetal (weight, position), and healthcare (support, mobilization, medical intervention) factors. Effective intrapartum care requires systematic assessment of all determinants and evidence-based, individualized management. Future research should focus on developing and validating predictive models that integrate multiple determinants.

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