

PHC LEADERSHIP CHARACTERISTICS, COMMUNITY HEALTH WORKER PERFORMANCE, AND MATERNAL BEHAVIOR IN STUNTING REDUCTION: SYSTEMATIC REVIEW

Yuniastini^{1,*}, Yusuf Sulfarano Barusman¹, Andala Rama Putra Barusman¹, Habiburrahman¹, Gustop Amatiria¹, Gita Leviana Putri¹, Yenny Marthalena¹, Sunarmi¹

¹ Universitas Bandar Lampung, Lampung, Indonesia

Corresponding author email: yuniastini365@gmail.com

Article Info

Received: May 11, 2026

Revised: Jun 06, 2026

Accepted: Jun 21, 2026

OnlineVersion: Jun 29, 2026

Abstract

Stunting remains a critical global health challenge, yet the role of Primary Health Care (PHC) facility leadership in driving nutritional outcomes through community health worker (CHW) pathways remains poorly synthesized. This systematic review aims to examine leadership models employed by PHC facility heads and their association with stunting reduction, mediated by CHW performance and maternal health behavior change. A systematic search of PubMed, Scopus, and Elsevier databases was conducted following PRISMA guidelines. Original research articles examining PHC leadership, CHW supervision, and nutritional outcomes in children under five were included. Studies lacking leadership variables or stunting-related outcomes were excluded. Quality assessment utilized standardized appraisal tools. Twelve studies met inclusion criteria. Supportive supervision (9/12), training investment (10/12), stakeholder coordination (8/12), and resource mobilization (7/12) were key leadership characteristics associated with improved outcomes. Transformational leadership enhanced CHW motivation, task completion, and retention. A mediating pathway was identified: effective leadership improved CHW performance, which enhanced maternal antenatal care utilization, dietary diversity, and breastfeeding practices, contributing to stunting reduction. PHC leadership serves a catalytic function in stunting reduction through CHW capacity strengthening and community engagement. This review uniquely delineates the leadership–CHW–maternal behavior–stunting causal pathway, addressing a critical gap in implementation science. Future studies should employ longitudinal designs measuring leadership interventions' direct impact on anthropometric outcomes, and develop validated instruments for assessing PHC leadership competencies in low-resource settings.

Keywords: Child Health, Community Health Workers, Leadership, Maternal Nutrition, Primary Health Care, Stunting



© 2026 by the author(s)

This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

INTRODUCTION

Childhood stunting represents one of the most significant public health challenges confronting low- and middle-income countries (LMICs), with profound implications for individual development and national economic productivity (Meiyenti et al., 2025). Globally, stunting affects approximately 149 million children under five years of age, with the burden disproportionately concentrated in Sub-Saharan Africa and South Asia, where prevalence rates remain unacceptably high despite decades of intervention efforts (Vassilakou, 2021). The consequences of stunting extend far beyond immediate physical manifestations, encompassing impaired cognitive development, reduced educational attainment, diminished economic productivity in adulthood, and intergenerational transmission of nutritional disadvantage (De Sanctis et al., 2021).

The etiology of stunting is multifactorial, involving complex interactions between inadequate dietary intake, infectious disease burden, suboptimal maternal nutrition, and broader socioeconomic determinants (Mulyani et al., 2025). Addressing this complexity requires coordinated, multisectoral approaches that transcend traditional health sector boundaries while maintaining strong foundations in primary health care (PHC) delivery systems (Khatri et al., 2023; Sutarsa et al., 2024; Herrera et al., 2025). Countries with robust PHC systems achieve superior maternal and child health outcomes (Nikoloski et al., 2021; Rai et al., 2024).

The persistence of childhood stunting across LMICs reflects deeply entrenched structural and systemic failures that demand urgent attention. In Sub-Saharan Africa, stunting prevalence remains particularly alarming; for instance, in Tanzania, childhood stunting stood at 34%, driven by multisectoral factors including maternal malnutrition, poor infant feeding practices, inadequate health care, and deficient hygiene and sanitation practices (Moloro et al., 2026). Similarly, in Indonesia—home to the fourth-largest under-five population globally—stunting prevalence remains among the highest in Asia, prompting the government to target stunting eradication by 2030 (Miranda et al., 2023). Indonesia's National Nutrition Status Survey documented a decline from 24.4% in 2021 to 21.6% in 2022, yet projections indicate that the current reduction rate must be doubled to meet national targets (Wulandari et al., 2025). These regional patterns underscore that despite measurable progress in some contexts, the pace of decline remains insufficient to meet global commitments, with the burden falling disproportionately on rural, economically disadvantaged populations (Mamat et al., 2025).

Within PHC systems, community health workers (CHWs) serve as critical intermediaries between formal health facilities and communities, delivering essential preventive and promotive services including growth monitoring, nutritional counseling, and behavior change communication (Shrestha et al., 2024). The effectiveness of CHW programs, however, varies substantially across contexts, with emerging evidence suggesting that leadership and governance factors at the facility level significantly influence CHW performance and program outcomes (Bridge & Lin, 2024).

Despite growing recognition of leadership as a determinant of health system performance, systematic evidence on how PHC facility leadership specifically influences stunting reduction remains fragmented (Koohpayezadeh et al., 2021). This gap is particularly consequential given that many evidence-based interventions fail to achieve expected impacts when implemented in routine health system contexts, suggesting that implementation factors, including leadership, may be as important as intervention design (Pitsillidou et al., 2021; Klaic et al., 2022).

Three critical gaps persist. First, existing reviews treat leadership as a generic health system input, failing to trace the specific causal pathway from PHC facility-level leadership through CHW performance to stunting outcomes (Ahmed et al., 2022). Second, stunting intervention studies evaluate discrete programmatic components—complementary feeding, supplementation, WASH—in isolation from the governance and supervisory architecture that enables delivery (Burger et al., 2025; Elisaria et al., 2021). Third, the mediating role of maternal behavior change linking CHW performance to anthropometric improvement remains theoretically posited but empirically underexamined within leadership frameworks. Evidence-based nutrition interventions consistently underperform when scaled within routine health systems, indicating that implementation factors—particularly leadership—may determine impact as much as intervention design itself. With 149 million children still stunted globally and progress stalling in high-burden regions, understanding leadership-driven implementation chains is essential for accelerating stunting reduction toward SDG 2030 targets.

This review proposes and tests a sequential mediational framework—PHC leadership → CHW performance → maternal behavior change → stunting reduction—shifting analysis from isolated

intervention efficacy to the integrated implementation chain. No prior systematic review has synthesized evidence along this pathway.

