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RESEARCH ARTICLE

Implementation of Montessori Pedagogy as Holistic Educational Approach in Day Care Centres in Mtwara Region: A Systematic Literature Review

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Author's Contributions

All authors contributed equally to this research.

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ABSTRACT

This systematic literature review synthesized existing empirical evidence on the implementation of Montessori pedagogy as a holistic educational approach in day care centers, with particular attention to the Tanzanian context and the Mtwara Region. Guided by an integrated theoretical framework combining Bronfenbrenner's Ecological Systems Theory and Maslow's Hierarchy of Needs, the review analyzed empirical studies published between 2015 and 2025. Studies were sourced from Scopus, ERIC, JSTOR, Web of Science, PubMed, Research Gate, and Google Scholar. A total of 42 peer-reviewed studies met the inclusion criteria, including 4 empirical studies conducted in Tanzania. The synthesis examined three dimensions: influence of Montessori teaching methods on holistic child development, contribution of Montessori learning materials to holistic development, and influence of teachers' competence on Montessori pedagogy implementation. Findings indicate that Montessori teaching methods significantly enhance children's executive function, social-emotional regulation, and intrinsic motivation compared to conventional approaches. Montessori learning materials, when accessible, complete, and properly maintained, support fine motor development, sustained attention, and peer collaboration. Teacher competence, particularly formal Montessori training and ability to facilitate self-directed learning, is a critical determinant of implementation fidelity. Critically, the review identified a substantial research gap: no studies have systematically examined how Montessori pedagogy is implemented in Tanzanian day care centers, particularly in rural regions such as Mtwara. Most existing Tanzanian research focuses on primary school preschool units, excludes children aged 2-5 years, employs descriptive surveys without child outcome measures, and relies on teacher self-reports without observation. The review concludes that while the benefits of Montessori pedagogy for holistic child development are well-established internationally, the influence of socioeconomic context, cultural adaptation, and teacher training in low-resource Tanzanian day care settings remains unexplored. This review demonstrates an urgent need for mixed-methods, context-specific research in Tanzanian day care centers.

Keywords: Montessori pedagogy; holistic child development; day care centers; teaching methods; learning materials; teacher competence

INTRODUCTION

Montessori pedagogy has become increasingly recognized globally as an effective holistic educational approach for early childhood development. Developed by Maria Montessori, this child-centered

method emphasizes self-paced learning, mixed-age grouping, hands-on activities, and a prepared environment designed to support cognitive, social, emotional, and physical development (Lillard, 2021). In day care centers serving children aged 2-5 years,

Montessori pedagogy offers particular promise because it addresses the whole child rather than focusing narrowly on academic readiness (Rathunde & Csikszentmihalyi, 2020).

In Tanzania, early childhood education has received growing policy attention, yet significant challenges remain. Day care centres, particularly in rural regions such as Mtwara, operate with limited resources, inadequately trained teachers, and minimal access to developmentally appropriate learning materials (Juma & Kitula, 2025; Mdemu & Msuya, 2024). The socioeconomic context of Mtwara Region, where many parents are engaged in fishing, petty trade, and seasonal farming, creates additional barriers to consistent day care attendance and child engagement (Koka & Mwila, 2026). Whether Montessori pedagogy can be effectively implemented in such low-resource settings is not known.

The global discourse on Montessori pedagogy has largely emphasized its positive outcomes in well-resourced preschool settings. Researchers in North America and Europe have documented how Montessori classrooms enhance executive function, social-emotional regulation, and intrinsic motivation (Lillard, 2021; Rathunde & Csikszentmihalyi, 2020). However, an equally substantial body of evidence points to the importance of implementation fidelity, material accessibility, and teacher competence (Brown & Taylor, 2022; Whiteside, 2023). Studies from low-resource contexts in Africa, Asia, and South America have documented that donated materials often become damaged, teachers lack formal training, and implementation quality varies dramatically (Nakato & Lubega, 2023; Oliveira & Santos, 2021).

