

School feeding programme as a predictor for enrolment and attendance in lower primary schools

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ABSTRACT

School feeding programmes (SFPs) are among the most widely adopted social protection instruments in education systems worldwide, reaching an estimated 466 million children through government-led schemes. This article synthesises evidence from fifteen peer-reviewed studies to examine the relationship between school feeding and four core education outcomes: enrolment, attendance, retention, and learning achievement. Using a secondary desktop review methodology, the article finds consistent evidence that SFPs raise enrolment and attendance, particularly among girls and in food-insecure settings, and more equivocal evidence regarding academic performance, which appears contingent on programme duration, meal quality, and complementary inputs such as teaching quality and infrastructure. Economic evaluations suggest school feeding generates substantial multi-sectoral returns, but sustainability depends on predictable financing, transparent procurement, and integration with broader education-sector planning. The article concludes that school feeding should be positioned as a core education investment rather than a stand-alone welfare measure, with monitoring systems that link meal delivery directly to learning indicators.

Keywords: school feeding, enrolment, attendance, learning outcomes, education policy, sub-Saharan Africa



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1. INTRODUCTION

Global education systems have struggled for decades to reconcile the ambition of universal, high-quality primary schooling with the reality that hunger and food insecurity routinely interrupt children's access to and engagement with learning. School feeding programmes interventions that provide meals, snacks, or take-home food rations to children in the school setting have emerged as one of the most scalable responses to this problem, operating in the great majority of the world's countries and reaching hundreds of millions of children each year. Their appeal rests on a straightforward theory of change: by lowering the direct and opportunity costs of sending a child to school and by alleviating short-term hunger during the school day, meals are expected to increase the probability that children enrol, attend regularly, remain in school, and learn more effectively once there.

The empirical literature that has accumulated around this theory of change is large, geographically diverse, and methodologically heterogeneous. Early foundational work situated school feeding within a broader social protection and human development framework, treating it as an instrument that could simultaneously advance nutrition, education, and local economic development goals (Bundy et al., 2009). Subsequent research has tested each link in the causal chain using a range of designs, from randomised controlled trials in Burkina Faso, India, and Uganda, to quasi-experimental and cohort designs in Ethiopia, Nigeria, South Africa, and Tanzania, to large cross-country panel analyses of coverage and cost. Taken together, this body of work offers a genuine opportunity to assess where the evidence for school feeding is strong, where it is contested, and what design features appear to matter most.

This is a timely exercise. Public expenditure on school feeding has grown sharply in recent years, and coverage has expanded fastest in the regions with the greatest concurrent food insecurity and the largest unmet demand for quality basic education, particularly sub-Saharan Africa. Governments and development partners are increasingly being asked to justify continued or expanded investment in school meals not only on humanitarian grounds but as a defensible use of education-sector resources, one that should be evaluated against measurable indicators of access, retention, and learning. At the same time, a strand of the literature cautions that the relationship between feeding and learning outcomes specifically is less settled than the relationship between feeding and participation outcomes, with several well-designed studies finding no significant effect, or even short-term negative effects, on test scores.

Against this backdrop, the present article asks three related questions. First, what does the peer-reviewed evidence indicate about the effect of school feeding on enrolment and attendance? Second, what does the evidence indicate about the effect of school feeding on retention and dropout? Third, and most contested, what does the evidence indicate about the effect of school feeding on measured learning outcomes, and under what conditions do positive effects on participation translate into positive effects on achievement? A subsidiary aim is to examine whether these relationships are moderated by gender, given the frequent claim in policy literature that attendance gains from school feeding are systematically larger for girls than for boys.

The article proceeds as follows. Section 2 sets out the methodology, which is a secondary desktop review of fifteen peer-reviewed sources selected for their direct relevance to the education outcomes of school feeding. Section 3 presents the results of the review, organised thematically around scale and coverage, enrolment and attendance effects, retention and dropout, learning outcomes, gender-differentiated effects, and the economic case for investment. Section 4 discusses the findings, addressing the tension between consistent participation effects and mixed learning effects, the design features that appear to explain variation in results, and the limitations of the underlying evidence base. Section 5 concludes with implications for policy and for future research and monitoring.

2. METHODS

2.1. Data collection technique

This article is based on a secondary desktop review of published, peer-reviewed literature on school feeding programmes and primary-school education outcomes. A desktop review was selected as the appropriate method because the objective was not to generate new primary data but to synthesise and

critically appraise an existing, dispersed body of empirical evidence to draw policy-relevant conclusions, an approach consistent with prior narrative and systematic reviews in this field (Wall et al., 2022).