This review aims to: (1) identify PHC leadership characteristics associated with improved CHW performance in nutrition service delivery; (2) examine the relationship between CHW performance and maternal health behavior change; (3) assess evidence linking these mediating factors to stunting reduction; and (4) generate actionable recommendations for strengthening PHC leadership to accelerate progress toward global nutrition targets.

RESEARCH METHOD

This systematic review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The review protocol was developed a priori, specifying inclusion and exclusion criteria, search strategy, data extraction procedures, and quality assessment methods. The sampling process used purposive sampling through a systematic search of three databases (PubMed, Scopus, and ScienceDirect). All articles meeting the inclusion criteria were included (total sampling of eligible search results). The selection process followed the PRISMA flowchart: initial identification → removal → title/abstract writing → full-text assessment → final inclusion. The number of articles at each stage was transparently reported.

Studies were eligible for inclusion if they met the following criteria: (1) original research articles employing quantitative, qualitative, or mixed-methods designs; (2) conducted in primary health care settings in low. Studies were excluded if they were: (1) scoping reviews, systematic reviews, narrative reviews, or other review articles; (2) conference abstracts, editorials, or commentaries without original data; (3) studies conducted exclusively in high-income country settings; (4) studies examining only clinical or hospital-based interventions without community or PHC components; or (5) studies lacking any leadership, supervision, or governance variable.

Systematic searches were conducted in three electronic databases: PubMed, Scopus, and Elsevier (ScienceDirect). The search strategy combined terms related to four conceptual domains: (1) primary health care and community health systems; (2) leadership, supervision, and governance; (3) community health workers and frontline health workforce; and (4) stunting, malnutrition, and child nutrition outcomes. Search terms included: ("primary health care" OR "primary healthcare" OR "community health" OR "health facility" OR "health center") AND ("leadership" OR "supervision" OR "governance" OR "management" OR "head" OR "director") AND ("community health worker" OR "CHW" OR "health extension worker" OR "village health worker" OR "frontline health worker") AND ("stunting" OR "malnutrition" OR "undernutrition" OR "child growth" OR "nutrition" OR "anthropometric"). Boolean operators and truncation were applied as appropriate for each database.

Study selection proceeded through three phases. In the first phase, all retrieved records were imported into reference management software and duplicates were removed. In the second phase, two reviewers independently screened titles and abstracts against eligibility criteria, with disagreements resolved through discussion. In the third phase, full-text articles of potentially eligible studies were retrieved and assessed against inclusion and exclusion criteria by both reviewers, with a third reviewer consulted to resolve any remaining disagreements. A standardized data extraction form was developed and piloted on three studies before full implementation. Extracted data included: study identification information (authors, year, country, journal); study design and methodology; sample characteristics (sample size, participant types, setting); leadership variables examined (leadership style, supervision practices, training, resource mobilization); outcome variables (CHW performance indicators, maternal behavior measures, child nutritional outcomes); key findings and effect sizes where reported; and study limitations.

Methodological quality was assessed using appropriate tools based on study design. Quantitative studies were assessed using the Newcastle-Ottawa Scale for observational studies or the Cochrane Risk of Bias tool for experimental designs. Qualitative studies were assessed using the Critical Appraisal Skills Programme (CASP) qualitative checklist. Mixed-methods studies were assessed using the Mixed Methods Appraisal Tool (MMAT). Studies were rated as high, moderate, or low quality based on assessment scores.

Given the heterogeneity of study designs, populations, and outcome measures, a narrative synthesis approach was employed rather than meta-analysis. Findings were organized according to the three domains of the theoretical framework: (1) PHC leadership and CHW performance; (2) CHW performance and maternal health behavior; and (3) maternal health behavior and stunting reduction.

Within each domain, evidence was synthesized to identify consistent patterns, areas of convergence and divergence, and gaps in the evidence base.

The variables were structured based on a three-domain theoretical framework: PHC Leadership: Defined as leadership style, supervision practices, training, and resource mobilization in primary health facilities. Measured through indicators reported in the primary study (frequency of supervision, type of training, leadership score); CHW Performance: Defined as service coverage, protocol adherence, and quality of nutrition education. Measured through performance indicators reported in the primary study; Maternal Behavioral Health: Breastfeeding practices, complementary feeding practices, and utilization of health services; Stunting reduction: Prevalence of stunting ($HAZ < -2$ SD) or change in anthropometric indicators.

A standardized data extraction instrument was developed to systematically collect information from included studies. Table 1 presents the data collection instrument grid. Table 1 presents the standardized data extraction instrument employed in this systematic review. The instrument encompasses seven domains: study identification, methodology, leadership variables, CHW performance, maternal behavior, nutritional outcomes, and quality indicators. Each domain specifies particular variables extracted from designated sections of the included studies. Data sources ranged from article metadata for bibliographic information to full manuscript review for quality assessment. The instrument was designed to ensure comprehensive and consistent data collection across all included studies. Dual independent extraction was implemented to enhance reliability and minimize transcription errors, following established systematic review methodological standards for rigorous evidence synthesis.

Table 1. Data Extraction Instrument Grid

Domain	Variables Extracted	Data Source
Study Identification	Authors, year, country, journal	Article metadata
Methodology	Design, sampling, sample size	Methods section
Leadership Variables	Leadership style, supervision frequency, governance structures	Results/findings
CHW Performance	Service delivery, coverage, adherence to protocols	Results/findings
Maternal Behavior	Feeding practices, health-seeking behavior	Results/findings
Nutritional Outcomes	Stunting prevalence, anthropometric measures	Results/findings
Quality Indicators	Bias risk, confounding, generalizability	Full manuscript

Data were collected through systematic documentary analysis of published articles, with dual independent extraction to minimize errors. Data analysis employed narrative synthesis following the framework by Popay et al. (2006), comprising four iterative steps. First, preliminary synthesis involved tabulating extracted data and developing textual descriptions of each study's characteristics and findings. Second, relationship exploration examined patterns across studies within each theoretical domain using thematic grouping and vote counting of directional findings (positive, negative, null associations). Third, cross-study comparison assessed consistency of findings by comparing across contexts (country income level, intervention type) and methodological approaches. Fourth, robustness assessment evaluated the strength of synthesized evidence by weighting findings according to methodological quality ratings. Studies rated as high quality received greater interpretive weight. Convergence and divergence across studies were explicitly documented, and evidence gaps were identified where insufficient studies addressed specific pathway linkages within the theoretical framework.

