

Bridging the Rural Early Childhood Literacy Gap in West Nusa Tenggara, Indonesia: A PRISMA 2020 Systematic Review of Teacher Capacity, Infrastructure, and Parental Expectations

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Abstract

Rural early childhood literacy in Indonesia is often discussed as a problem of classroom instruction, yet the conditions under which young children learn to read extend well beyond the classroom. This systematic review, reported according to PRISMA 2020, synthesises 102 empirical and conceptual studies published between 2015 and 2026 and retrieved from eight databases, with West Nusa Tenggara (NTB) as the contextual focus. Informed by ecological systems, family literacy, digital divide, and school readiness theories, a three-stage thematic synthesis generated seven analytic themes: teacher capacity; educational infrastructure; digital infrastructure and internet access; family literacy; parental expectations; curriculum and pedagogy; and policy, governance, and equity. Across these themes, the review identifies an expectation–capacity gap, in which parents' aspirations for early reading rise faster than the teacher qualifications, physical resources, and connectivity that rural early childhood services can provide. Rather than treating this gap as a deficit of families or teachers, the review reads it as a misalignment within the literacy ecosystem. The Rural Early Childhood Literacy Ecosystem Framework (RECLEF) is proposed as a nine-component conceptual model that organises these relationships and identifies priorities for policy, practice, and empirical testing. RECLEF is a theory-informed synthesis rather than a validated causal model.

1. Introduction

Early literacy has long been understood as a cluster of child-level competencies, including oral language, phonological awareness, print knowledge, letter knowledge, vocabulary, and emergent writing, that grow through instruction and repeated exposure to print (Mason & Allen, 1986; Zettler-Greeley et al., 2025). Ecological accounts have since extended this view by locating literacy development within nested family, school, community, and policy environments (Altun et al., 2018; Jaeger, 2016). Seen from this perspective, a child who arrives at primary school unable to recognise letters is not simply a child who has not been taught; she is a child whose learning environments have not yet been arranged to support her. This shift from the individual learner to the conditions of learning is the starting point of the present review.

The shift matters most where those conditions are least secure. Sustainable Development Goal (SDG) Target 4.2 commits countries to ensuring that all girls and boys have access to quality early childhood development, care, and pre-primary education so that they are ready for primary school (Boeren, 2019). The World Bank's learning-poverty estimates, however, indicate that more than half of ten-year-olds in low- and middle-income countries (LMICs) cannot read and understand a simple text, with the burden falling disproportionately on rural and low-income children (Azevedo et al., 2019). In rural Indonesia, evidence suggests that the sequence and quality of early childhood education (ECE) are associated with later language and mathematics performance, and that early investment can generate longer-term human-capital returns (Heckman, 2007; Kilburn & Karoly, 2008; Nakajima et al., 2019). Nakajima et al. (2019) report language and mathematics gains of approximately 0.42 and 0.43 standard deviations for

children who complete a full ECE pathway [PERLU DIKONFIRMASI: angka efek dan padanan tahun sekolah dicocokkan dengan Nakajima et al., 2019].

The COVID-19 pandemic made the dependence of rural ECE on infrastructure and connectivity painfully visible. A systematic review of Indonesian ECE during the pandemic concluded that online learning was particularly difficult in remote and low-income areas with limited internet access (Gayatri, 2020), and similar disruptions to early literacy programmes were documented elsewhere in the Global South (Dávalos & Alvarado, 2023). Studies of ECE quality further suggest that literacy gains are more likely when instructional quality, teacher–child interaction, dosage, and material conditions together reach a sufficient threshold (von Suchodoletz et al., 2023; Zaslow et al., 2016). Rural literacy readiness is therefore a systemic question, one that involves teachers, classrooms, households, connectivity, and policy at the same time.

Indonesia has built a layered regulatory framework for early childhood education (*Pendidikan Anak Usia Dini*, PAUD), including national PAUD standards, minimum service standards, and the 2022 Independent Curriculum (*Kurikulum Merdeka*) (Lisnawati et al., 2024). Implementation, however, remains uneven across a dispersed archipelago in which geographical conditions, local fiscal capacity, and teacher welfare differ considerably (Agustin, 2025; Ananda et al., 2025; Nirwana et al., 2025; Solihati & Rachmawati, 2020). Rural Indonesian studies continue to document shortages of qualified teachers, libraries, learning materials, and internet access, and link preschool quality with child development (Brinkman et al., 2016, 2017; Kasuba & Hawadi, 2024; Nurcahyoko et al., 2024; Wariningsih & Najiha, 2025), patterns that echo rural–urban literacy divides reported in other LMICs (Ndijuye & Beatus, 2024).

West Nusa Tenggara (*Nusa Tenggara Barat*, NTB), comprising the islands of Lombok and Sumbawa, offers an instructive case. Geographical dispersion, rurality, and infrastructure constraints coexist there with dense kinship networks and rising educational aspirations. Available evidence from NTB points to low levels of formal qualification among early childhood teachers in some districts (Zaenab, 2017) and to persistent reading-literacy challenges in the early grades (Nahdi et al., 2024). At the same time, Indonesian parents increasingly expect children to read and write before entering primary school, and some exert considerable pressure to achieve this (Rosepti et al., 2024). These observations suggest that the difficulty is not only a shortage of resources but also a mismatch between what families hope for and what rural PAUD services are equipped to provide. Rather than treating this mismatch as a failure of parents or teachers, the review approaches it as a property of the wider literacy ecosystem.

Three gaps motivate the review. First, reviews of rural Indonesian ECE have rarely integrated the micro-foundations of literacy readiness, namely teacher capacity, infrastructure, digital access, family literacy, and parental expectations, within one analytical frame. Second, international family-literacy evidence, much of it generated in high-income settings, has not been sufficiently re-contextualised for rural Indonesia. Third, the relationships among these factors and the policy conditions that shape them have seldom been synthesised for NTB, where locally produced evidence remains thin. This systematic review responds to these gaps by synthesising international and Indonesian evidence through an ecological

lens and by proposing the Rural Early Childhood Literacy Ecosystem Framework (RECLEF) as a conceptual model for organising that evidence and setting priorities for empirical testing.

The review addresses four research questions:

- RQ1. Which factors shape literacy readiness in rural early childhood education, particularly teacher capacity, infrastructure, digital access, family literacy, and parental expectations?
- RQ2. How do these school- and home-based factors interact to shape literacy readiness and school readiness in rural PAUD settings?
- RQ3. Which evidence-informed practices and policy approaches are applicable to rural Indonesian ECE, particularly in NTB?
- RQ4. Which evidence gaps and ecosystem priorities remain for improving rural early childhood literacy and educational equity?

2. Literature review

2.1 Teacher capacity and the quality threshold

Teacher capacity is repeatedly identified as a major determinant of ECE quality. A Campbell systematic review links higher teacher qualifications with higher-quality early childhood environments (Manning et al., 2017), and meta-analytic evidence shows that in-service professional development improves the quality of teacher–child interactions (Egert et al., 2020). Qualifications alone, however, do not guarantee learning; gains appear to depend on whether teacher knowledge is translated into responsive interaction and well-structured literacy activity, consistent with a quality-threshold interpretation (von Suchodoletz et al., 2023; Zaslow et al., 2016). In Indonesia, qualifications and access to sustained professional learning remain uneven, especially among non-formal PAUD educators, although studies show that mentoring, peer forums, and practice-based training can strengthen professional competence and assessment practice (Christianti et al., 2025; Palupi & Sugito, 2025). Comparable concerns about kindergarten teachers' professional development needs have been documented elsewhere in Southeast Asia (Bautista et al., 2016).

