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Tinjauan Pustaka

Maternal Factors Associated with Stunting in Children under Five in Asia: A Systematic Review

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Abstrak

Pendahuluan: Stunting merupakan masalah kesehatan balita utama di Asia yang penyebabnya sangat multifaktorial. Salah satu faktor tersebut berkaitan erat dengan faktor maternal yang memengaruhi proses kehamilan, perkembangan janin, dan pengasuhan anak. Variabilitas determinan maternal seperti status gizi, kesehatan reproduksi, perilaku higienitas, serta akses layanan kesehatan menunjukkan pentingnya identifikasi faktor risiko yang paling konsisten.
Metode: Database PubMed, ScienceDirect, dan Google Scholar digunakan untuk mencari literatur dilakukan dengan kriteria inklusi berupa artikel kuantitatif yang meneliti hubungan faktor maternal dan anak usia di bawah lima tahun dengan stunting, berlokasi di Asia, terbit pada 2019 hingga 2024, serta tersedia dalam teks lengkap berbahasa Inggris. Seleksi literatur mengikuti alur PRISMA, dan penilaian kualitas menggunakan JBI Critical Appraisal Checklist.
Pembahasan: Sebanyak lima belas artikel memenuhi kriteria untuk diikutsertakan pada tahap analisis. Tinjauan menunjukkan bahwa sebagian besar studi menggunakan desain penelitian cross-sectional dan mengidentifikasi sebanyak dua puluh faktor maternal yang konsisten berhubungan dengan stunting, terutama usia ibu, riwayat pendidikan, status gizi, status pekerjaan. Beberapa faktor perilaku seperti kebiasaan cuci tangan, paparan rokok, kepatuhan ANC, riwayat penyakit juga ditemukan signifikan meskipun dalam jumlah studi yang terbatas. Variabel-variabel ini berkontribusi terhadap risiko stunting melalui mekanisme biologis, sosial, ekonomi, dan lingkungan yang memengaruhi pertumbuhan anak sebelum dan sesudah lahir.
Simpulan: Kejadian stunting di Asia memiliki asosiasi erat dengan faktor maternal, dengan determinan yang paling konsisten meliputi usia maternal, pendidikan, dan status gizi. Upaya pencegahan stunting perlu mengintegrasikan intervensi berbasis ibu melalui penguatan gizi, edukasi kesehatan, serta peningkatan akses layanan maternal.

Kata Kunci: Balita, Stunting, Faktor Maternal, Ibu Hamil, Asia

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Abstract

Introduction: *Multiple maternal factors influencing pregnancy, fetal development, and early childhood care collectively contribute to stunting, a major health concern among children under five across Asia. Variations in maternal nutritional status, reproductive health, hygienic practices, and access to health services underscore the need to identify the most consistent risk factors.*
Method: *PubMed, ScienceDirect, and Google Scholar were utilized to identify relevant literature. The inclusion criteria encompassed quantitative studies examining maternal factors associated with stunting among children under five in Asian countries. Eligible articles were those published between 2019 and 2024 and available in full text in English. Study selection followed the PRISMA flowchart, and quality assessment used the JBI Critical Appraisal Checklist.*
Discussion: *A total fifteen studies were included and most studies used a cross-sectional design. Analysis identified twenty terms maternal determinants of stunting, including maternal age, educational level, nutritional, and employment status. Several behavioral factors such as handwashing practices, exposure to cigarette smoke, antenatal care compliance, and maternal disease history were also reported as significant although only in a limited number of studies. These factors influence stunting through biological, social, economic, and environmental pathways that affect child growth from pregnancy through early life.*
Conclusion: *Maternal factors have an important role in stunting among children in Asia. The most consistent determinants are maternal age, maternal education, and maternal nutritional status. Strengthening nutrition programs, improving maternal health education, and enhancing access to maternal care services are essential to reduce stunting.*

Keywords: Children Under Five, Stunting, Maternal Factors, Pregnancy, Asia

1. INTRODUCTION

Child health forms a critical foundation for human capital development, particularly during the ages of zero to five years, which represent a pivotal period of growth and heightened vulnerability to health problems such as recurrent infections, sensory disturbances, and nutritional deficiencies that may impair overall development[1]. Globally, stunting represents the most prevalent form of chronic malnutrition and is characterized by a height-for-age measurement that falls more than two standard deviations below the WHO growth standard median[2]. In 2022,

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approximately 148.1 million or 22.3% of the global population, children under five years were classified as stunted[3]. Although global trends indicate a gradual decline, the pace of improvement remains insufficient to meet international targets, and the prevalence of stunting continues to exceed other forms of malnutrition. In adulthood, it may result in impaired cognitive development, a heightened susceptibility to infections, and reduced overall productivity[4], and substantial economic losses estimated at 260 to 390 trillion rupiah annually[5].