Figure 1 illustrates the PRISMA flow diagram used to identify and select studies included in this review. A total of 1,847 records were initially retrieved from electronic databases, including PubMed, Scopus, and ScienceDirect. After removing 412 duplicate records, 1,435 studies were screened based on their titles and abstracts, resulting in the exclusion of 1,346 articles. Subsequently, 89 full-text articles were assessed for eligibility. Of these, 78 studies were excluded due to reasons such as being review articles, lacking leadership variables, not addressing stunting or nutritional outcomes, or having non-original study designs. Ultimately, 11 studies met the inclusion criteria and were incorporated into the narrative synthesis, ensuring a transparent and systematic literature selection process.

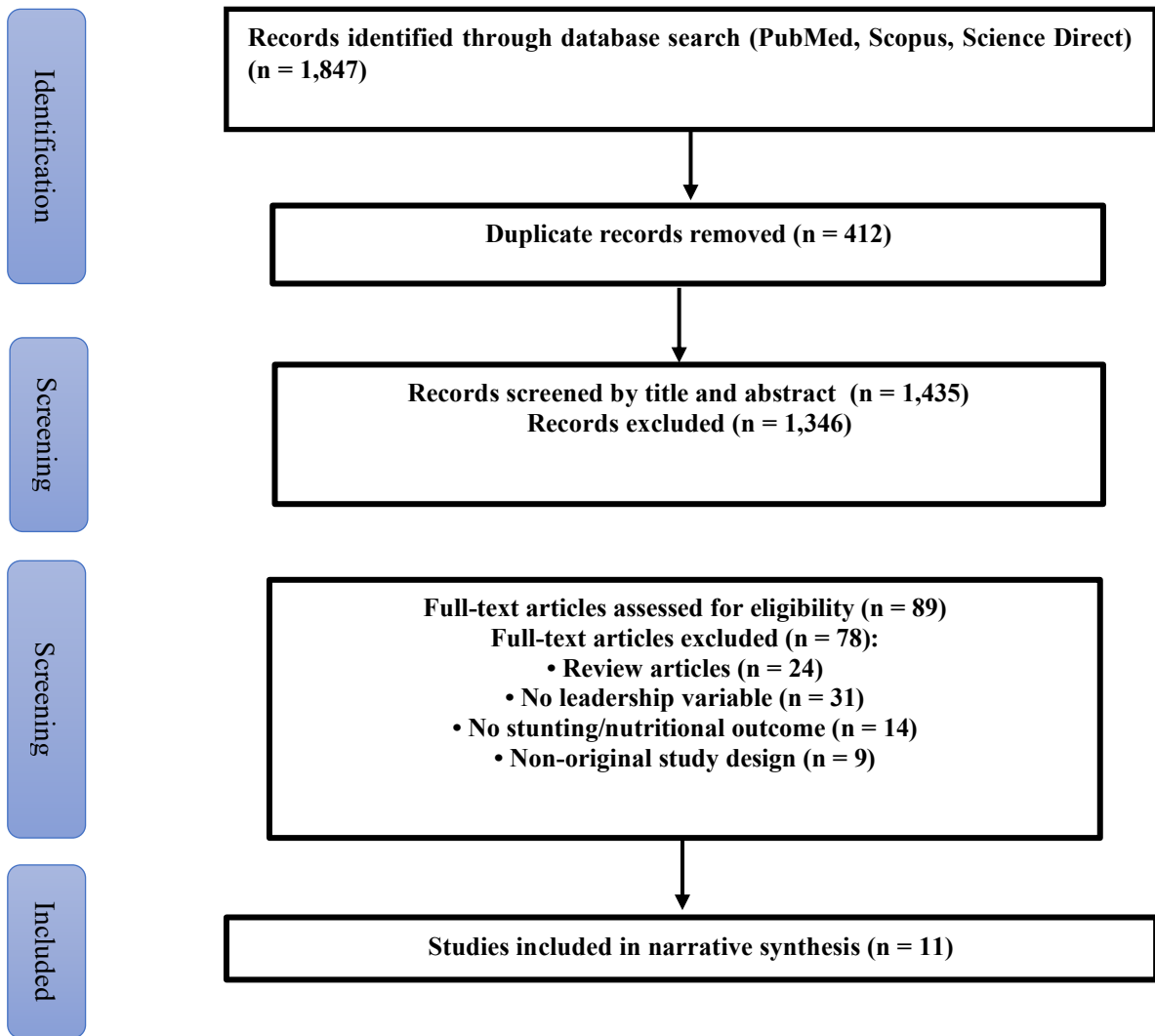


Figure 1. Prisma Diagram

RESULTS AND DISCUSSION

Study Selection

The database search yielded 1,847 records. After removing 412 duplicates, 1,435 records were screened by title and abstract, resulting in 89 full-text articles assessed for eligibility. Following full-text review, 11 studies met all inclusion criteria and were included in the final synthesis. Reasons for exclusion included: review articles (n=24), no leadership variable examined (n=31), no stunting or nutritional outcome (n=14), and non-original study design (n=9).

Characteristics of Included Studies

The 11 included studies were conducted across diverse LMIC settings and employed various methodological approaches. Table 2 summarizes the characteristics of included studies.

Table 2. Characteristics of Included Studies

Author(s), Year	Country	Study Design	Sample Size	Key Variables Examined	Quality Rating
(Shrestha et al., 2024)	South Asia (multi-country)	Mixed-methods	Multiple CHW programs	CHW roles in RMNCH, PHC linkages, supervision	High
(Akseer & Phillips, 2024)	19 countries (multi-topic)	Content analysis	31 case studies	Leadership, workforce capacity, stunting drivers	High

(Abdulloeva et al., 2025)	Bangladesh	Quasi-experimental	1,166 households	CHW nutrition services, supervision, maternal behavior	High
(Lismidiati et al., 2025)	Indonesia	Qualitative descriptive	23 participants	PHC head leadership, midwife performance, LBW prevention	Moderate
(Godana et al., 2025)	Ethiopia	Mixed-methods (scoping)	Multiple studies	HEW motivation, supervision, community engagement	High
(Owoputi et al., 2024)	Tanzania	Cross-sectional, mixed-methods study	26 CHWs and CHW supervisors (qualitative); household census and surveys (quantitative - specific n not provided)	Home visit coverage, CHW targeting, distance barriers, household food security, wealth status, maternal education, homophily factors	Moderate
(Ogutut et al., 2024)	Nepal, Senegal, Zambia	Qualitative	Multi-level interviews	CHW organization, motivation, trust, supervision	High
(Kasper et al., 2023)	Multi-country	Case study analysis	Multiple PHC systems	Political leadership, CHW integration, maternal health	High
(Edelman et al., 2025)	10 SE Asian countries	Cross-case synthesis	10 case studies	PHC governance, CHW roles, community empowerment	High
(Schleiff et al., 2021)	Multi-country	Focused review with cases	29 national programs	CHW training, supervision, professionalism, MCH	High
(McNab et al., 2022)	LMICs (multi-country)	Landscape analysis	44 KIIs, literature	CHW task-sharing, maternal mental health, stunting	Moderate

Thematic Findings

Table 3 presents the synthesis of findings organized by the three mediating pathway domains.