2.2 Educational and digital infrastructure

Infrastructure includes classrooms, learning materials, libraries, sanitation, play spaces, and the other resources that make instruction possible. Rural Indonesian studies document shortages in these areas and link them with fewer opportunities for meaningful literacy activity (Kasuba & Hawadi, 2024; Muryanti, 2022; Yanthi et al., 2025). Digital inequality adds a further layer. Following van Dijk (2006), the digital divide is better understood as a sequence of access, use, and outcomes than as a single indicator of connectivity. Indonesian evidence identifies connectivity, device availability, teacher digital competence, and technical support as interconnected constraints on digital storytelling and other literacy-supporting practices in rural PAUD (Harahap et al., 2025; Khoiriyah & Werdiningsih, 2025; Rahiem, 2021; Wariningsih

& Najiha, 2025). Similar constraints have been reported in rural India and in other Indonesian regions where digital tools are beginning to enter early literacy instruction (Bera & Bera, 2026; Laksana et al., 2025; Siregar et al., 2025).

2.3 Family literacy and the home learning environment

Family literacy theory positions parents and the home as active contributors to literacy development rather than as background conditions. Sénéchal and LeFevre's home literacy model distinguishes formal activities, in which adults explicitly teach reading and writing, from informal activities such as shared book reading, library visits, and exposure to environmental print; formal activities tend to relate more strongly to code-related skills, whereas informal activities relate more strongly to oral language and vocabulary (Sénéchal & LeFevre, 2014). The model has been extended to digital home literacy environments (Yuan et al., 2024) and examined across linguistic contexts (Alramamneh et al., 2023; Guzmán-Simón et al., 2020). Meta-analyses indicate that structured family-literacy interventions can have positive effects on children's literacy, including among low-SES families (Fikrat-Wevers et al., 2021; Sénéchal & Young, 2008; van Steensel et al., 2011).

Indonesian studies add texture to this picture. Among kindergarteners and parents in Pasuruan, parent–child interaction and home literacy activity predicted early literacy, whereas family socio-cultural values showed no direct effect (Astuti et al., 2025). Narratives from low-income parents reveal both a story of inequality, marked by limited paternal involvement and concerns about school, and a story of hope centred on school–home communication (Pratiwi et al., 2024). Ethnographic and qualitative work in Surabaya and Palembang shows that home literacy practices vary with family beliefs, language practices, and access to literacy media (Hamida et al., 2024; Lestari & Utami, 2023), while village-level programmes suggest that community libraries and parent training can strengthen the home environment (Silawati et al., 2021).

2.4 Parental expectations and the expectation–capacity gap

Parental expectations shape how families invest in children's learning and may structure the home literacy environment (Yuan et al., 2024; Zhang et al., 2023, 2025). In Indonesia, a study of 482 kindergarteners and their parents in Semarang found that parental educational expectations were significantly associated with school readiness, particularly in the academic domain (Setiowati et al., 2026), and a dyadic study of 507 father–mother pairs found that expectations mediated the relationship between parental beliefs and participation in early literacy activities (Solichah & Nawangsari, 2025). Expectations also have a less comfortable side. Some Indonesian parents expect children to read and write before the age of seven and press them to do so in order to avoid the stigma of having a child considered slow (Rosepti et al., 2024), and mothers in Jakarta have been found to emphasise academic preparation over broader developmental readiness (Fridani, 2021). Expectations can therefore act both as a resource and as a source of strain, especially where they exceed what local services can support.

2.5 School readiness, curriculum, and pedagogy

School readiness is multidimensional, encompassing cognitive, language, physical, social-emotional, and approaches-to-learning domains. Indonesian studies provide locally grounded operationalisations of readiness and show that family support and wellbeing are associated with readiness outcomes (Pangestuti et al., 2019; Retnawati et al., 2020; Rochimah et al., 2021; Saputri & Risnawati, 2024). Bioecological readings of readiness emphasise that it is co-produced by children, families, and institutions rather than residing in the child alone (Bratanoto et al., 2022). The review therefore treats literacy readiness as a proximal component of broader school readiness rather than as its synonym. Curriculum and pedagogy mediate how teacher capacity and infrastructure become children's actual literacy experiences. Indonesian evidence supports phonics, storytelling, play-based activities, and integrated approaches when these are adapted to local needs and supported by teacher–parent collaboration (Indriani et al., 2025; Iswara et al., 2026; Nurmahanani et al., 2021; Ratminingsih et al., 2025; Wati & Aulina, 2025; Wijaya, 2025). Comparative Southeast Asian studies suggest that teacher competence, curriculum frameworks, governance, funding, and monitoring contribute to differences in ECE quality across the region (Adriany et al., 2022; Aquino et al., 2017; Falah, 2026; Idrees et al., 2025; Mutalib et al., 2024; Rusydiyah et al., 2022), although these studies offer contextual rather than direct evidence on NTB.

3. Theoretical framework

The review draws on four core theoretical lenses, supported by five complementary perspectives. Together they form an explanatory scaffold that was applied after descriptive coding (see Section 4.6) so that it could interpret, rather than predetermine, the findings.

Ecological systems theory provides the primary contextual lens. It locates children's literacy development within nested microsystems (home, PAUD classroom), mesosystems (home–school links), exosystems (local government, community organisations), and macrosystems (policy and cultural expectations), and it explains why teacher capacity, home literacy, infrastructure, and governance must be read as interacting rather than isolated determinants (Jaeger, 2016; Yang & Sanborn, 2021). **Family literacy theory** positions the home as a co-constructor of emergent literacy, complementing the school literacy environment (Sénéchal & LeFevre, 2014). **Digital divide theory** distinguishes inequalities in access, use, and educational outcomes (van Dijk, 2006), which allows the review to separate digital infrastructure from internet accessibility and from the capacity to use both meaningfully. **School readiness theory** frames readiness as a relationship between children's developing capacities and the demands of school environments, and defines the downstream outcome to which literacy readiness contributes (Pangestuti et al., 2019; Retnawati et al., 2020).

Five supporting perspectives refine this core. Human capital theory explains why early investment can generate cumulative developmental returns and justifies prioritising teacher capacity and early learning resources (Attanasio, 2015; Heckman, 2007). The capability approach shifts attention from the distribution of resources to children's substantive opportunities to convert those resources into meaningful learning (Buzzelli, 2015; Hart & Brando, 2018; Potsi, 2017). The opportunity-to-learn

framework focuses on the content, exposure, and quality of instruction actually available to children (Guiton & Oakes, 1995; Mugendawala & Muijs, 2020; Perry et al., 2024). An educational equity perspective provides the normative basis for differentiated support where starting conditions differ (Guiton & Oakes, 1995). Finally, a teacher professional competence perspective treats competence as an integration of knowledge, instructional skill, values, and engagement that can be cultivated through sustained institutional and peer support (Egert et al., 2020; Palupi & Sugito, 2025).

4. Method

4.1 Design and protocol

This systematic literature review is reported in accordance with the PRISMA 2020 statement (Page et al., 2021) and proceeded through identification, screening, eligibility, and inclusion. The review was conducted under an internal protocol [PERLU DIKONFIRMASI: apakah protokol didaftarkan di PROSPERO/OSF; jika ya, cantumkan nomor registrasi; jika tidak, nyatakan secara eksplisit "the protocol was not prospectively registered"]. Screening and appraisal were conducted by a team of four reviewers, two senior and two junior, with disagreements resolved by a third reviewer [PERLU DIKONFIRMASI: identitas dua peninjau di luar penulis, untuk dicantumkan di Acknowledgements]. A completed PRISMA 2020 checklist is provided as supplementary material [PERLU DIKONFIRMASI: lampirkan checklist PRISMA 2020 27 butir].