2.2. Search and selection strategy

Relevant literature was identified through structured searches of academic databases and journal repositories using combinations of the terms "school feeding," "school meals," "enrolment," "attendance," "dropout," "retention," "learning outcomes," and "academic performance," combined with regional terms (e.g., "sub-Saharan Africa," "Ethiopia," "Nigeria," "India," "South Africa"). Searches were supplemented by citation tracking from key review articles to identify frequently cited primary studies. Sources were prioritised for inclusion if they (a) were published in a peer-reviewed journal with an assigned Digital Object Identifier (DOI); (b) reported empirical findings on at least one of the four outcomes of interest enrolment, attendance, retention/dropout, or learning/academic performance; (c) used an identifiable research design (randomised controlled trial, quasi-experimental, prospective cohort, propensity-score matching, panel or cross-country analysis, or systematic review); and (d) were published within approximately the last two decades, with priority given to studies from the last ten years, to reflect the current policy and programming environment.

2.3. Sample

Fifteen sources met these criteria and form the evidentiary basis of this review (see References). The sample spans multiple regions and study designs: foundational multi-country synthesis (Bundy et al., 2009); randomised and quasi-experimental studies from India (Afridi, 2011; Chakraborty & Jayaraman, 2019); prospective cohort and quasi-experimental studies from Ethiopia (Desalegn et al., 2021; Destaw et al., 2022); cross-sectional and matching studies from Nigeria and South Africa (Barnabas et al., 2024; Mostert, 2021); cross-country panel analyses from sub-Saharan Africa (Gelli, 2015; Gelli et al., 2007); a systematic review of African evidence (Wall et al., 2022); a qualitative and policy-oriented review of programme sustainability (Harvey et al., 2024) and design (Roothaert et al., 2021); and multi-country economic evaluations of programme cost and return on investment (Drake et al., 2020; Irizarry et al., 2024; Verguet et al., 2020).

2.4. Analytical approach

Findings from the fifteen sources were extracted and organised thematically according to the four outcomes of interest, together with a fifth theme capturing economic returns and a sixth capturing gender-differentiated effects. Where studies reported quantitative effect sizes, these are reported alongside the study context and design to allow the reader to judge the strength and generalisability of the evidence. Because the included studies vary substantially in design, sample, and context, this review does not attempt a formal meta-analysis; instead, it applies a narrative synthesis approach, explicitly noting areas of convergence and divergence across studies. This approach is a recognised and appropriate method for policy-relevant secondary review, particularly where the underlying evidence base is heterogeneous in design and setting.

3. RESULTS

3.1 Scale, coverage, and the policy context

School feeding is now a near-universal feature of education systems. Multi-country evidence indicates that government-led school feeding programmes reach several hundred million children globally, with coverage and public expenditure on school meals having grown substantially over the past decade, a trend the literature links to the sector's post-2020 repositioning as an instrument of both social protection and education-system recovery (Bundy et al., 2009; Drake et al., 2020). Programme costing analyses model the scale of investment required to reach the world's most food-insecure children and estimate that further expansion, if properly targeted, would represent a comparatively modest addition to existing global education and social protection budgets relative to the population it would benefit (Drake et al., 2020).

3.2 Enrolment and attendance

The most consistent finding across the reviewed literature concerns school participation, enrolment, and attendance rather than achievement. Cross-country panel evidence from 32 sub-Saharan African countries found that school feeding modalities were associated with measurable gains in primary enrolment, with effects broadly similar whether meals were delivered on-site or through take-home rations (Gelli, 2015). An earlier study using World Food Programme–assisted schools found that the introduction of feeding programmes was associated with substantial first-year increases in absolute enrolment, with especially large gains recorded for girls (Gelli et al., 2007).

Country-level studies corroborate this pattern. In Nigeria, propensity-score matching analysis of pupils in the northeastern region found that school feeding had a statistically significant positive influence on both enrolment and classroom attendance, a result the authors interpret through a human-capital lens in which the reduced cost of schooling shifts household decisions toward sending children to class (Barnabas et al., 2024). In India, a difference-in-differences evaluation of the transition from monthly food-grain distribution to daily hot meals found a significant improvement in daily participation rates, with the effect on girls' attendance in the first grade markedly larger than the effect on boys' attendance (Afridi, 2011). In South Africa, an instrumental-variables analysis using a two-stage least squares model found that the national school feeding programme had a significant positive effect on school attendance, with the effect larger in rural than in urban settings (Mostert, 2021).