Accounting for more than half of all global stunting cases, Asia continues to bear the highest burden of stunting worldwide, with a prevalence of 21.3% or around 76.6 million children[3]. South Asia and Southeast Asia show the highest rates, with India, Bangladesh, Nepal, and Indonesia identified as major contributors[6]. Although several countries, such as Vietnam and Thailand, have demonstrated notable reductions, many others still face structural challenges including poverty, food insecurity, unequal access to health services, and educational disparities, reflecting the complex socioeconomic and maternal-child health landscape[7].

Stunting is the result of both direct and indirect determinants[8], among which maternal characteristics play a highly influential role during the first one thousand days of life[9]. Maternal conditions before and during pregnancy, including nutritional status, reproductive age, educational level, and overall health, determine fetal growth quality[10]. Chronic energy deficiency, anemia, and pregnancy at a young age may disrupt the delivery of nutrients and oxygen to the fetus, leading to impaired growth after birth[11,12]. Beyond biological aspects, maternal knowledge and health-related behaviors during pregnancy also contribute to stunting risk in children[13].

Studies across Asia have demonstrated associations between maternal factors and stunting; however, findings remain heterogeneous because most research is local and observational. Research in Indonesia and Bangladesh highlights maternal nutritional status, whereas studies from India and Nepal emphasize maternal age and education. To date, no comprehensive systematic review has synthesized these findings, underscores the need for a systematic literature review to assess the role of maternal factors in influencing early-life growth outcomes in children below five years of age in Asia.

2. METHOD

The Preferred Reporting Items for Systematic Reviews and Meta-

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Analyses (PRISMA) 2020 guidelines served as the foundation for the systematic review framework employed in this study. This review design synthesizes evidence on the association between maternal factors and early childhood growth impairment among children under five in Asia. This method enables an in-depth understanding of patterns of similarity and variation among different nations, supported by a protocol that ensures transparency and reproducibility through clearly defined search strategies, selection criteria, quality appraisal, and data synthesis.

Research Questions

The research questions were formulated using the PICO framework, which specifies the Population, Exposure, Comparison, and Outcome components (Table 1).

Table 1. PICO Framework

Criteria	Application
P	Children below five years living across Asia
I	Pregnancy-related maternal determinants
C	Children without maternal risk factors
O	Stunting as height-for-age below −2 SD from the WHO median

Based on this framework, the present study formulated one primary and supplementary research question as follows:

RQ1: Which study designs are most commonly used in studies looking at the connection between maternal variables and stunting in Asian children under five?

RQ2: Which maternal characteristics have been linked to stunting in Asian children under five between 2019 and 2024?

Search Terms

For articles from 2019 to 2024, the PubMed, ScienceDirect, and Google Scholar databases were utilized to perform a comprehensive literature search. Based on Medical Subject Headings (MeSH) and commonly used synonyms, keywords were created by combining the Boolean operators "AND" and "OR". Stunting, maternal factors, and the Asian area were among the search phrases used, such as (“stunting” OR “child undernutrition” OR “child malnutrition”) AND (“maternal factors” OR “maternal status” OR “mother characteristics”) AND (“Asia” OR “Asian region” OR “Asian countries”).

Selection Criteria

Inclusion criteria were original research studies with observational designs exploring the connection between maternal variables and stunting in Asian countries, which published between 2019 and 2024 and were available in full text in English. The exclusion criteria included non-original research articles, studies that did not clearly report maternal variables and stunting outcomes, and studies with invalid

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methodologies or data that were not extractable.

Quality Checklist and Procedures

Study selection followed the four standard stages of the PRISMA framework. Duplicates were eliminated after an initial screening based on the titles and abstracts of all gathered records. After then, publications that were judged pertinent were carefully reviewed to make sure they satisfied the inclusion criteria. The PRISMA 2020 flowchart illustrates the final selection procedure.