4.2 Search strategy

Eight databases were searched: Scopus, Web of Science, ERIC, ScienceDirect, SpringerLink, Wiley Online Library, Taylor & Francis Online, and SAGE Journals. The master search string, written for Scopus, combined early childhood education terms, literacy terms, and rural, Indonesian, or LMIC terms: TITLE-ABS-KEY (("early childhood education" OR "preschool" OR "kindergarten" OR "PAUD" OR "pre-primary") AND ("literacy" OR "emergent literacy" OR "literacy readiness" OR "reading readiness" OR "early reading" OR "phonological awareness" OR "vocabulary") AND ("rural" OR "remote" OR "low-income" OR "developing country" OR "low-and-middle-income" OR "West Nusa Tenggara" OR "Indonesia")) AND PUBYEAR > 2014 AND PUBYEAR < 2027. The string was adapted to the syntax of each database (Table 1). Backward and forward citation chaining was applied to seminal studies identified during the initial searches. All searches were run during 2026 [PERLU DIKONFIRMASI: tanggal pasti penelusuran per basis data dari log arsip].

Table 1
Database search results.

Database	Search string (abridged)	Records retrieved	After deduplication
Scopus	TITLE-ABS-KEY master string	287	254
Web of Science	TS = literacy AND (rural OR Indonesia)	198	174
ERIC	AB = (literacy OR reading) AND (preschool OR ECE)	154	137
ScienceDirect	TITLE-ABS-KEY (preschool AND literacy AND developing country)	132	119
SpringerLink	"early childhood education" AND "literacy readiness"	119	105
Wiley Online Library	"early literacy" AND (rural OR low-income)	98	87
Taylor & Francis Online	"kindergarten" AND "literacy development"	104	92
SAGE Journals	ECE AND literacy AND (family OR parent)	92	82
Total		1,184	1,050
Note. Strings shown are abridged; full database-specific strings are available in the supplementary material.			

4.3 Eligibility criteria

Eligible sources were peer-reviewed empirical studies, systematic or scoping reviews, and conceptual or theoretical articles published in English or Indonesian between 2015 and 2026. Each had to include an explicit ECE or PAUD component (ages 3–6) and to examine literacy, language, school readiness, teacher capacity, infrastructure, information and communication technology (ICT), family literacy, or parental expectations. Studies from rural, urban, or mixed LMIC settings were included when the mechanism they examined was structurally relevant to rural LMIC contexts; studies from high-income countries were retained only when the mechanism was plausibly transferable. Seminal theoretical works published before 2015 were exempted from the publication window. The full criteria are presented in Table 2.

Table 2
Eligibility criteria.

Inclusion criteria	Exclusion criteria
Peer-reviewed empirical articles, systematic or scoping reviews, and conceptual or theoretical articles	Grey literature, except reports from UN agencies, UNESCO, UNICEF, the World Bank, and the OECD
Published in English or Indonesian	Studies focused exclusively on secondary or higher education
Focus on ECE, pre-primary, kindergarten, or PAUD (ages 3–6), or an explicit ECE intervention component	Studies without literacy, language, or school readiness content
Published 2015–2026 (seminal theoretical works exempted)	Non-peer-reviewed reports
Examination of literacy, language, school readiness, teacher capacity, infrastructure, ICT, family literacy, or parental expectations	Studies outside the publication window (except seminal theoretical works)
Conducted in rural, urban, or mixed LMIC settings, or in high-income settings with transferable implications for LMICs	

4.4 Screening and selection

Records were managed and screened in Rayyan (Ouzzani et al., 2016). The searches yielded 1,184 records. After 134 duplicates were removed, 1,050 records were screened by title and abstract, of which 312 were excluded. The remaining 738 full-text reports were assessed for eligibility, and 636 were excluded for the following reasons: wrong population ($n = 246$), insufficient ECE literacy content ($n = 178$), non-peer-reviewed status ($n = 89$), non-rural or non-LMIC focus without transferable mechanism ($n = 73$), and publication outside the review window ($n = 50$). The final synthesis included 102 studies (Fig. 1). Inter-rater agreement was $\kappa = .87$ at title and abstract screening and $\kappa = .84$ at full-text eligibility.

4.5 Quality appraisal

Two reviewers independently appraised the 102 studies using the Mixed Methods Appraisal Tool (MMAT) version 2018 (Hong et al., 2018) and the relevant JBI critical appraisal checklists. Sixty-seven studies were rated as high quality, 28 as moderate, and seven as low quality; inter-rater agreement for appraisal was $\kappa = .83$. Low-quality studies were retained for their contextual contribution but were not used as the sole basis for any central conclusion. A qualitative sensitivity check, in which each analytic theme was re-examined after setting aside the seven low-quality studies, indicated that all themes remained supported by moderate- and high-quality evidence (Table 3).

Table 3
Qualitative sensitivity check excluding the seven low-quality studies.

Analytic theme	Support after excluding low-quality studies	Interpretive conclusion
Teacher capacity	Retained in higher-quality evidence	Low-quality studies add context but are not the sole basis
Educational infrastructure	Retained in higher-quality evidence	Core infrastructure pattern remains supported
Digital infrastructure and internet	Retained in higher-quality evidence	Connectivity and digital-capacity constraints remain supported
Family literacy	Retained in higher-quality evidence	Home-literacy mechanisms remain supported
Parental expectations	Retained in higher-quality evidence	Expectation–capacity interpretation remains supported
Curriculum and pedagogy	Retained in higher-quality evidence	Instructional implications remain supported
Policy, governance, and equity	Retained in higher-quality evidence	Equity and governance implications remain supported
Note. [PERLU DIKONFIRMASI: daftar tujuh studi berkualitas rendah sebaiknya dicantumkan di materi tambahan].		

4.6 Data extraction and synthesis

Two reviewers independently extracted author, year, country and setting, design, sample, theoretical framework, key findings, quality rating, and relevance to the emerging framework. Where mixed-methods studies reported qualitative and quantitative strands separately, these were extracted separately; systematic reviews were treated as secondary evidence rather than as independent primary samples.

Synthesis followed the three-stage thematic synthesis approach described by Thomas and Harden (2008). In the first stage, findings were coded line by line; in the second, codes were grouped into descriptive themes; and in the third, descriptive themes were interpreted through the theoretical scaffold to generate analytic themes. Coding was supported by NVivo 14, and pilot coding of a 20% random subset produced $\kappa = .86$. The scaffold was applied only after descriptive coding to reduce confirmation bias and to preserve findings that did not fit the initial framework. Because designs, outcomes, measures, and contexts were heterogeneous, reported effect sizes were synthesised narratively and used to corroborate, rather than statistically pool, the thematic conclusions.

5. Results

5.1 Characteristics of the included studies

The 102 included studies were published between 2015 and 2026, with the majority appearing after 2020. They comprise 49 qualitative studies (48.0%), 23 quantitative studies (22.5%), 19 mixed-methods studies (18.6%), and 11 systematic reviews (10.8%). Fifty-one studies were conducted in Asia, including 19 in Indonesia, of which four were situated in NTB; the remainder were distributed across Europe, North America, Oceania, Africa, and cross-continental samples. The temporal profile shows a shift from foundational descriptive work (2015–2018) through a period dominated by family literacy and pandemic-related studies (2019–2022) to a more recent concentration on the digital divide and parental expectations (2023–2026) (Table 4). Selected studies that anchor the synthesis are summarised in Table 5.