Not every study report uniformly positive attendance effect, however. Evidence from Ethiopia's Sidama zone found, in an earlier cross-sectional assessment, no significant relationship between school feeding and enrolment, attendance, or dropout, a result the same body of literature later revised when a subsequent prospective cohort study in the same zone benefiting from a longitudinal design and an academic year of follow-up across sixteen public schools found that feeding-programme beneficiaries experienced significantly better attendance and lower absenteeism than non-beneficiaries (Desalegn et al., 2021). The authors attribute the divergence between the two Ethiopian studies partly to improvements in programme implementation over time and partly to the superior ability of a prospective cohort design to isolate programme effects from confounding factors that affect cross-sectional comparisons.

3.3 Retention and dropout

Evidence on retention is somewhat thinner than that on enrolment and attendance but points in a consistent direction. A mixed-methods study of primary schools in Kebbi State, Nigeria, using survey, interview, and secondary-source data, found that school feeding programmes were positively associated with all three of enrolment, retention, and completion rates, with the authors linking the effect to reduced household poverty pressure and improved pupil well-being (referenced through the broader Nigerian evidence synthesised in Barnabas et al., 2024). Consistent with this, take-home ration components food provided to the household contingent on the child's attendance have been found in the sub-Saharan African literature to be particularly effective at reducing dropout among girls in the higher primary grades, where the opportunity cost of a girl's time (for household labour, water collection, or early marriage) tends to rise (Gelli et al., 2007).

Table 3.1 summarises the design, context, and reported participation effects of the six reviewed studies with the most directly comparable findings on enrolment, attendance, and retention.

Table 3.1:*Study design and participation outcomes (enrolment, attendance, retention)*

Study	Country region /	Design	Sample context /	Enrolment effect	Attendance effect	Retention / dropout effect
Gelli (2015)	32 sub-Saharan African countries	Cross-country panel analysis	National primary schools; on-site meals vs. take-home rations	Positive; broadly comparable across delivery modalities	Not the primary outcome measured	Not the primary outcome measured
Gelli, Meir & Espejo (2007)	Sub-Saharan Africa (WFP-assisted schools)	Multi-country programme evaluation	Food-for-Education programme schools	+28% for girls; +22% for boys in the first year	Positive	Take-home rations linked to lower dropout among older girls
Barnabas, Bavorova & Madaki (2024)	Northeastern Nigeria	Propensity score matching	Primary schools with vs. without SFP	Statistically significant positive effect	Statistically significant positive effect	Not directly measured
Afridi (2011)	Rural India	Difference-in-differences (school panel)	Transition from monthly grain distribution to daily hot meals	Not the primary outcome measured	Grade 1 girls' attendance +12 percentage points; boys' effect positive but not statistically significant	Not directly measured
Mostert (2021)	South Africa	Two-stage least squares (2SLS)	National household survey data	Not the primary outcome measured	Statistically significant positive effect, larger in rural than urban areas	Not directly measured
Desalegn et al. (2021)	Southern Ethiopia (Sidama zone)	Prospective cohort (1 academic year; 16 schools; n = 480)	SFP beneficiaries vs. non-beneficiaries	Not the primary outcome measured	Significantly fewer absences among beneficiaries	Not directly measured

Note. "Not the primary outcome measured" indicates the study's design did not isolate this specific outcome, not that the effect was absent or null.

3.4 Learning and academic performance

The evidence on learning outcomes is the least uniform of the four outcome domains, and several of the reviewed studies explicitly flag this as an area of contested or equivocal findings. On one hand, the strongest available quasi-experimental evidence from India's midday meal programme, using variation in the duration of a child's exposure to the scheme finds a positive and significant effect of programme

exposure on learning achievement in language and mathematics, with the authors identifying improved school attendance as the primary mechanism through which feeding translates into learning gains (Chakraborty & Jayaraman, 2019). A companion difference-in-differences study of the extension of midday meals to upper-primary grades in Delhi similarly found a significant improvement in attendance and classroom attention, although this particular study did not detect a corresponding increase in test scores over its relatively short four-month observation window (a finding the wider literature attributes to the limited time horizon of the evaluation rather than to an absence of effect).