The Joanna Briggs Institute (JBI) Critical Appraisal Checklist was used to assess methodological quality. Clarity of inclusion criteria, measurement of exposure and outcomes, suitability of analytical methodologies, and sufficiency of confounding control are all part of the assessment. Studies achieving ≥70% of the quality criteria were classified as high quality and included in the final synthesis.

Data Extraction Strategy

Each study covers the author, year of publication, title, location, design, sample size, maternal variables examined, and analytic findings. Data extraction was conducted independently by two reviewers using a standardized extraction table to ensure consistency and validity.

Data Synthesis Strategy

Because the study approaches and variables were significantly varied, the analysis was undertaken narratively. The findings are presented in tables and descriptive summaries that illustrate the relationships between maternal factors and stunting across various Asian countries, as well as the relative dominance of each maternal variable analyzed.

3. RESULTS

Search Results

From a total of 3,193 articles identified through PubMed (315), ScienceDirect (1,128), and Google Scholar (1,750), 1,158 duplicates were removed, leaving 2,035 records for screening. Title and abstract screening resulted in the exclusion of 1,386. During the eligibility assessment of 649 full texts, 634 articles were excluded for reasons such as lack of full-text availability, non-original research, or failure to investigating the relationship between stunting and maternal variables. Finally, fifteen papers were included in the systematic synthesis and met the inclusion conditions.

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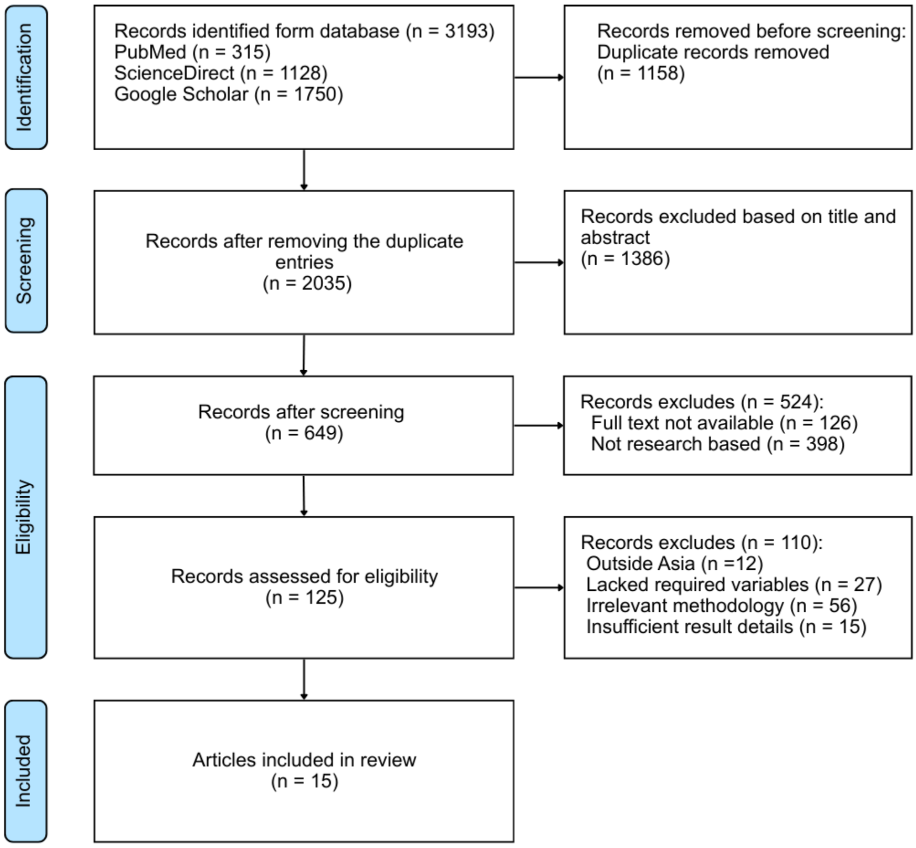