Table 4
Temporal and methodological profile of the included studies (N = 102).

Period	Studies, n (%)	Dominant focus	Qual.	Quant.	Mixed	SR
2015–2018	21 (20.6)	Foundational, descriptive	14	5	2	0
2019–2022	38 (37.3)	Family literacy; COVID-19	13	5	14	6
2023–2026	43 (42.2)	Digital divide; parental expectations	22	13	3	5
Total	102 (100)		49	23	19	11
Note. Qual. = qualitative; Quant. = quantitative; SR = systematic review. [PERLU DIKONFIRMASI: daftar empat studi NTB dan persentase publikasi per periode dari matriks ekstraksi].						

Table 5
Characteristics of selected included studies.

Study	Country	Design	Sample / setting	Key finding	RECLEF
Brinkman et al. (2017)	Indonesia	Multilevel cross-sectional	303 rural villages	Preschool quality associated with child development	A, C
Christianti et al. (2025)	Indonesia	Community-service programme	20 PAUD; 33 teachers	Teachers' literacy-assessment competence rose from 58% to 88%	A
Manning et al. (2017)	International	Campbell systematic review	48 studies	Teacher qualification associated with ECEC quality	A
Egert et al. (2020)	International	Meta-analysis	In-service PD studies	PD improves teacher–child interaction quality	A, B
von Suchodoletz et al. (2023)	International	Meta-analysis	185 articles	ECEC quality associated with child outcomes	B
Kasuba & Hawadi (2024)	Indonesia	SDA [PERLU DIKONFIRMASI]	North Maluku	Single classroom, no library	C
Khoiriyah & Werdiningsih (2025)	Indonesia	Mixed methods	100 teachers	80% use technology; 62% report resource needs	D, E
Rahiem (2021)	Indonesia	Conceptual	–	Digital storytelling constrained by unequal connectivity	D, E
Wariningsih & Najiha (2025)	Indonesia	Qualitative	4 PAUD, Temanggung highlands	Limited digital resources constrain transformation	D, E

Note. RECLEF components: A = teacher capacity; B = teaching quality; C = educational infrastructure; D = digital infrastructure; E = internet accessibility; F = family literacy; G = parental expectations; H = community engagement; I = government support. APIMeM = actor–partner interdependence mediation model; ECEC = early childhood education and care; HLE = home literacy environment; PD = professional development; SEM = structural equation modelling; SLR = systematic literature review.

Study	Country	Design	Sample / setting	Key finding	RECLEF
Astuti et al. (2025)	Indonesia	Regression	100 children and parents, Pasuruan	Parent–child interaction and home literacy activity predict early literacy	F
Pratiwi et al. (2024)	Indonesia	Narrative inquiry	10 low-income parents	Narratives of inequality and hope	F, H
Hamida et al. (2024)	Indonesia	Ethnography	6 families, Surabaya	Home language and literacy socialisation	F
Lestari & Utami (2023)	Indonesia	Qualitative	4 families, Palembang	Inclusion-based early literacy practices	F
Sénéchal & Young (2008)	International	Meta-analysis	16 studies, K–Grade 3	Family literacy interventions support reading acquisition	F
Fikrat-Wevers et al. (2021)	International	Meta-analysis	Low-SES families	Positive effects on emergent literacy	F
Yuan et al. (2024)	China	Quantitative	Kindergartners	Traditional and digital HLE both matter	D, F
Zhang et al. (2023)	China	Multigroup SEM	553 kindergartners, urban and rural	Distal and proximal parental factors significant	F, G
Zhang et al. (2025)	China	SEM	235 children	Expectations → HLE → comprehension	F, G
Setiowati et al. (2026)	Indonesia	Survey	482 children and 482 parents	Expectations associated with school readiness	G
Solichah & Nawangsari (2025)	Indonesia	Dyadic (APIMeM)	507 father–mother dyads	Expectations mediate literacy participation	G
Note. RECLEF components: A = teacher capacity; B = teaching quality; C = educational infrastructure; D = digital infrastructure; E = internet accessibility; F = family literacy; G = parental expectations; H = community engagement; I = government support. APIMeM = actor–partner interdependence mediation model; ECEC = early childhood education and care; HLE = home literacy environment; PD = professional development; SEM = structural equation modelling; SLR = systematic literature review.					

Study	Country	Design	Sample / setting	Key finding	RECLEF
Pangestuti et al. (2019)	Indonesia	Qualitative	83 teachers and parents	Holistic view of school readiness	Outcome
Saputri & Risnawati (2024)	Indonesia	Correlational	139 children	Family support associated with readiness	F
Rochimah et al. (2021)	Indonesia	Path analysis	Children and families	Family factors influence readiness	F
Iswara et al. (2026)	Indonesia	Mixed methods	90 students; 9 teachers	READI model supports foundational reading	B
Indriani et al. (2025)	Indonesia	SLR	20 articles	Phonics supports early literacy	B
Wati & Aulina (2025)	Indonesia	Qualitative	Kindergarten	Play-based literacy builds language foundations	B
Nurmahanani et al. (2021)	Indonesia	Ethnography	Private primary school, Bandung	Early reading practices	B
Idrees et al. (2025)	South & SE Asia	Comparative policy	6 countries	ECE policy differences	I
Rusydiyah et al. (2022)	SE Asia	Comparative	Singapore, Malaysia, Indonesia	Literacy policy differences	I
Adriany et al. (2022)	SE Asia	Comparative case	4 countries	Neoliberal legacies in ECE	I
Falah (2026)	ASEAN	Policy analysis	Cross-national	Structural disparities persist	I

Note. RECLEF components: A = teacher capacity; B = teaching quality; C = educational infrastructure; D = digital infrastructure; E = internet accessibility; F = family literacy; G = parental expectations; H = community engagement; I = government support. APIMeM = actor-partner interdependence mediation model; ECEC = early childhood education and care; HLE = home literacy environment; PD = professional development; SEM = structural equation modelling; SLR = systematic literature review.

5.2 Factors shaping rural literacy readiness (RQ1)

Seven analytic themes emerged from the synthesis (Table 6). They are presented below with their principal empirical anchors.

Table 6
Coding framework and thematic mapping.

Analytic theme	Exemplar codes	Descriptive theme	Theoretical lens	RECLEF
1. Teacher capacity	Qualification; professional development; mentoring; digital competence	Teacher quality and professional support	Ecological systems; teacher competence	A–B
2. Educational infrastructure	Classrooms; libraries; learning materials; play spaces	Physical learning conditions	Opportunity to learn; capability	C
3. Digital infrastructure and internet access	Devices; connectivity; digital skills; technical support	Digital access, use, and benefit	Digital divide	D–E
4. Family literacy	Parent–child interaction; shared reading; home resources	Home literacy environment	Family literacy; ecological systems	F
5. Parental expectations	Aspiration; school-readiness pressure; parental participation	Expectation–capacity alignment	Family literacy; school readiness	G
6. Curriculum and pedagogy	Phonics; storytelling; play; instructional materials	Developmentally appropriate literacy instruction	Opportunity to learn; school readiness	B
7. Policy, governance, and equity	Funding; standards; coordination; differentiated support	Structural enabling conditions	Capability; equity	H–I

Theme 1: Teacher capacity and qualification. Teacher capacity was the most consistently documented determinant across the corpus. Higher qualifications and sustained professional development were associated with better ECE quality and richer teacher–child interaction (Egert et al., 2020; Manning et al., 2017), whereas Indonesian evidence showed persistent gaps in qualification, welfare, and access to professional learning (Agustin, 2025; Nurkolis et al., 2023; Palupi & Sugito, 2025). Encouragingly, practice-based programmes appear able to shift teacher competence within a short period; in one community-service programme, teachers' literacy-assessment competence rose from 58% to 88% (Christianti et al., 2025). The synthesis therefore positions teacher capacity as an upstream condition that shapes how curriculum, infrastructure, and family engagement are translated into children's experience.