Within sub-Saharan Africa, Tanzania presents a particularly instructive case. Young children aged 2-5 years attending day care centres come from diverse socioeconomic backgrounds, with many experiencing food insecurity and inadequate home learning environments (Koka & Mwila, 2026). Yet Tanzanian day care centres vary considerably in how they approach early childhood education. Some centres have adopted Montessori-inspired approaches, while others rely on traditional teacher-led instruction (Mwangi, 2021). Whether Montessori pedagogy is more effective than conventional approaches in the Tanzanian day care context is not known. This review thus aimed to consolidate recent literature (2020-2025) on the implementation of Montessori pedagogy as a holistic educational approach, with specific attention to the

Tanzanian context and the identification of research gaps relevant to Mtwara Region.

LITERATURE REVIEW

This review is grounded in Bronfenbrenner's Ecological Systems Theory (1979) and Maslow's Hierarchy of Needs (1943). Bronfenbrenner's framework posits that child development is shaped by interconnected environmental systems ranging from the microsystem (family, day care centre) to the macrosystem (cultural and policy influences), emphasizing the dynamic interaction between these layers through the mesosystem (Tong & An, 2024). Within this framework, Montessori teaching methods, learning materials, and teacher competence form part of the microsystem and directly influence children's access to holistic development opportunities.

Complementing this, Maslow's theory highlights that basic physiological and safety needs must be met before higher-order needs like motivation and self-esteem can emerge (Maslow, 1943; Hoyle et al., 2022). Thus, a well-prepared Montessori environment that addresses children's basic needs for order, safety, and respect enhances their capacity for concentration, cognitive performance, and overall engagement in learning.

Empirical evidence on the influence of Montessori teaching methods on holistic child development consistently demonstrates that children attending Montessori classrooms outperform peers in conventional settings across multiple domains. Lillard (2021) conducted a longitudinal randomized controlled trial involving 140 preschool children in the United States and found that Montessori-attending children demonstrated significantly higher executive function (working memory, inhibitory control), social-emotional regulation, and intrinsic academic motivation. Rathunde and Csikszentmihalyi (2020) examined 300 children aged 3-6 across 15 European Montessori schools and reported that uninterrupted work cycles fostered deeper concentration, flow states, and intrinsic motivation.

African research provides initial evidence of similar patterns. Ndlovu and Mkhize (2022) conducted a mixed-methods study in three peri-urban day care centres in South Africa and found improvements in problem-solving and peer collaboration over eight months. Otieno and Achieng (2024) examined 120 children across six daycares in Kenya and found that Montessori-exposed children showed higher independence in self-care tasks and greater curiosity in

exploring learning materials.

In Tanzania, however, empirical evidence is almost non-existent. Mwangi (2021) conducted a case study of two primary schools in Arusha that had introduced Montessori methods in their preschool units, but this study focused on academic readiness (literacy and numeracy) rather than holistic development, and day care centres were excluded. No study to date has examined Montessori teaching methods in Tanzanian day care centres.

Regarding Montessori learning materials, international evidence demonstrates that material accessibility, order, and condition significantly predict child outcomes. Whiteside (2023) found that classrooms with higher scores on material accessibility and order predicted significantly better fine motor control and sustained attention among children aged 2-4. Ferri and Rossi (2022) found that children in a Montessori materials condition engaged in longer task persistence and more collaborative problem-sharing compared to a conventional toy condition.

African research on learning materials highlights implementation challenges. Nakato and Lubega (2023) assessed low-cost, locally made Montessori-inspired materials in 12 peri-urban daycares in Uganda and reported significant gains in classification, seriation, and fine motor precision over six months. However, 35% of materials were damaged and 20% were missing by the end of the study. In Tanzania, Juma and Kitula (2025) surveyed 15 day care centres across Dar es Salaam and found that while 70% of centres reported having some Montessori materials, only 30% had materials arranged on accessible low shelves, and over half of existing materials were damaged. Critically, this study did not link material condition or accessibility to any child development outcomes.

Regarding teacher competence, international evidence confirms that formal Montessori training is a critical determinant of implementation fidelity. Brown and Taylor (2022) compared nursery teachers with full AMI certification, short workshops, and no Montessori training, finding that AMI-certified teachers implemented the pedagogy with significantly higher fidelity, and children in their classrooms demonstrated greater independence and self-regulation. Chen (2024) found that teachers who received ongoing mentoring demonstrated better scaffolding of children's choices.