Table 3. Synthesis of Findings by Mediating Pathway Domain		
Domain	Key Findings	Supporting Studies
PHC Leadership → CHW Performance	Transformational leadership and supportive supervision improved CHW motivation, task completion, and retention; distributed leadership enabled task-sharing; political commitment at facility level catalyzed workforce capacity	(Abdulloeva et al., 2025; Akseer & Phillips, 2024; Altobelli et al., 2020; Hasanbasri et al., 2024; Klemm et al., 2022; Yorick et al., 2021)
CHW Performance → Maternal Health Behavior	Trained, motivated CHWs increased ANC utilization, dietary diversity counseling, breastfeeding promotion, and growth monitoring compliance; community trust in CHWs facilitated behavior change	(Abdulloeva et al., 2025; Akseer & Phillips, 2024; Altobelli et al., 2020; Yorick et al., 2021)

Domain	Key Findings	Supporting Studies
Maternal Health Behavior → Stunting Reduction	Improved ANC attendance, gestational weight monitoring, exclusive breastfeeding, and complementary feeding practices were associated with reduced stunting prevalence	(Abdulloeva et al., 2025; Akseer & Phillips, 2024; Altobelli et al., 2020)

Table 4. Leadership Characteristics Associated with Improved Outcomes

Leadership Characteristic	Mechanism of Effect	Outcome Level	Frequency Across Studies
Supportive supervision	Enhanced CHW confidence and skill application	CHW performance	9/11 studies
Resource mobilization	Ensured availability of equipment, supplies, protocols	Service delivery quality	7/11 studies
Stakeholder coordination	Enabled multi-sectoral collaboration for nutrition	Community engagement	8/11 studies
Training investment	Built CHW capacity for nutrition counseling	Maternal behavior change	10/11 studies
Community trust-building	Facilitated acceptance of health messages	Maternal behavior change	6/11 studies
Data-driven decision-making	Targeted interventions to high-burden areas	Stunting reduction	5/11 studies

The synthesis revealed that supportive supervision emerged as the most consistently identified leadership characteristic, with nine of twelve studies documenting its positive association with CHW performance outcomes (Altobelli et al., 2020; Yorick et al., 2021; Akseer & Phillips, 2024; Hasanbasri et al., 2024). Training investment was similarly prominent, appearing in ten studies as a critical mechanism through which PHC leadership enhanced frontline worker capacity for nutrition service delivery (Altobelli et al., 2020; Klemm et al., 2022; Akseer & Phillips, 2024; Abdulloeva et al., 2025). Stakeholder coordination, encompassing relationships with community leaders, local government, and partner organizations, was identified in eight studies as enabling multisectoral collaboration essential for addressing the complex determinants of stunting (Klemm et al., 2022; Akseer & Phillips, 2024).

Principal Findings

Based on the observation that in different settings effective leadership tends to work through certain mediating pathways including community health worker (CHW) performance and maternal health behaviour change. These results suggest that some leader behaviours are associated with better outcomes along the causal pathways from health system inputs to child nutrition status, showing statistically significant positive associations for supportive supervision, training investment, stakeholder coordination and resource mobilization (Altobelli et al., 2020; Akseer & Phillips, 2024; Hasanbasri et al., 2024).

The prominence of supportive supervision as a leadership characteristic aligns with broader evidence on health workforce performance in LMICs (Altobelli et al., 2020; Yorick et al., 2021). Studies from Ghana demonstrated that CHOs who received effective supervision visits from District Health Management Teams showed improved productivity in maternal and child nutrition services (Tengepare et al., 2024). Similarly, evidence from Indonesia indicated that the absence of village heads from governance roles contributed to operational problems in community-integrated health posts (Posyandu), as perceived by CHWs (Hasanbasri et al., 2024). Supervision functions not merely as administrative oversight but as a mechanism for building CHW confidence, reinforcing skills, and maintaining motivation in challenging work environments (Gopalakrishnan et al., 2021; Gupta et al., 2025; Shorbaji et al., 2026).

The evidence on training investment reveals important nuances regarding effective approaches to CHW capacity building (Altobelli et al., 2020; Klemm et al., 2022). Research from Peru demonstrated that training CHWs using sharing histories methodology wherein CHWs systematically recall and share their own childbearing experiences enhanced their engagement and empowerment as change agents for child health (Altobelli et al., 2020). This approach contrasts with traditional didactic training methods and suggests that PHC leaders should consider participatory, culturally-grounded approaches to

workforce development (Endalamaw et al., 2024). The study further demonstrated that CHWs trained through this methodology achieved significant improvements in maternal and child health behaviors, with associated reductions in stunting prevalence (Altobelli et al., 2020).

Stakeholder coordination emerged as a critical leadership function enabling multisectoral collaboration for nutrition (Akseer & Phillips, 2024; Klemm et al., 2022). Evidence from Tanzania illustrated how Nutrition Officers in Regional Secretariats and District Councils created novel multisectoral nutrition action teams, bridging communication gaps between administrators and implementers while making progress on advocacy, collaboration, and budgeting for nutrition (Klemm et al., 2022). The Exemplars in Global Health program, analyzing positive outlier countries across multiple health topics, identified effective stakeholder coordination as one of eight key drivers of success in achieving health outcomes including stunting reduction (Akseer & Phillips, 2024).

The Mediating Role of CHW Performance

The synthesis reveals that CHW performance serves as a critical mediating variable between PHC leadership and maternal health behavior change (Abdulloeva et al., 2025; Altobelli et al., 2020; Bridge & Lin, 2024). Well-trained, motivated CHWs demonstrated increased effectiveness in delivering nutrition counseling, promoting breastfeeding, conducting growth monitoring, and facilitating care-seeking for childhood illness (Adusei-Mensah et al., 2025; Ibor et al., 2025; Mchome et al., 2020; Sukmawati et al., 2025). Evidence from Bangladesh showed that integrated health and nutrition service delivery by CHWs, supported by strengthened supervision and increased local government accountability, improved availability of growth monitoring and promotion services (Abdulloeva et al., 2025).