Theme 2: Educational infrastructure. Infrastructure deficits included limited classrooms, libraries, learning materials, and play resources. In parts of rural Indonesia, PAUD services operate in a single room without a library (Kasuba & Hawadi, 2024), and the lack of print-rich environments narrows children's opportunities to encounter written language (Muryanti, 2022; Yanthi et al., 2025). Indicative contrasts between urban and rural NTB settings are summarised in Table 7. Read through the

opportunity-to-learn lens, these deficits matter less as missing objects than as missing occasions for literacy.

Table 7
Indicative infrastructure and home-literacy indicators: urban and rural NTB contexts.

Indicator	Urban (e.g. Jakarta)	Rural NTB	Notes
Teachers with S1/D-IV qualification	High proportion	Below 50% in some districts (Zaenab, 2017)	Shortage of qualified teachers (Ananda et al., 2025)
Internet connectivity in schools	Approximately 80%†	Limited	ECE not prioritised in connectivity programmes
Library access in PAUD	Common	Limited	Substantial gap (Kasuba & Hawadi, 2024)
Child–teacher ratio	15:1†	High	Above national standard
Print-rich home environment	Variable	Limited	Constrained by socio-economic status
Frequency of home reading	Daily	Less frequent	Family literacy gap
Note. † [PERLU SUMBER: angka 80% dan rasio 15:1 belum disertai rujukan; tambahkan sumber atau ganti dengan deskripsi kualitatif].			

Theme 3: Digital infrastructure and internet accessibility. The digital theme covered connectivity, device access, teacher digital competence, and educational benefit. Indonesian studies consistently identified gaps in rural connectivity, devices, and technical support (Harahap et al., 2025; Rahiem, 2021; Wariningsih & Najiha, 2025). Even where technology was used, teachers reported needing more appropriate resources (Khoiriyah & Werdiningsih, 2025). Consistent with van Dijk's (2006) access–use–outcome sequence, the evidence indicates that connectivity is a necessary but insufficient condition: digital resources support literacy only when teachers can use them purposefully.

Theme 4: Family literacy and the home learning environment. Home literacy practices were associated with early literacy across cultural contexts, but their form varied with family beliefs, communication patterns, material resources, and access to literacy media (Astuti et al., 2025; Hamida et al., 2024; Lestari & Utami, 2023). International meta-analyses indicate that structured family-literacy programmes can benefit children, including those from low-SES households, although effects vary by programme type and context (Table 8). Community libraries, literacy programmes, and parent training appear to strengthen the home environment in Indonesian villages (Silawati et al., 2021), and extended family members often participate in children's literacy support (Pratiwi et al., 2024).

Table 8
Selected meta-analyses of family literacy interventions.

Study	Studies included	Population / focus	Reported effect
Fikrat-Wevers et al. (2021)	48 [PERLU DIKONFIRMASI]	Low-SES families; emergent literacy	Significant positive effect on literacy skills
Sénéchal & Young (2008)	16	Kindergarten to Grade 3 reading	Effects vary by intervention type
Petersen-Brown et al. (2024)	68 [PERLU DIKONFIRMASI]	Caregiver-implemented home literacy	Multiple significant effects
Dahl-Leonard et al. (2025)	22	Family-implemented interventions, school-aged children	Significant effects
van Steensel et al. (2011)	30	Family literacy programmes	Small but significant mean effect across contexts

Theme 5: Parental expectations and the expectation–capacity gap. Parental expectations were associated with school readiness and with participation in early literacy activities (Setiowati et al., 2026; Solichah & Nawangsari, 2025), and Chinese studies modelled expectations as operating partly through the home literacy environment (Zhang et al., 2023, 2025). Indonesian evidence also revealed pressure to achieve reading and writing before primary school, particularly where parents perceived school capacity as insufficient (Fridani, 2021; Rosepti et al., 2024). Expectations thus emerged as a resource that can become misaligned with institutional capacity, a pattern the review terms the expectation–capacity gap.

Theme 6: Curriculum, pedagogy, and instructional materials. The evidence supports phonics, storytelling, play-based activities, and integrated approaches when these are adapted to local needs and accompanied by teacher preparation and family engagement (Indriani et al., 2025; Ratminingsih et al., 2025; Wati & Aulina, 2025). The READI model illustrates how phonological instruction, learner engagement, and sociocultural support can be combined across diverse Indonesian contexts (Iswara et al., 2026), while school-based literacy programmes in rural primary schools suggest the value of continuity across the PAUD–primary transition (Wijaya, 2025).

Theme 7: Policy, governance, and equity. Policy determines teacher standards, infrastructure financing, curriculum expectations, and the distribution of support. Indonesian evidence indicates that the equity effects of national regulation remain uneven because geography and regional capacity differ (Ananda et al., 2025; Nurkolis et al., 2023), and comparative Southeast Asian studies show how governance and funding arrangements shape ECE quality across the region (Table 9). The synthesis therefore links literacy improvement with differentiated investment and coordinated governance rather than with uniform allocations.

Table 9
Indicative cross-national comparison of rural ECE literacy determinants.

Country	Teacher qualification standard	Internet connectivity in ECE	Family literacy programmes	Curriculum standardisation	Parental expectation intensity
Indonesia (urban)	S1/D-IV	High	Moderate	High	High
Indonesia (rural/NTB)	Below S1 for many teachers (Zaenab, 2017)	Very low (Wariningsih & Najiha, 2025)	Limited	Variable	High (Rosepti et al., 2024)
Malaysia	Diploma minimum	High	Established	High	Moderate
Philippines	BSEd minimum	Moderate	Limited	High	Moderate
Vietnam	Variable	Moderate	Emerging	Moderate	Moderate
China (urban/rural)	Qualified	High in urban; lower in rural	Established	High	Very high (Zhang et al., 2025)
India (rural)	Variable	Variable (Bera & Bera, 2026)	Limited	Variable	High
Zambia	Variable	Very low	Limited	Moderate	Moderate
Note. Ratings are the authors' qualitative judgements derived from the included studies and comparative sources (Aquino et al., 2017; Idrees et al., 2025; Mutalib et al., 2024; Rusydiyah et al., 2022). They are indicative rather than measured. [PERLU DIKONFIRMASI: sumber untuk sel tanpa sitasi, khususnya Malaysia, Filipina, Vietnam, dan Zambia; atau pindahkan tabel ini ke materi tambahan].					

5.3 How school- and home-based factors interact (RQ2)

Across the seven themes, the clearest recurring pattern was relational rather than additive. School-based conditions (teacher capacity, teaching quality, infrastructure, and connectivity) and home-based conditions (family literacy practices and parental expectations) did not operate as separate channels. Instead, the evidence suggests that each conditions the effectiveness of the other. Parents' expectations shaped how they organised home literacy activity (Solichah & Nawangsari, 2025; Zhang et al., 2025), but where PAUD services lacked qualified teachers and materials, those expectations tended to be expressed as pressure for early formal reading rather than as rich, informal literacy engagement (Fridani, 2021; Rosepti et al., 2024). Conversely, teachers' ability to sustain developmentally appropriate pedagogy depended partly on whether families understood and supported it (Pratiwi et al., 2024; Wati & Aulina, 2025).