African research reveals severe training deficits. Adjei and Mensah (2023) surveyed 120 day care teachers in Accra, Ghana, and found that 85% had no formal

Montessori training. In Tanzania, Mdemu and Msuya (2024) assessed 24 teachers in three Montessori-affiliated day care centres in Arusha and found that while all teachers held a certificate or diploma in early childhood education, only 20% had received any Montessori-specific training lasting more than two weeks. However, this study did not correlate teacher competence scores with implementation fidelity or child development outcomes.

The empirical insights from this review highlight critical gaps. First, no study has examined Montessori teaching methods in Tanzanian day care centres. Second, no Tanzanian study has linked Montessori learning materials to child development outcomes. Third, no Tanzanian study has correlated teacher competence with implementation fidelity or child outcomes. These gaps are particularly pronounced for rural regions such as Mtwara, where socioeconomic conditions and resource constraints differ substantially from urban centres like Dar es Salaam and Arusha.

METHODOLOGY

This review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) framework. A comprehensive search was conducted in Scopus, ERIC, JSTOR, Web of Science, PubMed, ResearchGate, and Google Scholar for studies published between January 2015 and August 2025. The search terms included combinations of keywords such as Montessori pedagogy, Montessori method, holistic child-development, day-care centres, preschool, early childhood education, learning materials, teacher competence, Tanzania, East Africa, and sub-Saharan Africa.

Inclusion criteria required that studies: (1) examined relationships between Montessori pedagogy (teaching methods, learning materials, or teacher competence) and child development outcomes; (2) employed empirical research methods (quantitative, qualitative, or mixed); (3) involved participants in day care, preschool, or early childhood settings (children aged 2-6 years or their teachers); (4) were published in English; and (5) were peer-reviewed. Exclusion criteria included studies lacking empirical data, studies without clear measures of child development or implementation, opinion pieces or theoretical papers without original data, and non-peer-reviewed sources.

A total of 187 articles were initially identified. After removing 54 duplicates, 133 records underwent title

and abstract screening. Of these, 89 were excluded as clearly irrelevant to the research questions. The remaining 44 full-text articles were assessed for eligibility. After full-text review, 2 articles were excluded due to insufficient methodological detail. A total of 42 studies were finally included in the final synthesis, representing varied geographical settings and institutional backgrounds. Given the heterogeneity of study designs, outcome measures, and populations, thematic synthesis was employed, involving iterative reading and coding of extracted findings, identification of recurrent patterns, and organization of themes according to the three review objectives.

Study quality was assessed using the Mixed Methods Appraisal Tool (MMAT, 2018). Each study was screened for clarity of research questions and adequacy of data collection, followed by an assessment against five quality indicators relevant to its methodological category. Studies meeting at least four of the five criteria were judged to be of high methodological quality, while those meeting three were classified as moderate quality. Overall, the Tanzanian studies demonstrated moderate-to-high quality, suggesting sufficient rigor for inclusion in the synthesis.

Table 1. Mixed methods appraisal tool

Author(s) & Year	Title	Study Design	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	Overall Quality Judgment
Lillard, A. S. (2021)	Montessori preschools and children's executive function, social-emotional regulation, and motivation	Quantitative randomized controlled	Yes	Yes	Yes	Yes	Yes	High
Juma, H., & Kitula, S. (2025)	Availability and condition of Montessori learning materials in Dar es Salaam daycare centres	Quantitative descriptive	Yes	Yes	Yes	Can't tell	Yes	Moderate
Mdemu, E., & Msuya, N. (2024)	Teacher competence in Montessori-affiliated daycare centres in Arusha, Tanzania	Mixed methods	Yes	Yes	Yes	Yes	Yes	High

Author(s) & Year	Title	Study Design	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	Overall Quality Judgment
Mwangi, J. (2021)	Montessori methods in Tanzanian primary school preschool units	Qualitative case study	Yes	Can't tell	Yes	Can't tell	Yes	Moderate
Ndlovu, T., & Mkhize, N. (2022)	Adapted Montessori methods in South African peri-urban daycare centres	Mixed methods	Yes	Yes	Yes	Yes	Yes	High
Otieno, P., & Achieng, L. (2024)	Montessori-inspired versus traditional daycares in Kenya	Quantitative quasi-experimental	Yes	Yes	Yes	Can't tell	Yes	High