Figure 1. PRISMA Flowchart

Quality Assessment

Table 2. Evaluation of Cross-*s*ectional Study Quality

No	Author	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Score
1.	Vijay & Patel (2024)	√	√	×	√	√	√	√	√	7/8 (87,5%)
2.	Supadmi et al. (2024)	√	√	×	√	√	√	√	√	7/8 (87,5%)
3.	Mistry et al. (2019)	√	√	√	√	√	√	√	√	8/8 (100%)
4.	Chowdhury et al. (2021)	√	√	√	√	√	√	√	√	8/8 (100%)
5.	Laksono et al. (2024)	√	√	×	√	√	√	√	√	7/8 (87,5%)
6.	Nomura et al. (2023)	√	√	√	√	√	√	√	√	8/8 (100%)
7.	Wali et al. (2020)	√	√	√	√	√	√	√	√	8/8 (100%)
8.	Budhathoki et al. (2019)	√	√	√	√	√	√	√	√	8/8 (100%)
9.	Mahmood et al. (2020)	√	√	√	√	√	√	√	√	8/8 (100%)
10.	Nakphong & Beltrán-Sánchez (2021)	√	√	×	√	√	√	√	√	7/8 (87,5%)
11	Mutunga et al. (2020)	√	√	√	√	√	√	√	√	8/8 (100%)
12.	Kumar et al. (2021)	√	√	√	√	√	√	√	√	8/8 (100%)
13	Puri et al. (2020)	√	√	×	√	√	√	√	√	7/8 (87,5%)
14.	Saha et al. (2019)	√	√	√	√	√	√	√	√	8/8 (100%)

Table 3. Evaluation of Case Control Study Quality

No	Author	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Score
1.	Pariyana et al. (2021)	√	√	√	√	×	×	√	√	√	√	8/10 (80%)

Using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist, a methodological quality assessment of fifteen included papers revealed that every study received a score higher than 70%. Therefore, it was deemed appropriate to include this study in a systematic review.

Data Analysis

The analysis was further conducted to assess the variation in research designs used and to identify the distribution of maternal factors shown to be associated with stunting.

Table 4. Research Design of Included Studies

No	Study Design	Article Code	Count
1.	Cross-sectional	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14	14

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2.	Case Control	A15	1

Across the 15 articles included in the analysis, 14 employed a cross-sectional study and only one utilized a case control study. Thus, the research designs in the reviewed studies were predominantly cross-sectional study.

Table 5. Identified Maternal Determinants

No	Maternal Factors	Article Code	Count
1	Mother's age	A1, A2, A3, A6, A7, A9, A10,A11, A12,A13, A14, A15	12
2	Mother's Body Mass Index	A1, A3, A4, A5, A7, A11, A12, A14	8
3	Mother's height	A6, A7, A10,A11, A14, A15	6
4	Mother's weight	A10	1
5	Pregnant interval	A1, A7, A15	3
6	Number of pregnancies	A10	1
7	Vitamin A intake	A3	1
8	Fe intake	A3, A8	2
9	Antenatal care compliance	A4, A5, A8, A9, A15	5
10	Postnatal care compliance	A4	1
11	IPV vaccination history	A4	1
12	Anemia during pregnancy	A15	1
13	Infections during pregnancy	A15	1
14	Educational level	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11,A12, A13, A14	14
15	Employment status	A1, A4, A5, A8, A10,A12, A13, A15	8
16	Marital status	A2, A5	2
17	Handwashing practices after defecation	A3	1
18	Handwashing practices before meal	A3	1
19	Smoking behavior	A10	1
20	Place of delivery	A1, A8, A9	3

The analysis indicated that among the 20 maternal factors identified, including maternal age, BMI, maternal height, birth spacing, ANC compliance, educational level, employment status, and place of delivery. Other factors were reported less frequently, such as maternal weight, vitamin A and iron supplementation, PNC compliance, IPV vaccination history, marital status, handwashing practices, smoking behavior, and maternal conditions including anemia and infections during pregnancy.

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Table 6. Overview of The Selected Studies.