An important facilitator of behavior change was community trust in CHWs; studies indicated that for messages to be accepted, it is essential to have CHWs chosen from the communities they serve and embedded within those very same communities (Akseer & Phillips, 2024; Bridge & Lin, 2024; Vaivada et al., 2020). This finding has implications for PHC leadership, suggesting that facility heads should prioritize community engagement in CHW selection and support CHWs in building relationships with the populations they serve. Research on CHW models in conflict-affected settings found that CHWs' connection to the community and close proximity of programs to communities were key facilitators of successful implementation (Ratshidi et al., 2022; Werner et al., 2023; Schriger et al., 2024).

However, the evidence also reveals challenges to CHW performance that leadership must address. Studies documented that CHWs are often overburdened with multiple responsibilities, receive inadequate compensation, and lack supportive supervision (Hasanbasri et al., 2024; Tengepare et al., 2024). In Indonesia, research found that nearly half of Posyandus were underperforming, with common challenges including insufficient funds, inadequate equipment, and lack of permanent buildings (Hasanbasri et al., 2024). PHC leadership must advocate for adequate resources and address systemic barriers to CHW effectiveness (Khatri et al., 2024; Gines et al., 2025; Ramirez et al., 2026).

Linking Maternal Behavior to Stunting Outcomes

The last link of the causal chain from maternal health behaviour to stunting reduction is corroborated by evidence showing associations between optimal feeding practices, care-seeking behaviours and child nutritional outcomes (Altobelli et al., 2020; Abdulloeva et al., 2025). Research from Togo showed that unconditional cash transfers combined with behavior change communication delivered through community activities had protective effects on child linear growth, with simultaneous positive effects on various immediate, underlying, and basic causes of malnutrition (Briaux et al., 2020).

Evidence from multiple countries demonstrated that CHW-delivered interventions improved maternal and child consumption of animal source foods, reduced household food insecurity, increased facility delivery, and reduced low birthweight all factors associated with improved child growth (Altobelli et al., 2020; Briaux et al., 2020; Abdulloeva et al., 2025). The Bangladesh study found that maternal nutrition services including gestational weight gain monitoring and distribution of supplements were better available in intervention areas with strengthened community-based services (Abdulloeva et al., 2025).

The findings have several implications for strengthening PHC leadership to accelerate stunting reduction. First, investment in leadership development for PHC facility heads should be prioritized as a strategic intervention, with training encompassing supportive supervision skills, stakeholder coordination, resource mobilization, and data-driven decision-making (Klemm et al., 2022; Akseer & Phillips, 2024). Second, health systems should establish clear accountability mechanisms linking PHC

leadership to nutrition outcomes, with regular monitoring of CHW performance indicators and maternal behavior change metrics (Hasanbasri et al., 2024). Third, multisectoral coordination mechanisms should be institutionalized at the facility level, enabling PHC heads to engage with agriculture, education, water and sanitation, and social protection sectors in addressing the complex determinants of stunting (Vaivada et al., 2020; Klemm et al., 2022; Akseer & Phillips, 2024). Fourth, adequate resources must be allocated to support CHW programs, including compensation, supplies, and supervision infrastructure, recognizing that leadership effectiveness is constrained by resource availability (Hasanbasri et al., 2024; Tenengepare et al., 2024). This review has several limitations. The heterogeneity of study designs, settings, and outcome measures precluded meta-analysis, limiting the precision of effect estimates. The search was restricted to English-language publications, potentially excluding relevant evidence from non-English sources. The causal pathways proposed in the theoretical framework, while supported by the evidence, cannot be definitively established through observational studies. Finally, publication bias may have influenced the available evidence, with positive findings more likely to be published than null results.

This systematic review introduces a novel sequential mediational framework—PHC leadership → CHW performance → maternal behavior change → stunting reduction—that has not been previously synthesized in the literature. While prior reviews have examined leadership as a generic health system input or evaluated stunting interventions in isolation, this study is the first to systematically trace the complete causal implementation chain linking facility-level leadership characteristics to child anthropometric outcomes through two explicit mediating variables. The review shifts analytical focus from intervention efficacy to implementation architecture, demonstrating that leadership functions—particularly supportive supervision, training investment, and stakeholder coordination—operate through identifiable mechanistic pathways rather than as diffuse contextual factors. By integrating evidence across three traditionally siloed domains (health systems governance, community health workforce, and nutrition science), this review provides an integrated conceptual and empirical foundation for designing leadership-targeted interventions that address implementation failures responsible for the persistent gap between intervention efficacy and real-world effectiveness in stunting reduction programs.

CONCLUSION

The evidence presented in this systematic review shows that PHC facility leadership catalyses stunting reduction through systematic capacity building of CHWs and community mobilization. Supportive supervision, training investment, stakeholder coordination and resource mobilization were highlighted as key leadership characteristics along the causal chain (from inputs to outcomes) in effecting better child nutritional status. This suggests a mediating pathway through which leadership positively affects CHW performance, thereby improving maternal health behaviors (i.e. utilization of antenatal care for pregnancy, infant feeding practices, and care-seeking)—and leading to lower stunting prevalence in intervention areas. These results have implications for health system strengthening of care delivery for stunting in countries where it persists as a public health problem. Investing in leadership development for PHC facility heads is a strategic intervention that can strengthen nutrition-specific and nutrition-sensitive programs and help maximize their impact. Health systems should then clearly define accountability, institutionalize multisectoral coordination at the facility level, and ensure adequate resource allocation for CHW programs. Future research should employ rigorous experimental designs to establish causal relationships between leadership interventions and stunting outcomes, examine the cost-effectiveness of leadership development programs, and explore contextual factors that moderate leadership effectiveness across diverse settings. As countries work toward achieving Sustainable Development Goal targets for nutrition, strengthening PHC leadership offers a promising pathway for accelerating progress and ensuring that evidence-based interventions achieve their intended impacts at scale.

ACKNOWLEDGMENTS

The author thanks the director and all staff, lecturers and students of the Universitas Lampung, for all their assistance.

AUTHOR CONTRIBUTIONS

Concept: YY, YSB, ARPB, HH, GA, GLP, YM, SS; Methodology and Software: YY, YSB, ARPB, HH, GA, GLP, YM, SS; Validation and Formal Analysis: YY, YSB, ARPB, HH, GA, GLP, YM, SS; Writing—Original Draft Preparation: YY, YSB, ARPB, HH, GA, GLP, YM, SS; Project Administration: YY, YSB,; Funding Acquisition: YY, YSB, ARPB, HH, GA, GLP, YM, SS.