On the other hand, several African studies find weaker or null relationships between feeding and measured academic performance. The Southern Ethiopia prospective cohort study found that feeding-programme beneficiaries had significantly fewer absences than non-beneficiaries but did not find a correspondingly large or statistically robust improvement in average academic scores across the ten subjects assessed (Desalegn et al., 2021). A related Ethiopian study set in Addis Ababa reports a more favourable relationship between school meals and educational outcomes, including performance, once local implementation had matured (Destaw et al., 2022). Reviewing the wider sub-Saharan African literature, a systematic review of nine controlled and cohort studies published in the decade to 2022 found a generally positive correlation between school feeding and educational outcomes taken as a composite, while cautioning that individual studies varied considerably in the strength and statistical significance of their learning-specific findings, and that programmes are more consistently linked to participation gains than to test-score gains (Wall et al., 2022).

The South African evidence offers a further nuance: the two-stage least squares analysis found that school feeding had a significant positive effect on academic achievement as well as attendance, but that this effect was larger for boys than for girls and larger in rural than in urban areas, a pattern that complicates any assumption that participation and learning gains move together in a simple or uniform way across sub-groups (Mostert, 2021).

3.5 Gender-differentiated effects

A recurring theme across the sub-Saharan African literature is that school feeding tends to have a disproportionately positive effect on girls' school participation, consistent with the broader finding that structural and economic barriers to schooling time poverty, household labour demands, and the direct and opportunity costs of education weigh more heavily on girls in food-insecure settings (Gelli et al., 2007; Gelli, 2015). This pattern intersects with wider evidence on the role of compulsory, tuition-free primary education policy: a recent thirty-five-country analysis of school attendance in Africa found that once primary education was made compulsory and tuition-free, girls became as likely as, or slightly more likely than, boys to be reported as attending school in the large majority of countries studied, suggesting that school feeding operates most powerfully for gender equity when it is combined with, rather than substituted for, complementary access-oriented policy (Bose et al., 2025). This is consistent with the sub-Saharan African review's finding that take-home rations, sanitation provision, and community engagement around the specific barriers girls face are important complements to on-site meals (Gelli et al., 2007; Harvey et al., 2024).

3.6 Economic returns and programme design

The economic evaluation literature strengthens the case for viewing school feeding as an education investment. A fourteen-country benefit-cost analysis spanning Africa, Asia, and Latin America estimated that the multi-sectoral benefits of school feeding spanning health and nutrition, education, social protection, and the local agricultural economy yield an overall benefit-cost ratio in the range of seven to thirty-five, with the bulk of the estimated USD 180 billion in annual human-capital returns attributable to education-sector gains rather than health gains alone (Verguet et al., 2020). Complementary global costing work estimates that a benefit-cost ratio of approximately twenty to one is achievable when programmes are properly targeted at the world's poorest and most food-insecure children, a return comparable to other leading "best-buy" development interventions (Drake et al., 2020). Regional evidence from Latin America and the Caribbean similarly finds returns of up to nine dollars for every dollar invested, with the largest additional gains accruing when school meal programmes are integrated with complementary health and nutrition services rather than delivered as a stand-alone food transfer (Irizarry et al., 2024).

Design and delivery factors recur across the literature as key moderators of both the size and the sustainability of these returns. Home-grown school feeding models in which schools procure food from local smallholder farmers are found to strengthen local agricultural economies and community buy-in, but their long-term sustainability depends on reliable multi-year financing, transparent procurement, and active women's participation in food preparation and programme governance (Harvey et al., 2024; Roothaert et al., 2021). Where financing is unpredictable or procurement is opaque, the evidence suggests programmes are prone to interruption, undermining the very consistency of exposure that the learning-outcome literature identifies as the mechanism through which feeding translates into academic gains (Chakraborty & Jayaraman, 2019; Roothaert et al., 2021). Table 3.2 sets out the comparable learning-outcome and economic return-on-investment findings from the reviewed studies, illustrating both the more contested nature of the learning evidence and the consistently favourable economic evaluations.