Article Code	Authors (Year)	Country	Study Design	Sample (n)	Maternal Factors
A1	Vijay & Patel (2024)[14]	Nepal	Cross-sectional	2.491	1. Educational level (p-value <0,001) 2. Employment status (p-value <0,001) 3. Mother's age (p-value = 0,04) 4. Mothers' BMI (p-value <0,001) 5. Place of delivery (p-value <0,001) 6. Pregnant interval (p-value <0,001)
A2	Supadmi et al. (2024)[15]	Indonesia	Cross-sectional	2.073	1. Educational level (p-value <0,001) 2. Marital status (p-value <0,001) 3. Mother's age (p-value <0,001)
A3	Mistry et al. (2019)[16]	Bangladesh	Cross-sectional	6.539	1. Educational level (p-value <0,001) 2. Mother's age (p-value = 0,02) 3. Mother's BMI (p-value <0,001) 4. Vitamin A intake supplementation (p-value <0,001) 5. Fe intake supplementation (p-value = 0,036) 6. Handwashing practices after defecation (p-value <0,001) 7. Handwashing practices before meal (p-value = 0,003)

A4	Chowdhury et al. (2021)[17]	Bangladesh	Cross-sectional	7.661	1. Educational level (p-value <0,001) 2. Mother's BMI (p-value <0,001) 3. Employment status (p-value = 0,004) 4. Antenatal care compliance (p-value <0,001) 5. Postnatal care compliance (p-value = 0,001) 6. IPV vaccination history (p-value = 0,005)
A5	Laksono et al. (2024)[18]	Indonesia	Cross-sectional	43.284	1. Educational level (p-value <0,001) 2. Mother's BMI (p-value <0,001) 3. Employment status (p-value <0,001) 4. Marital status (p-value <0,001 5. Antenatal care compliance (p-value <0,001)
A6	Nomura et al. (2023)[19]	Timor Leste	Cross-sectional	4.581	1. Educational level (p-value = 0,035) 2. Mother's age (p-value = 0,039) 3. Mother's heightt (p-value <0,001)
A7	Wali et al. (2020)[20]	Bangladesh, India, Nepal Maldives, and Pakistan	Cross-sectional	564.518	1. Educational level (p-value <0,001) 2. Mother's age (p-value = 0,009) 3. Mother's BMI (p-value <0,001) 4. Mother's heightt (p-value <0,001) 5. Pregnant interval (p-value = 0,001)

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A8	Budhathoki et al. (2020)[21]	Nepal	Cross-sectional	47.702	1. Educational level (p-value <0,01) 2. Employment status (p-value <0,01) 3. Antenatal care compliance (p-value <0,01) 4. Fe intake supplementation (p-value <0,01) 5. Place of delivery (p-value <0,01)
A9	Mahmood et al. (2020)[22]	Punjab, Pakistan	Cross-sectional	25.067	1. Educational level (p-value <0,001) 2. Mother's age (p-value = 0,042) 3. Antenatal care compliance (p-value <0,001) 4. Place of delivery (p-value <0,001)
A10	Nakphong & Beltrán-Sánchez (2021)[23]	Cambodia	Cross-sectional	14.988	1. Educational level (p-value <0,001) 2. Mother's age (p-value <0,001) 3. Mother's heightt (p-value <0,001) 4. Mother's weight (p-value <0,001) 5. Employment status (p-value <0,001) 6. Number of pregnancies (p-value <0,001) 7. Smoking behavior (p-value <0,001)
A11	Mutunga et al. (2020)[24]	Cambodia, Lao PDR, Myanmar, Thailand, Timor Leste, Vietnam	Cross-sectional	47.554	1. Educational level (p-value = <0,001) 2. Mother's BMI (p-value <0,001) 3. Mother's age (p-value <0,001) 4. Mother's heightt (p-value <0,001)

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A12	Kumar et al. (2021)[25]	Bangladesh	Cross-sectional	8.312	1. Educational level (p-value <0,001) 2. Mother's age (p-value <0,001) 3. Mother's BMI (p-value <0,001) 4. Employment status (p-value <0,001)
A13	Puri et al. (2020)[26]	India	Cross-sectional	25.563	1. Educational level (p-value <0,001) 2. Mother's age (p-value <0,001) 3. Employment status (p-value <0,001)
A14	Saha et al. (2019)[27]	Bangladesh	Cross-sectional	6.974	1. Educational level (p-value <0,001) 2. Mother's age (p-value <0,001) 3. Mother's BMI (p-value <0,001) 4. Mother's heightt (p-value <0,001)
A15	Pariyana et al. (2021)[28]	Palembang, Indonesia	Case Control	170	1. Mother's age (p-value = 0,03) 2. Employment status (p-value = 0,000) 3. Mother's heightt (p-value = 0,000) 4. Number of pregnancies (p-value = 0,000) 5. Pregnant interval (p-value = 0,000) 6. Antenatal care compliance (p-value = 0,000) 7. Anemia during pregnancy (p-value = 0,000) 8. Infections during pregnancy (p-value = 0,000)