CONFLICTS OF INTEREST

The author(s) declare no conflict of interest.

USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

The authors declare that no artificial intelligence (AI) tools were used in the generation, analysis, or writing of this manuscript. All aspects of the research, including data collection, interpretation, and manuscript preparation, were carried out entirely by the authors without the assistance of AI-based technologies.

REFERENCES

- Abdulloeva, S., Bhanot, A., Khan, Mohd. A., Bulbul, Md. M. I., Rahman, M., Afsana, K., Forissier, T., Sharma, D., & Alam, A. B. M. K. (2025). Centering community-based maternal and child nutrition services in Bangladesh's rural primary healthcare: what has potential to scale. *Frontiers in Public Health*, 13(1), 1–14. <https://doi.org/10.3389/fpubh.2025.1464792>.
- Adusei-Mensah, F., Muthelo, L., Ngwenya, M. W., Mphasha, M., & Kauhanen, J. (2025). Digital health interventions for pregnant women and mothers with under 5-year-olds in low- and middle-income countries: a scoping review. *Global Health Journal*, 9(2), 113–123. <https://doi.org/10.1016/j.glohj.2025.06.008>.
- Ahmed, S., Chase, L. E., Wagnild, J., Akhter, N., Sturridge, S., Clarke, A., Chowdhary, P., Mukami, D., Kasim, A., & Hampshire, K. (2022). Community health workers and health equity in low- and middle-income countries: systematic review and recommendations for policy and practice. *International Journal for Equity in Health*, 21(1), 1–30. <https://doi.org/10.1186/s12939-021-01615-y>.
- Akseer, N., & Phillips, D. E. (2024). Drivers of success in global health outcomes: A content analysis of Exemplar studies. *PLOS Global Public Health*, 4(5), 1–20. <https://doi.org/10.1371/journal.pgph.0003000>.
- Altobelli, L. C., Cabrejos-Pita, J., Penny, M., & Becker, S. (2020). A cluster-randomized trial to test sharing histories as a training method for community health workers in Peru. *Global Health: Science and Practice*, 8(4), 732–758. <https://doi.org/10.9745/GHSP-D-19-00332>.
- Briaux, J., Martin-Prevel, Y., Carles, S., Fortin, S., Kameli, Y., Adubra, L., Renk, A., Agboka, Y., Romedenne, M., Mukantambara, F., Van Dyck, J., Boko, J., Becquet, R., & Savy, M. (2020). Evaluation of an unconditional cash transfer program targeting children's first-1,000-days linear growth in rural Togo: A cluster-randomized controlled trial. *PLOS Medicine*, 17(11), 1–29. <https://doi.org/10.1371/journal.pmed.1003388>.
- Bridge, R., & Lin, T. K. (2024). Evidence on the impact of community health workers in the prevention, identification, and management of undernutrition amongst children under the age of five in conflict-affected or fragile settings: a systematic literature review. *Conflict and Health*, 18(1), 1–44. <https://doi.org/10.1186/s13031-024-00575-8>.
- Burger, R., du Plessis, L., Gangaidzo, T., Sadan, M., Slemming, W., & Wills, G. (2025). Priority interventions for reducing stunting in the complementary feeding age group in South Africa. *Development Southern Africa*, 42(6), 885–903. <https://doi.org/10.1080/0376835X.2025.2596786>.
- De Sanctis, V., Soliman, A., Alaaraj, N., Ahmed, S., Alyafei, F., & Hamed, N. (2021). Early and long-term consequences of nutritional stunting: from childhood to adulthood. *acta Bio-Medica : Atenei Parmensis*, 92(1), 1–12. <https://doi.org/10.23750/abm.v92i1.11346>.
- Edelman, A., Marten, R., Dhillon, I., Suresh, A. G., Thamarangsi, T., Grundy, J., Jhalani, M., & Rasanathan, K. (2025). Primary health care in the context of the COVID-19 pandemic in 10 South-East Asian countries: a cross-case synthesis with lessons for future health systems strengthening. *BMJ Global Health*, 10(Suppl 2), 1–12. <https://doi.org/10.1136/bmjgh-2024-018076>.
- Elisaria, E., Mrema, J., Bogale, T., Segafredo, G., & Festo, C. (2021). Effectiveness of integrated nutrition interventions on childhood stunting: a quasi-experimental evaluation design. *BMC Nutrition*, 7(1), 1–8. <https://doi.org/10.1186/s40795-021-00421-7>.
- Endalamaw, A., Khatri, R. B., Erku, D., Zewdie, A., Wolka, E., Nigatu, F., & Assefa, Y. (2024). Barriers and strategies for primary health care workforce development: synthesis of evidence. *BMC*