This interaction is captured by the expectation–capacity gap: parental aspirations for early literacy appear to rise faster than the teacher qualifications, physical resources, and digital access available to rural PAUD services. The gap was supported by moderate- and high-quality evidence across all relevant themes, and the sensitivity check confirmed that none of the analytic themes depended solely on low-quality studies (Table 3).

6. The Rural Early Childhood Literacy Ecosystem Framework

6.1 Framework architecture

Drawing on the seven themes and their interactions, RECLEF is proposed as a nine-component conceptual architecture that links structural determinants with literacy-readiness outcomes (Fig. 2). The components are as follows: (A) teacher capacity, comprising qualification, content knowledge, pedagogical skill, and reflective practice; (B) teaching quality, the proximal layer through which teacher capacity becomes teacher–child interaction and instruction; (C) educational infrastructure, including classrooms, libraries, learning materials, sanitation, and play spaces; (D) digital infrastructure, including devices, applications, and age-appropriate digital resources; (E) internet accessibility, the connectivity that enables digital practice; (F) family literacy, comprising parent–child interaction, formal and informal home literacy activities, and home reading resources; (G) parental expectations, the beliefs and aspirations that shape home investment; (H) community engagement, the links among PAUD services, families, local cultural resources, and community organisations; and (I) government support, including funding, accreditation, curriculum standards, and intergovernmental coordination. The downstream outcomes are literacy readiness and school readiness, with educational equity as the overarching outcome.

6.2 Relational propositions

The framework's relational logic is expressed here as propositions to be tested rather than as established causal pathways. First, teacher capacity (A) is likely to improve teaching quality (B) most when it is supported by adequate educational infrastructure (C). Second, in the contemporary literacy environment, digital infrastructure (D) contributes to learning only when internet accessibility (E) and teachers' digital competence are also present. Third, family literacy (F) operates as a parallel, home-based mechanism whose form is shaped by parental expectations (G). Fourth, community engagement (H) connects school-based and home-based mechanisms, and may help translate parental aspirations into developmentally appropriate home practice. Fifth, government support (I) establishes the structural conditions for all upstream components. The expectation–capacity gap, located at the intersection of A–C and G, is proposed as the central leverage point for rural intervention.

7. Discussion

This review set out to understand why rural early childhood literacy in NTB remains fragile despite an expanding regulatory framework and rising family aspirations. Rather than locating the problem in children, parents, or teachers individually, the synthesis points to misalignments within the literacy ecosystem. Three interpretations follow.

The first concerns the expectation–capacity gap. Parental pressure for early reading is often described as a misunderstanding of developmentally appropriate practice. The evidence reviewed here invites a more generous reading. In communities where primary schooling is viewed as a gateway to mobility, and where PAUD services are perceived as under-resourced, pressing a child to read early can be an act of care and of social investment (Pratiwi et al., 2024; Rosepti et al., 2024; Setiowati et al., 2026). The difficulty arises when that care meets services that cannot offer an alternative, play-based route to literacy that parents can see and trust. Read this way, the gap is not a deficit of families but a signal that institutional capacity has not kept pace with what families want for their children. This interpretation resonates with critical accounts of how market-oriented pressures shape early childhood provision in Southeast Asia (Adriany et al., 2022) and with the tension between academic preparation and holistic readiness reported among Indonesian mothers (Fridani, 2021).

The second interpretation extends ecological models of literacy. Bioecological accounts have long emphasised nested systems (Jaeger, 2016; Yang & Sanborn, 2021), but they have rarely distinguished digital infrastructure from connectivity, or connectivity from meaningful use. The rural Indonesian evidence suggests that these are distinct layers, each capable of failing independently (Khoiriyah & Werdiningsih, 2025; Wariningsih & Najiha, 2025), and that digital inclusion therefore belongs within the ecosystem rather than beside it (van Dijk, 2006). Similarly, the synthesis positions community engagement as a structural connector rather than a peripheral asset. Extended families, village reading houses, and local storytelling traditions emerged as resources through which school and home can be brought into conversation (Pratiwi et al., 2024; Silawati et al., 2021). For NTB, where kinship networks remain strong, such resources constitute local knowledge that can refine, rather than merely receive, frameworks developed elsewhere.

The third interpretation concerns thresholds. The international evidence suggests that ECE quality must reach a sufficient level before literacy gains become visible (von Suchodoletz et al., 2023; Zaslow et al., 2016). In rural NTB, this implies that isolated investments, such as distributing devices without strengthening teachers or building classrooms without supporting families, may fail to cross that threshold. The synthesis therefore supports coordinated rather than sequential intervention, consistent with the opportunity-to-learn argument that equality of resources does not guarantee equality of learning opportunity (Guiton & Oakes, 1995; Perry et al., 2024).

Taken together, the review contributes to debates on rural early literacy in three ways. It integrates teacher capacity and parental expectations as co-equal upstream conditions rather than treating one as context for the other; it separates digital infrastructure, connectivity, and digital use within an ecological model; and it frames educational equity as a primary outcome rather than a contextual modifier. These

contributions remain conceptual. RECLEF is a theory-informed synthesis whose propositions require empirical testing in rural NTB.

8. Implications for policy and practice (RQ3)

The implications below are evidence-informed priorities rather than tested intervention effects (Tables 10 and 11). At the national level, the synthesis supports strengthening qualification pathways and sustained, practice-based professional development for rural PAUD teachers, building on evidence that mentoring, peer forums, and structured training can raise teacher competence (Christianti et al., 2025; Palupi & Sugito, 2025). Provincial and district governments in NTB could prioritise minimum physical and digital infrastructure standards for rural PAUD, informed by documented deficits in comparable regions (Kasuba & Hawadi, 2024; Wariningsih & Najiha, 2025), and could support village reading houses and community library networks (Silawati et al., 2021). Teacher-education institutions are well placed to offer structured modules that combine phonics-based early reading, family-literacy coaching, and ICT-integrated pedagogy (Indriani et al., 2025; Iswara et al., 2026).

For PAUD providers and teachers, the evidence supports integrated pedagogy that combines phonological work with storytelling, picture cards, and play (Wati & Aulina, 2025), together with observational assessment of readiness (Retnawati et al., 2020) and participation in professional learning communities. For principals and parents, regular family-literacy sessions and clear school–home communication may help translate parental aspirations into structured but developmentally appropriate home routines (Astuti et al., 2025; Setiowati et al., 2026). Communities, non-governmental organisations, and universities can contribute through community reading corners, storytelling drawn from local wisdom, and research–practice partnerships that co-design and evaluate interventions aligned with RECLEF components. Implementation should be locally adapted and monitored through indicators of teacher participation, opportunity to learn, infrastructure, family engagement, and child literacy readiness. The alignment of RECLEF components with SDG targets is presented in Table 12.

Table 10
Analytic themes and implications for RECLEF components.