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4. DISCUSSION

Maternal conditions during pregnancy, including nutritional status, infections, and prenatal care, strongly influence fetal growth and early child development. The risk of growth will be interrupted and growth will be inhibited if these conditions are not optimal. Maternal well-being is the crucial role of in preventing stunting from the earliest stages of life.

Educational Level

Maternal educational level appears as the most influential factor in this review, as lower education is consistently linked with inadequate nutrition literacy, suboptimal childcare practices, and reduced utilization of health services, all of This raises the possibility of stunting[15]. Saha et al. (2020) reported that lower maternal education was associated with higher odds of child stunting (p<0.001), with an Odds Ratio of 1.29 (95% CI:0.94–1.77), indicating 1.29 times higher odds of stunting among children of mothers with lower educational attainment[27].

Mother's Age

Maternal age represents the second strongest factor identified in this systematic literature review and serves as a key indicator of both biological and social readiness for pregnancy. Younger mothers (<20 years) face increased risks of stunting due to reproductive immaturity, suboptimal and nutritional reserves[14]. Conversely, advanced maternal age (>35 years) is associated with metabolic complications and placental insufficiency, which may impair fetal growth[22]. Evidence from Puri et al. (2020) supports this association, showing that maternal age was associated with stunting (p<0.001), with an Odds Ratio of 1 (95% CI:0.81–1.03), indicating comparable odds of stunting among children born to younger mothers and those born to older mothers[26].

Mother's Body Mass Index

Maternal nutritional status and fetal nutritional adequacy, identified as the third most influential factor in this systematic literature review, are directly reflected by the mother's Body Mass Index (BMI). A BMI <18.5 kg/m² indicates insufficient energy and micronutrient reserves, raises the risk of intrauterine growth problems and the delivery of younger infants who are more prone to stunting[27]. Wali et al. (2020) reported a substantial association between low maternal BMI and child stunting (p<0.001), with an Odds Ratio of 1.29 (95% CI:1.00–1.68), indicating that children born to mothers with low BMI had 1.29 times the odds of stunting compared to those born to mothers with normal BMI[20].

Employment Status

Maternal employment during pregnancy reflects both physical

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workload and socioeconomic conditions that may affect fetal growth. Heavy or prolonged work can increase maternal fatigue, reduce nutritional intake, and heighten physiological stress, thereby elevating the risk of impaired fetal development and subsequent stunting[26]. Similarly, Kumar et al. (2021) demonstrated a substantial association between maternal work during pregnancy and child stunting (p<0.001), with an Odds Ratio of 3.6, indicating that children born to mothers who worked during pregnancy had 3.6 times the odds of stunting compared to those whose mothers did not work[25].

Mother's Height

Maternal height reflects long-term nutritional and health status and serves as a biological risk indicator in pregnancy[27]. Short stature (<145–150 cm) is associated with reduced pelvic capacity, limited uteroplacental perfusion, and a history of chronic malnutrition, all of which may restrict fetal growth and increase the likelihood of stunting[19]. According to Mutunga et al. (2020), short maternal height was associated with child stunting (p < 0.001), with an Odds Ratio of 1.05 (95% CI:0.89–1.24), indicating that children born to shorter mothers had 1.05 times the odds of being stunted compared to those born to mothers of normal height[24].

Antenatal Care Compliance

Maternal compliance with Antenatal Care (ANC) is critical for recognizing early difficulties, tracking fetal progress, and obtaining counseling on nutrition and supplementation. Inadequate ANC visits (<4 visits) reduce opportunities for these interventions, thereby increasing the risk of intrauterine growth impairment and subsequent stunting[18]. Mahmood et al. (2020) demonstrated that insufficient antenatal care attendance was associated with higher odds of childhood stunting (p<0.001), with an Odds Ratio of 1.05, indicating that children born to mothers with inadequate ANC visits had 1.05 times the odds of stunting compared to those with adequate ANC attendance[22].