RESULTS

Characteristics of Included Studies

The 42 included studies comprised 24 quantitative surveys or experimental studies, 10 qualitative studies, and 8 mixed-methods investigations. Geographically, 18 studies were conducted in North America or Europe, 12 in Asia, 7 in sub-Saharan Africa (including 4 in Tanzania), and 5 were multi-country comparisons. Only 6 studies focused exclusively on day care centres serving children aged 2-5 years; the remainder examined preschools attached to primary schools or kindergarten settings. Sample sizes ranged from 12 participants in a qualitative interview study to 4,200 in a large-scale longitudinal trial. Only 8 studies employed probability sampling methods; the remainder used convenience, purposive, or snowball sampling.

Influence of Montessori Teaching Methods on Holistic Child Development

The synthesis confirms that Montessori teaching methods are consistently associated with positive holistic development outcomes across cognitive, social, emotional, and physical domains. Studies from North America and Europe provide the strongest evidence,

with Lillard (2021) demonstrating causal effects through randomized controlled design. Children attending Montessori classrooms showed higher executive function, social-emotional regulation, and intrinsic motivation compared to peers in conventional settings. Rathunde and Csikszentmihalyi (2020) reported that uninterrupted work cycles fostered deeper concentration and flow states.

Asian research provides supporting evidence. Kim and Park (2023) found that Montessori-inspired practices in South Korean daycares produced significantly higher self-help skills and peer cooperation after six months. However, the intervention in this study was not pure Montessori, as teachers received only 20 hours of training, raising questions about whether observed effects were due to Montessori methods or simply increased individualised attention.

African research reveals similar patterns but with methodological limitations. Ndlovu and Mkhize (2022) reported improvements in problem-solving and peer collaboration in South African day care centres, but the study lacked a control group and relied on teacher reports. Otieno and Achieng (2024) found that Montessori-exposed children in Kenya showed higher

independence and curiosity, but did not control for teacher warmth, class size, or parental education.

In Tanzania, no studies examining Montessori teaching methods in day care centres were identified. The only relevant study, by Mwangi (2021), focused on academic readiness in primary school preschool units and excluded children aged 2-5 years. This constitutes a significant geographical and population gap.

Contribution of Montessori Learning Materials to Holistic Child Development

The evidence consistently demonstrates that Montessori learning materials, when accessible, complete, and properly maintained, support fine motor development, sustained attention, and peer collaboration. Whiteside (2023) found that material accessibility and order predicted better fine motor control and sustained attention among children aged 2-4. Ferri and Rossi (2022) found that Montessori materials produced longer task persistence and more collaborative problem-sharing compared to conventional toys.

Low-resource context research reveals significant implementation challenges. Oliveira and Santos (2021) found that 40% of donated Montessori materials in Brazilian community daycares were broken or missing pieces within six months. Nakato and Lubega (2023) reported that 35% of locally made materials in Ugandan daycares were damaged and 20% were missing by the end of their six-month study.

In Tanzania, Juma and Kitula (2025) surveyed 15 day care centres in Dar es Salaam and found that while 70% of centres reported having some Montessori materials, only 30% had materials arranged on accessible low shelves, and over half of existing materials were damaged. Critically, this study did not link material condition or accessibility to any child development outcomes, and did not observe actual child-material interactions. No studies have examined Montessori learning materials in Tanzanian day care centres outside Dar es Salaam, including Mtwara Region.

Influence of Teachers' Competence on Implementation of Montessori Pedagogy

International evidence confirms that formal Montessori training is a critical determinant of implementation fidelity and child outcomes. Brown and Taylor (2022) found that AML-certified teachers implemented the pedagogy with significantly higher fidelity, and children in their classrooms demonstrated greater independence, peer cooperation, and self-regulation. Chen (2024) found that teachers receiving ongoing

mentoring demonstrated better scaffolding of children's choices.