Theme	Empirical anchor	Implication	RECLEF
Teacher capacity	Teacher qualification associated with ECEC quality (Manning et al., 2017)	Pre-service and in-service teacher development cycles	A
Curriculum and pedagogy	READI model gains across settings (Iswara et al., 2026)	Structured, play-informed literacy curriculum	B
Educational infrastructure	Single classroom, no library (Kasuba & Hawadi, 2024)	Provincial infrastructure grants for rural PAUD	C
Digital infrastructure	Large numbers of unconnected schools (Rahiem, 2021)†	Rural connectivity programme including PAUD	D–E
Family literacy	Parent–child interaction predicts literacy (Astuti et al., 2025)	Family literacy mobilisation programme	F
Parental expectations	Expectations associated with readiness (Setiowati et al., 2026)	Expectation–capacity alignment through parent dialogue	G
Policy and equity	Equity gaps persist despite regulation (Ananda et al., 2025)	Equity-targeted special allocation fund (DAK) line	I
Note. † [PERLU DIKONFIRMASI: angka "80.000 sekolah tidak terhubung" dalam naskah lama tidak dapat dipastikan berasal dari Rahiem (2021); periksa sumbernya].			

Table 11
Policy and practice recommendations for rural early childhood literacy in NTB.

Recipient	Recommendation	RECLEF
Ministry of Primary and Secondary Education	Strengthen qualification pathways for PAUD teachers, linked to incentives and structured in-service development in phonics, home-literacy coaching, and parental engagement	A, B
Provincial Government of NTB	Allocate a dedicated physical and digital infrastructure grant line for rural PAUD, aligned with the existing special allocation fund (DAK)	C, D, E
District governments	Conduct infrastructure audits and establish local print-rich library networks based on village reading-house models	C, F
Teacher-education institutions	Offer structured multi-session modules on phonics-based early reading, family-literacy coaching, expectation alignment, and ICT-integrated pedagogy	A, B, G
PAUD providers	Adopt integrated curricula combining phonological, engagement, and sociocultural elements (e.g. the READI model)	B, F
Principals	Hold regular family-literacy sessions and formalise school-home agreements	F, G
Teachers	Integrate phonics, storytelling, and picture cards; join professional learning communities	B
Parents	Join family-literacy workshops and establish regular, play-based home literacy routines	F, G
Local communities	Establish community reading corners and storytelling drawn from local wisdom	F, H
NGOs and universities	Build research-practice partnerships and co-design evaluations aligned with RECLEF	A, F, H

Table 12
Alignment of RECLEF components with SDG targets.

RECLEF component	SDG target	Specific mapping
A. Teacher capacity	4.c	Teacher qualification and professional development
B. Teaching quality	4.2	Developmentally appropriate, quality instruction
C. Educational infrastructure	4.a	Safe, inclusive, and effective learning facilities
D. Digital infrastructure	9.c	Digital resources and infrastructure
E. Internet accessibility	9.c	Affordable and reliable connectivity
F. Family literacy	4.2	Home literacy support for quality pre-primary education
G. Parental expectations	4.5	Reducing inequities associated with socio-economic conditions
H. Community engagement	4.5; 10.2	Participation and inclusion
I. Government support	4.5; 10.2	Policy, funding, coordination, and equity

9. Evidence gaps and future research (RQ4)

The synthesis reveals a striking scarcity of locally produced evidence (Table 13). Only four of the 102 studies were situated in NTB, and none examined rural NTB PAUD through longitudinal, experimental, or quasi-experimental designs. Future research should prioritise longitudinal cohort studies of rural NTB children, trials of teacher-development and connectivity interventions, community-based family-literacy programmes, and studies of expectation–capacity alignment. Because RECLEF posits interacting rather than independent pathways, such studies should test combined as well as single-component interventions and document the implementation conditions that make them feasible and sustainable. Research designs that involve teachers, parents, and community members as co-researchers would also help ensure that the framework is refined by those whose lives it describes.

Table 13
Evidence gaps identified in the synthesis.

Gap	Existing coverage	Description
NTB-specific rural ECE literacy data	Limited	Very few ECE-focused studies; broader NTB ECE literacy data absent
Longitudinal NTB cohort study	Absent	No longitudinal, RCT, or quasi-experimental cohort study in rural NTB ECE
Teacher-effectiveness intervention in NTB	Absent	No experimental study of teacher professional development in rural NTB
Internet accessibility intervention	Absent	No RCT or quasi-experimental study of rural internet provision for ECE
Family literacy efficacy in NTB	Absent	Indonesian family-literacy trials have not tested rural NTB
Parental expectation alignment	Absent	No expectation–capacity alignment research in rural Indonesian ECE
Curriculum and ICT integration	Limited	Few trials of integrated curriculum and ICT in rural Indonesian ECE
Multi-component interventions	Absent	No documented multi-component intervention study in NTB

10. Limitations

Several limitations should be borne in mind. The restriction to English and Indonesian may have omitted relevant studies in other languages, and the restriction to peer-reviewed sources excluded implementation evidence from grey literature and theses. The selection of databases may have introduced database-selection and publication bias. Including rural, urban, mixed-LMIC, and transferable high-income studies broadened the evidence base but limits direct generalisation to rural NTB, and combining empirical and conceptual literature increased heterogeneity. Effect sizes were not pooled because outcome measures, designs, and contexts were too heterogeneous for a defensible meta-analysis. Although coding began inductively, the subsequent interpretation through a theoretical scaffold remains subject to the reviewers' judgement. Finally, RECLEF has not yet been empirically validated in rural NTB PAUD settings and should be read as a theory-informed synthesis rather than a causal model.

11. Conclusion

This PRISMA 2020 review synthesised 102 empirical and conceptual studies to examine rural early childhood literacy, with West Nusa Tenggara as its contextual focus. Seven themes, namely teacher capacity, educational infrastructure, digital infrastructure and connectivity, family literacy, parental expectations, curriculum and pedagogy, and policy and equity, converge on an ecosystem interpretation

in which children's literacy opportunities are shaped by the interaction of school, home, community, and state. The strongest recurring pattern is an expectation–capacity gap, in which parents' aspirations for their children outpace the institutional resources available to support developmentally appropriate literacy learning. RECLEF organises these findings into nine components and a set of testable propositions. The framework does not claim causal validity; rather, it offers a map of where evidence is strong, where it is thin, and where coordinated action is most likely to matter. Closing the rural literacy gap in NTB appears to depend less on discovering new knowledge than on aligning what is already known with the realities of rural kindergartens, households, and communities, and on listening to the teachers and families who live those realities every day.

Declarations

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Data availability statement

All data analysed in this review were obtained from published, peer-reviewed sources. No new data were generated. The data-extraction matrix and full database-specific search strings are available from the

corresponding author upon reasonable request.

Ethical approval

Ethical approval was not required because this review used only published literature and involved no human participants, personal data, or animals.

Author contributions (CRediT)

M. A. Muazar Habibi: Conceptualisation, Methodology, Investigation, Data curation, Formal analysis, Writing – original draft, Writing – review and editing. Jundu Muhammad Mufakkirul Islami: [PERLU DIKONFIRMASI: peran CRediT penulis kedua]. Both authors approved the final manuscript.

Use of generative AI

Generative AI tools were used for language refinement, structural editing, consistency checking, and formatting. The authors retained full responsibility for the research questions, evidence selection, appraisal, interpretation, synthesis, references, and final text. No AI-generated data or references were used.