Birth Interval

Birth spacing reflects the maternal biological and nutritional recovery after childbirth. Short intervals (<24 months) may lead to maternal depletion, where nutritional reserves have not fully recovered, resulting in suboptimal placental perfusion and inadequate nutrient supply in the subsequent pregnancy[20]. This illness raises the possibility of having a stunting children cause of low-birth-weight child. Vijay and Patel (2024) reported a strong association between short birth intervals and childhood stunting (p<0.001), with an Odds Ratio of 1.1, indicating that children born

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after short birth intervals had 1.1 times the odds of stunting compared to those born after longer intervals[14].

Place of Delivery

Place of delivery reflects access to safe and professional intrapartum care. Deliveries outside health facilities increase infection risk and reduce essential newborn care, contributing to stunting[15]. Mahmood et al. (2020) reported a significant association between non-facility births and higher risk of childhood stunting (p<0.001), with an Odds Ratio of 1.03, indicating that children born outside health facilities had 1.03 times the odds of stunting compared to those born in health facilities[22].

Number of Pregnancies

Number of pregnancies reflects the cumulative physiological demands placed on the mother during repeated pregnancies. Higher number of pregnancies (>4) may limit maternal nutritional recovery between gestations, leading to suboptimal nutrient reserves and impaired fetal growth[23]. Nakphong and Beltrán-Sánchez (2021) identified a strong association between higher parity and childhood stunting (p=0.000), with an Odds Ratio of 1.94, indicating that children born to mothers with a higher number of pregnancies had 1.94 times the odds of stunting compared to those born to mothers with fewer pregnancies[23].

Iron/Fe Supplementation

Because iron is necessary for hemoglobin synthesis and fetal oxygenation, iron shortage during pregnancy might impede fetal growth and raise the risk of fetal growth restriction stunting[29]. Mistry et al. (2019) reported that inadequate iron supplementation was significantly associated with childhood stunting (p=0.036), with an Odds Ratio of 1, indicating equal odds of stunting among children whose mothers received inadequate iron supplementation compared to those who received adequate supplementation[16].

Marital Status

Maternal marital status during pregnancy reflects stability and support that influence maternal well-being, nutrition, and antenatal care, all of which affect fetal growth. Limited support in unmarried mothers may increase stress and reduce resource access, contributing to impaired fetal development and later stunting[18]. Supadmi et al. (2024) found a significant association between marital status during pregnancy and childhood stunting (p<0.001), with an Odds Ratio of 1.5 (95% CI:1.461–1.540), indicating that children born to mothers with unfavorable marital status during pregnancy had 1.5 times the odds of stunting compared to those with favorable marital status[15].

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Mother's Weight

Maternal weight during pregnancy reflects nutritional adequacy needed for fetal growth. Low maternal weight may indicate insufficient energy reserves and suboptimal placental support, increasing the risk of impaired growth[23]. In this study, Nakphong and Beltrán-Sánchez (2021) reported a significant association between lower maternal weight and increased risk of childhood stunting (p<0.001), with an Odds Ratio of 1.94, indicating that children born to mothers with lower body weight had 1.94 times the odds of stunting compared to those born to mothers with normal body weight[23].

Vitamin A Supplementation

Insufficient vitamin A during pregnancy can affect fetal growth and increase susceptibility to infections, resulting to stunting. This is because vitamin A is needed for cell differentiation, immunological function, and fetal tissue development[16]. According to Mistry et al. (2019), maternal vitamin A deficiency was associated with childhood stunting (p<0.001), with an Odds Ratio of 1, indicating equal odds of stunting among children of mothers with vitamin A deficiency compared to those without deficiency[16].

Postnatal Care Compliance

Postnatal Care (PNC) supports early maternal and neonatal health through monitoring, breastfeeding counseling, and timely detection of growth concerns[29]. Inadequate PNC can raise the risk of stunting since it can delay the diagnosis of early developmental abnormalities. Chowdury et al. (2024) found that incomplete postnatal care visits were significantly associated with childhood stunting (p<0.001), with an Odds Ratio of 14.2 (95% CI:12.3–16.3), indicating that children who did not complete postnatal care visits had 14.2 times the odds of stunting compared to those who completed postnatal care visits[17].