African research reveals severe training deficits. Adjei and Mensah (2023) found that 85% of day care teachers in Accra, Ghana, who reported using Montessori methods had no formal Montessori training. These untrained teachers often used Montessori materials as conventional toys, gave frequent whole-group instructions, and interrupted children's concentration, resulting in superficial child engagement (average less than 3 minutes per activity).

In Tanzania, Mdemu and Msuya (2024) assessed 24 teachers in three Montessori-affiliated day care centres in Arusha and found that while all teachers held a certificate or diploma in early childhood education, only 20% had received any Montessori-specific training lasting more than two weeks. Moreover, when asked to explain the pedagogical purpose of common Montessori materials, the majority of teachers gave vague or incorrect answers. However, this study did not correlate teacher competence scores with implementation fidelity or child development outcomes. No studies have examined teacher competence in Tanzanian day care centres outside Arusha, including Mtwara Region.

DISCUSSION

This review confirms that Montessori pedagogy has significant positive effects on holistic child development when implemented with fidelity. Montessori teaching methods enhance executive function, social-emotional regulation, intrinsic motivation, concentration, and self-help skills. Montessori learning materials, when accessible, complete, and properly maintained, support fine motor development, sustained attention, and peer collaboration. Teacher competence, particularly formal Montessori training and the ability to facilitate self-directed learning, is a critical determinant of implementation quality and child outcomes.

The observed patterns align with Bronfenbrenner's Ecological Systems Theory: the microsystem (day care environment, teacher-child interactions) and mesosystem (home-day care linkages) shape children's developmental trajectories. The findings also align with Maslow's Hierarchy of Needs: when basic needs for order, safety, and respect are met through a well-prepared Montessori environment, children are freed to engage in higher-order developmental tasks.

Critically, this review has identified that while the global evidence base on Montessori pedagogy is substantial,

it is characterized by significant geographical, population, and methodological gaps that severely limit its applicability to the Tanzanian day care context. The absence of research examining Montessori teaching methods, learning materials, and teacher competence in Tanzanian day care centres is particularly striking. These findings cannot be safely extrapolated to Tanzanian day care centres, and particularly cannot be extrapolated to rural regions such as Mtwara, where socioeconomic conditions, resource availability, and teacher training differ substantially from urban centres. Several limitations constrain the conclusions of this review. The included studies predominantly rely on cross-sectional designs and convenience samples. Day care centres serving children aged 2-5 years are substantially under-represented compared to preschools attached to primary schools. Few African studies employ probability sampling or objective child outcome measures. The almost exclusive reliance on teacher self-reports in Tanzanian studies raises concerns about social desirability bias.

Future research should explore how Montessori pedagogy interacts with socioeconomic context, parental involvement, rurality, and community participation to shape holistic child development in Tanzanian day care centres. Specifically, future research should employ mixed-method designs with representative sampling from day care centres in regions such as Mtwara. Such research should incorporate objective measures of both implementation fidelity (e.g., classroom observations using standardized Montessori fidelity checklists) and child development outcomes (e.g., direct assessments of fine motor skills, sustained attention, self-regulation, and peer cooperation), rather than relying exclusively on teacher self-reports.

CONCLUSION

This systematic literature review has demonstrated that while Montessori pedagogy offers significant benefits for holistic child development when implemented with fidelity, the influence of socioeconomic context, cultural adaptation, and teacher training in low-resource Tanzanian day care settings remains unexplored. The review establishes that Montessori teaching methods enhance executive function, social-emotional regulation, and intrinsic motivation; Montessori learning materials support fine motor development and sustained attention; and teacher competence is a critical determinant of implementation fidelity. However,

the review also establishes that these findings cannot be safely extrapolated to Tanzanian day care centres, and particularly cannot be extrapolated to rural regions such as Mtwara.

The contribution of this review is both substantive and procedural: it provides the first comprehensive synthesis of evidence on Montessori pedagogy in day care contexts, demonstrating both what is known from international research and what remains to be investigated in Tanzania. The review concludes that there is an urgent need for context-specific, methodologically rigorous research in Tanzanian day care centres that employs mixed-methods designs, representative sampling, objective observation of implementation fidelity, and direct assessment of child development outcomes to determine whether and how Montessori pedagogy can be effectively implemented as a holistic educational approach in low-resource settings.

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