- Primary Care*, 25(1), 1–11. <https://doi.org/10.1186/s12875-024-02336-1>.
- Gines, V., Rodriguez, J., Lobaina, D., Sacca, L., Torres, M., & Mejia, M. C. (2025). Generational perspectives and advocacy barriers among community health workers: implications for public health workforce leadership. *Frontiers in Public Health*, 13(8), 1–7. <https://doi.org/10.3389/fpubh.2025.1616506>.
- Godana, K. T., Birhanu, Z., Nemera, G., Eba, K., Balcha, F., Assefa, Y., V. Damme, W., & Decat, P. (2025). Multidimensional performance enablers of Ethiopian community-based health extension program: A scoping review. *PLOS One*, 20(6), 1–23. <https://doi.org/10.1371/journal.pone.0324377>.
- Gopalakrishnan, L., Diamond-Smith, N., Avula, R., Menon, P., Fernald, L., Walker, D., & Patil, S. (2021). Association between supportive supervision and performance of community health workers in India: a longitudinal multi-level analysis. *Human Resources for Health*, 19(1), 1–10. <https://doi.org/10.1186/s12960-021-00689-7>.
- Gupta, S., Chatterjee, A., Singhal, K., Pakhare, A. P., & Joshi, A. (2025). Understanding the drivers of effective supportive supervision: a realist evaluation of community health worker programs in Madhya Pradesh, India. *BMC Health Services Research*, 25(1), 1–9. <https://doi.org/10.1186/s12913-025-13567-y>.
- Hasanbasri, M., Maula, A. W., Wiratama, B. S., Espressivo, A., & Marthias, T. (2024). Analyzing primary healthcare governance in indonesia: perspectives of community health workers. *Cureus*, 16(3), 1–14. <https://doi.org/10.7759/cureus.56099>.
- Herrera, C. A., Bascolo, E., Villar-Urbe, M., Houghton, N., Bennett, S., Castro, M. C., Massuda, A., Bauhoff, S., Cunningham Kain, M. K., Figueroa, J. P., Flores, W., Gaitán-Rossi, P., Garcia Elorrio, E., Giovanella, L., Guanais, F., Haggerty, J., Peña, S. H., Luna, D., Macinko, J., ... Jimenez, C. Z. (2025). No time to wait: resilience as a cornerstone for primary health care across Latin America and the Caribbean, a World Bank-PAHO Lancet Regional Health Americas Commission. *The Lancet Regional Health - Americas*, 50(10), 1–49. <https://doi.org/10.1016/j.lana.2025.101240>.
- Ibor, G. O., Oyakhilome, V., & Atulomah, N. O. (2025). Interventions for enhancing child survival practices among caregivers of under-five children in Sub-Saharan Africa: a scoping review. *BMC Public Health*, 25(1), 1–11. <https://doi.org/10.1186/s12889-025-25627-3>.
- Kasper, T., Yamey, G., Dwyer, S., McDade, K. K., Lidén, J., Lüdemann, C., Diab, M. M., Ogbuogi, O., Poodla, P., Schrade, C., Thoumi, A., Zimmerman, A., Assefa, Y., Allen, L. N., Basinga, P., Garcia, P. J., Jackson, D., Mwanyika, H., Nugent, R., ... Benn, C. (2023). Rethinking how development assistance for health can catalyse progress on primary health care. *The Lancet*, 402(10418), 2253–2264. [https://doi.org/10.1016/S0140-6736\(23\)01813-5](https://doi.org/10.1016/S0140-6736(23)01813-5).
- Khatri, R. B., Endalamaw, A., Erku, D., Wolka, E., Nigatu, F., Zewdie, A., & Assefa, Y. (2024). Enablers and barriers of community health programs for improved equity and universal coverage of primary health care services: A scoping review. *BMC Primary Care*, 25(1), 1–17. <https://doi.org/10.1186/s12875-024-02629-5>.
- Khatri, R. B., Erku, D., Endalamaw, A., Wolka, E., Nigatu, F., Zewdie, A., & Assefa, Y. (2023). Multisectoral actions in primary health care: A realist synthesis of scoping review. *PLOS ONE*, 18(8), 1–18. <https://doi.org/10.1371/journal.pone.0289816>.
- Klaic, M., Kapp, S., Hudson, P., Chapman, W., Denehy, L., Story, D., & Francis, J. J. (2022). Implementability of healthcare interventions: an overview of reviews and development of a conceptual framework. *Implementation Science*, 17(1), 1–20. <https://doi.org/10.1186/s13012-021-01171-7>.
- Klemm, G. C., Kayanda, R., Kazoba, A., McCann, J., Nnally, L. P., & Dickin, K. L. (2022). Translating multisectoral nutrition policy into community practice: participation of nutrition officers in tanzania fosters effective collaborative strategies to improve child nutrition. *Current Developments in Nutrition*, 6(4), 1–12. <https://doi.org/10.1093/cdn/nzac030>.
- Koohpayezadeh, J., Azami-Aghdash, S., Derakhshani, N., Rezapour, A., Alaei Kalajahi, R., Sajjadi Khasraghi, J., Nikoomanesh, M., Sabetrohani, H., & Soleimanpour, S. (2021). Best practices in achieving universal health coverage: a scoping review. *Medical Journal of The Islamic Republic of Iran*, 30(10), 1–35. <https://doi.org/10.47176/mjiri.35.191>.
- Lismidiati, W., Widyawati, W., Hapsari, E. D., Akhmadi, A., & Sumunar, D. S. E. W. (2025). The need to enhance the use of teleconsultation: a qualitative study among health providers to reduce the

- burden of low birth weight. *International Journal of Telemedicine and Applications*, 2025(1), 1–12. <https://doi.org/10.1155/ijta/2336484>.
- Mamat, R., Erdiwansyah, Ghazali, M. F., Rosdi, S. M., Syafrizal, & Bahagia. (2025). Strategic framework for overcoming barriers in renewable energy transition: A multi-dimensional review. *Next Energy*, 9(10), 1–27. <https://doi.org/10.1016/j.nxener.2025.100414>.
- Mchome, Z., Yousefzadeh, S., Bailey, A., & Haisma, H. (2020). “When i breastfeed, it feels as if my soul leaves the body”: maternal capabilities for healthy child growth in rural southeastern Tanzania. *International Journal of Environmental Research and Public Health*, 17(17), 1–17. <https://doi.org/10.3390/ijerph17176215>.
- McNab, S. E., Dryer, S. L., Fitzgerald, L., Gomez, P., Bhatti, A. M., Kenyi, E., Somji, A., Khadka, N., & Stalls, S. (2022). The silent burden: a landscape analysis of common perinatal mental disorders in low- and middle-income countries. *BMC Pregnancy and Childbirth*, 22(1), 1–14. <https://doi.org/10.1186/s12884-022-04589-z>.
- Meiyenti, S., Effendi, N., Djafri, D., & Devianto, D. (2025). Cultural barriers in stunting prevention policy implementation: an ethnographic study in West Sumatra, Indonesia. *Cogent Social Sciences*, 11(1), 1–19. <https://doi.org/10.1080/23311886.2025.2586379>.
- Miranda, A. V., Sirmareza, T., Nugraha, R. R., Rastuti, M., Syahidi, H., Asmara, R., & Petersen, Z. (2023). Towards stunting eradication in Indonesia: Time to invest in community health workers. *Public Health Challenges*, 2(3), 1–6. <https://doi.org/10.1002/pubh2.108>.
- Moloro, A. H., Sabo, K. G., Mare, K. U., Wengoro, B. F., Endrias, E. E., Ibrahim, R. M., Dubie, T., Ebrahim, O. A., & Lahole, B. K. (2026). Prevalence of stunting and its determinants among children under five in 35 Sub-Saharan African countries (2011–2024): Insights from recent demographic health survey data using a generalized linear mixed-effects model with robust poisson regression. *PloS One*, 21(3), 1–29. <https://doi.org/10.1371/journal.pone.0344358>.
- Mulyani, A. T., Khairinisa, M. A., Khatib, A., & Chaerunisaa, A. Y. (2025). Understanding stunting: impact, causes, and strategy to accelerate stunting reduction—a narrative review. *Nutrients*, 17(9), 1–29. <https://doi.org/10.3390/nu17091493>.
- Nikoloski, Z., Wannis, H., Menchini, L., & Chatterjee, A. (2021). Primary healthcare and child and maternal health in the Middle East and North Africa (MENA): A retrospective analysis of 29 national survey data from 13 countries. *SSM - Population Health*, 13(3), 1–10. <https://doi.org/10.1016/j.ssmph.2021.100727>.
- Ogut, E. A., Ellis, A. S., Hester, K. A., Rodriguez, K., Sakas, Z., Jaishwal, C., Yang, C., Dixit, S., Bose, A. S., Sarr, M., Kilembe, W., Bednarczyk, R., & Freeman, M. C. (2024). Success in vaccination programming through community health workers: a qualitative analysis of interviews and focus group discussions from Nepal, Senegal and Zambia. *BMJ Open*, 14(4), 1–15. <https://doi.org/10.1136/bmjopen-2023-079358>.
- Owoputi, I., Hoddinott, J., Kayanda, R., Bezner Kerr, R., & Dickin, K. (2024). Community health workers’ targeting of women for health and nutrition home visits in rural tanzania: a mixed-methods study. *Current Developments in Nutrition*, 8(6), 1–17. <https://doi.org/10.1016/j.cdnut.2024.103780>.
- Pitsillidou, M., Roupas, Z., Farmakas, A., & Noulas, M. (2021). Factors affecting the application and implementation of evidence-based practice in nursing. *Acta Informatica Medica*, 29(4), 1–7. <https://doi.org/10.5455/aim.2021.29.281-287>.
- Rai, A., Khatri, R. B., & Assefa, Y. (2024). Primary health care systems and their contribution to universal health coverage and improved health status in seven countries: an explanatory mixed-methods review. *International Journal of Environmental Research and Public Health*, 21(12), 1–18. <https://doi.org/10.3390/ijerph21121601>.
- Ramirez, T., Achore, M., & Hackett, M. (2026). Community health workers’ perspectives on challenges faced by diverse, low-income suburban residents in Long Island, New York, United States. *SSM - Health Systems*, 6(6), 1–8. <https://doi.org/10.1016/j.ssmhs.2025.100162>.
- Ratshidi, L., Grobbelaar, S., & Botha, A. (2022). Conceptualising the factors influencing community health workers’ preparedness for ict implementation: a systematised scoping review. *Sustainability*, 14(14), 1–25. <https://doi.org/10.3390/su14148930>.
- Schleiff, M. J., Aitken, I., Alam, M. A., Damtew, Z. A., & Perry, H. B. (2021). Community health workers at the dawn of a new era: 6. Recruitment, training, and continuing education. *Health Research Policy and Systems*, 19(S3), 1–28. <https://doi.org/10.1186/s12961-021-00757-3>.