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Figures

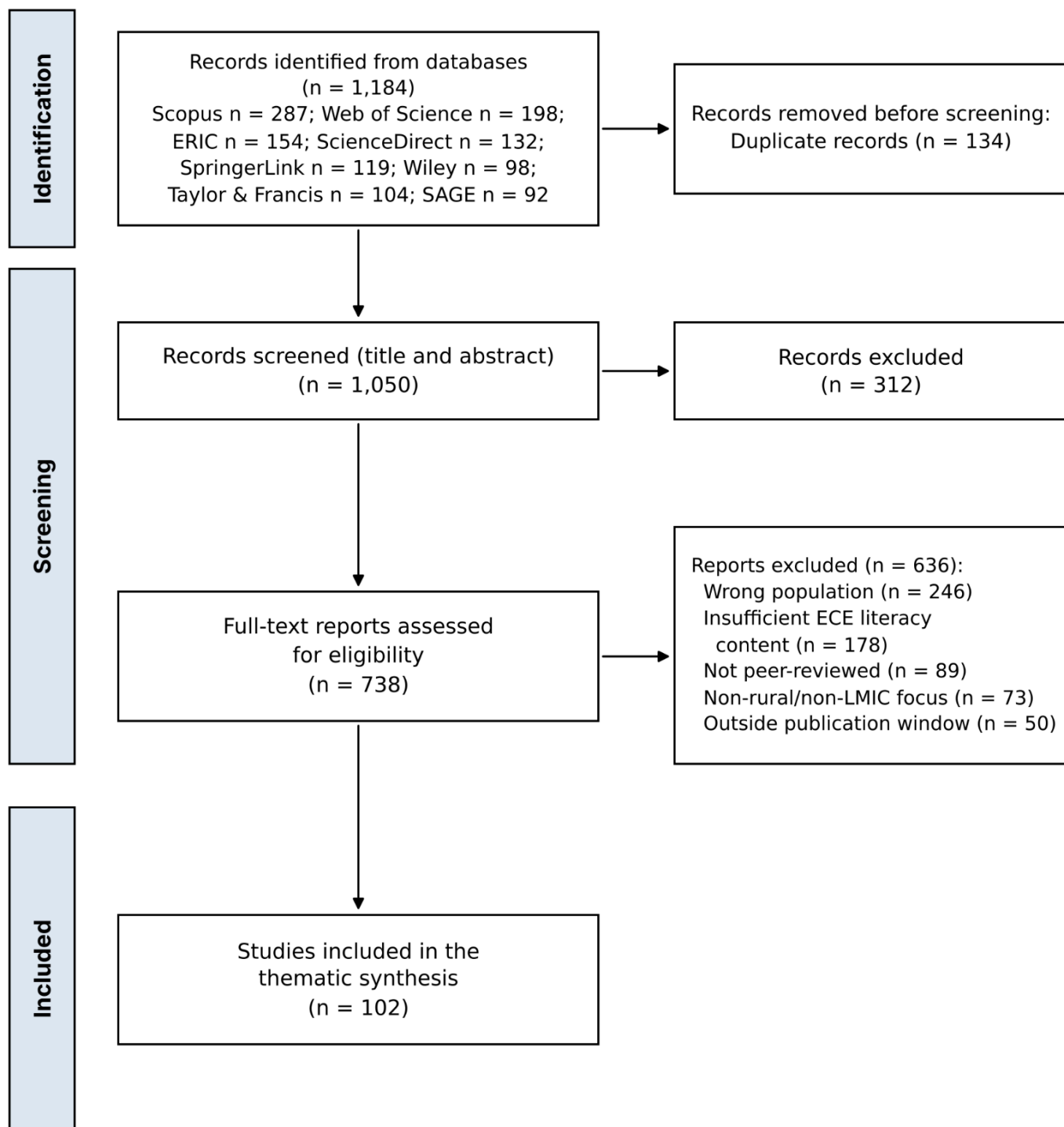


Figure 1

PRISMA 2020 flow diagram of study selection.

RECLEF Conceptual Framework

Rural Early Childhood Literacy Ecosystem Framework

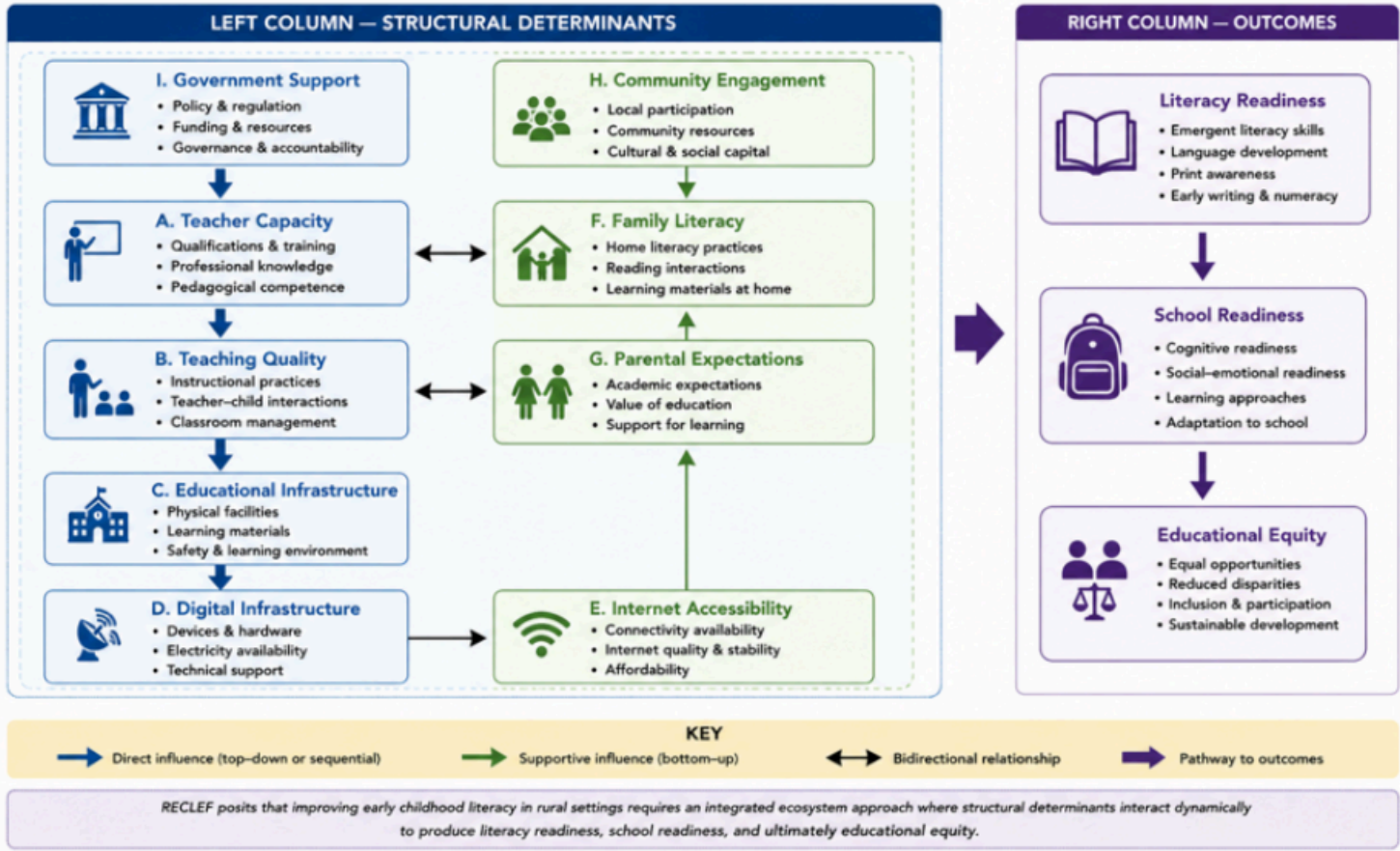


Figure 2

The Rural Early Childhood Literacy Ecosystem Framework (RECLEF).