IPV Vaccination History

IPV immunization during pregnancy plays a crucial role in protecting both the mother and fetus from poliovirus infection and its associated health risks. Incomplete maternal immunization may reflect limited access to preventive healthcare, increasing the risk of maternal infection and potentially compromising fetal growth[17]. Chowdury et al. (2021) observed that incomplete IPV immunization was strongly associated with childhood stunting (p=0.005), with an Odds Ratio of 18.7 (95% CI:17.5–19.9), indicating markedly higher odds of stunting among children who did not complete IPV immunization compared to those who did[17]. In this systematic literature review, maternal immunization history consistently associated with

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stunting was limited to IPV immunization, which likely reflects the availability of evidence rather than excluding the potential role of other maternal vaccines. IPV is often used as an indicator of overall maternal health status and utilization of antenatal and preventive healthcare services. Other maternal vaccinations, such as tetanus toxoid, influenza, and Tdap, are theoretically linked to improved pregnancy outcomes through the prevention of maternal infections; however, among studies meeting the inclusion criteria of this SLR, a direct and consistent association with stunting was not specifically reported.

Anemia During Pregnancy

Maternal anemia, defined by WHO as hemoglobin <11 g/dL, reflects insufficient iron stores to meet pregnancy-related oxygen demands[30]. Growth retardation is more likely as a result of this condition's ability to disrupt fetal growth and placental oxygenation. Pariyana et al. (2021) found a significant association between maternal anemia and childhood stunting (p=0.000), with an Odds Ratio of 9.947, indicating that children born to anemic mothers had 9.947 times the odds of stunting compared to those born to non-anemic mothers[28].

Infections During Pregnancy

Maternal infections during pregnancy can impair fetal growth through systemic inflammation and increased metabolic demands, ultimately reducing nutrient and oxygen delivery to the fetus[28]. Pariyana et al. (2021) highlighted prenatal infection as a biological risk factor for childhood stunting, reporting a significant association between maternal infection during pregnancy and stunting (p=0.000), with an Odds Ratio of 1, indicating equal odds of stunting among children born to mothers with and without prenatal infection[28].

Handwashing Practices After Defecation

Maternal handwashing after defecation is a key hygiene behavior that prevents fecal–oral pathogen transmission and reduces maternal infection[16]. Mistry et al. (2021) identified a significant association between inadequate handwashing practices and childhood stunting (p<0.001), with an Odds Ratio of 1, indicating equal odds of stunting among children exposed to inadequate handwashing behaviors compared to those with adequate practices[16].

Handwashing Practices Before Meal

Maternal handwashing before meals is a fundamental hygiene practice that helps prevent food contamination[16]. In this SLR, Mistry et al. (2021) reported that inadequate handwashing before meals was significantly associated with childhood stunting (p<0.001), with an Odds Ratio of 1, indicating

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equal odds of stunting among children whose caregivers practiced inadequate pre-meal handwashing compared to those with adequate practices[16].

Smoking Behavior

Household smoking during pregnancy can adversely affect fetal growth through maternal hypoxia, oxidative stress, and increased susceptibility to infection, mechanisms that heighten the risk of impaired postnatal linear growth[31]. Nakphong and Beltrán-Sánchez (2021) identified prenatal smoking exposure as a significant risk factor for childhood stunting ($p<0.001$), with an Odds Ratio of 3.01, indicating that children exposed to maternal smoking during pregnancy had 3.01 times the odds of stunting compared to those not exposed[23].

5. CONCLUSION

This review offers important insights; however, several limitations warrant consideration. The majority of research employs cross-sectional designs. This lowers the capacity to generate causal inferences about the association between maternal variables and child developmental impairments. In addition, although the review focuses on Asia, research was concentrated in a limited number of countries, leaving many regions underrepresented and limiting the understanding of broader regional variability.

Overall, there is an association between maternal characteristics and the risk of stunted growth in children in Asia, particularly maternal education level, age, employment status, and maternal height. These findings highlight the significance of interventions targeting mothers within nutrition and public health programs. Nevertheless, further research employing longitudinal designs with wider geographic coverage is needed to strengthen causal inference, standardize assessment methods, and provide a more robust evidence base to inform stunting prevention policies across Asia.

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