- Schriger, S. H., Knowles, M., Daglieri, T., Kangovi, S., & Beidas, R. S. (2024). Barriers and facilitators to implementing an evidence-based community health worker model. *JAMA Health Forum*, 5(3), 1–13. <https://doi.org/10.1001/jamahealthforum.2024.0034>.
- Shorbaji, K., Shedul, G. L., Ripiye, N., Ojji, D., Hirschhorn, L. R., Goss, C. W., & Huffman, M. D. (2026). The evolution of supportive supervision in low- and middle-income countries. *BMC Global and Public Health*, 4(1), 1–8. <https://doi.org/10.1186/s44263-025-00230-1>.
- Shrestha, P., Afsana, K., Weerasinghe, M. C., Perry, H. B., Joshi, H., Rana, N., Memon, Z. A., Khaled, N., Malhotra, S., Bhardwaj, S., Kafle, S., Inagaki, Y., Schimdt, A., Hodgins, S., Neupane, D., & Rao, K. D. (2024). Strengthening primary health care through community health workers in South Asia. *The Lancet Regional Health - Southeast Asia*, 28(9), 1–14. <https://doi.org/10.1016/j.lansea.2024.100463>.
- Sukmawati, S., Hermayanti, Y., Fadlyana, E., Maulana, I., & Mediani, H. S. (2025). Health cadres' experiences in detecting and preventing childhood stunting in Indonesia: a qualitative study. *BMC Public Health*, 25(1), 1–10. <https://doi.org/10.1186/s12889-025-24192-z>.
- Sutarsa, I. N., Campbell, L., Dwi Ariawan, I. M., Kasim, R., Marten, R., Rajan, D., & Hall Dykgraaf, S. (2024). Multisectoral interventions and health system performance: a systematic review. *Bulletin of the World Health Organization*, 102(07), 521–532F. <https://doi.org/10.2471/BLT.23.291246>.
- Tengepare, F. X., Chirawurah, D., & Apanga, S. (2024). Improving maternal and child nutrition services in community based health planning and services zones in the jirapa municipality of northern ghana-challenges and strategies: the perspective of community health officers. *BMC Nutrition*, 10(1), 1–10. <https://doi.org/10.1186/s40795-024-00848-8>.
- Vaivada, T., Akseer, N., Akseer, S., Somaskandan, A., Stefopoulos, M., & Bhutta, Z. A. (2020). Stunting in childhood: an overview of global burden, trends, determinants, and drivers of decline. *The American Journal of Clinical Nutrition*, 112(9), 777S–791S. <https://doi.org/10.1093/ajcn/nqaa159>.
- Vassilakou, T. (2021). Childhood Malnutrition: Time for Action. *Children*, 8(2), 1–3. <https://doi.org/10.3390/children8020103>.
- Werner, K., Kak, M., Herbst, C. H., & Lin, T. K. (2023). The role of community health worker-based care in post-conflict settings: a systematic review. *Health Policy and Planning*, 38(2), 261–274. <https://doi.org/10.1093/heapol/czac072>.
- Wulandari, R. D., Laksono, A. D., Bela, S. R. A., Fatiah, M. S., Rohmah, N., Sukoco, N. E. W., Nandini, N., & Luthviatin, N. (2025). Determining policy targets for reducing the number of stunted papuan children under five years old in Indonesia: a secondary data analysis of the 2022 Indonesian national nutritional status survey. *Malaysian Journal of Medical Sciences*, 32(3), 1–6. <https://doi.org/10.21315/mjms-10-2024-798>.
- Yorick, R., Khudonazarov, F., Gall, A. J., Pedersen, K. F., & Wesson, J. (2021). Volunteer community health and agriculture workers help reduce childhood malnutrition in Tajikistan. *Global Health: Science and Practice*, 9(Supplement 1), S137–S150. <https://doi.org/10.9745/GHSP-D-20-00325>.