Table 3.2:

Learning outcomes and economic return-on-investment evidence

Study	Outcome domain	Design / method	Key finding
Chakraborty & Jayaraman (2019)	Learning achievement (India)	Panel analysis exploiting variation in programme exposure duration	Positive, significant effect of longer exposure on language and mathematics scores; improved attendance identified as the primary mechanism
Wall et al. (2022)	Composite educational outcomes (sub-Saharan Africa)	Systematic review (9 controlled/cohort studies)	Generally positive correlation overall; participation effects more consistently significant than learning-specific effects
Destaw et al. (2022)	Educational outcomes incl. performance (Addis Ababa, Ethiopia)	Quasi-experimental comparison	More favourable relationship with performance once local implementation had matured
Desalegn et al. (2021)	Academic performance (Sidama zone, Ethiopia)	Prospective cohort	No statistically robust improvement in average academic score despite reduced absenteeism
Mostert (2021)	Academic achievement (South Africa)	Two-stage least squares (2SLS)	Statistically significant positive effect; larger for boys than for girls
Verguet et al. (2020)	Multi-sectoral economic return (14 LMICs)	Benefit-cost analysis	Benefit-cost ratio of 7–35; ≈USD 180 billion in annual human-capital returns, of which ≈USD 156 billion via the education channel
Drake et al. (2020)	Global costing and return on investment	Costing model / benefit-cost analysis	≈USD 20 return per USD 1 invested when programmes are properly targeted at the poorest, most food-insecure children
Irizarry et al. (2024)	Regional economic return (Latin America & Caribbean)	Benefit-cost analysis (14 countries)	Up to USD 9 return per USD 1 invested; larger returns when meals are integrated with complementary health and nutrition services

4. DISCUSSION

The pattern that emerges from this review is one of a strong and consistent evidence base for the effect of school feeding on school participation enrolment, attendance, and to a lesser extent retention set against a considerably more contested evidence base for its effect on measured learning outcomes. This asymmetry is itself informative. It suggests that the first link in the school-feeding theory of change, from meals to reduced cost of schooling to increased participation, operates reliably across highly diverse contexts, from rural Burkina Faso and Ethiopia to urban South Africa and Delhi. Households appear to respond predictably to the direct and indirect subsidy that a school meal represents, particularly in food-insecure settings where the meal itself may constitute a meaningful share of a child's daily nutritional intake.

The second link in the chain, from increased participation to improved learning, is evidently more fragile and more conditional. Several explanations for this fragility recur across the reviewed studies. First, duration and consistency of exposure matter: the Indian evidence that finds significant learning gains relies on multi-year exposure to the programme, whereas shorter observation windows, such as the four-month Delhi evaluation, are less likely to detect an effect even where attendance and attention improve, because standardised test performance responds to accumulated instructional exposure over time rather than to short-run participation changes (Chakraborty & Jayaraman, 2019). Second, learning outcomes are jointly determined by factors well beyond the school meal itself: teacher availability, instructional quality, class size, textbook availability, and home support, and the reviewed African evidence explicitly attributes the weaker or more gradual improvement in academic performance, relative to enrolment and attendance, to these complementary constraints rather than to any failure of the feeding intervention per se. Third, meal quality and nutritional adequacy plausibly matter for the cognitive pathway specifically, even where they matter less for the participation pathway: a meal that reduces short-term hunger may be sufficient to bring a child to school and keep them there, without being nutritionally sufficient to produce the concentration and cognitive gains needed to move test scores.

The gender-differentiated findings add a further layer of nuance that policymakers should not overlook. While the dominant narrative in the sub-Saharan African literature is that school feeding disproportionately benefits girls' participation, the South African evidence that finds a larger academic-performance effect for boys than for girls is a useful corrective against assuming that participation gains and learning gains are symmetric across sub-groups (Mostert, 2021). This reinforces the case, made explicitly in the compulsory-education-law literature, for designing school feeding as one component of a coordinated package alongside sanitation, protection from unpaid labour, and enforced tuition-free access rather than treating it as a sufficient stand-alone lever for gender parity in either participation or achievement (Bose et al., 2025; Gelli et al., 2007).

The economic evaluation literature offers a further, largely under-utilised argument for treating school feeding as core education infrastructure rather than discretionary welfare spending. The estimated benefit-cost ratios ranging from roughly seven to thirty-five across the multi-sectoral analyses reviewed here are sensitive to assumptions about local wage levels and the counterfactual value of an additional year of schooling, and the literature itself flags this sensitivity as a limitation (Verguet et al., 2020). Even at the conservative end of this range, however, the returns compare favourably with other widely endorsed development interventions, and the bulk of the estimated benefit consistently accrues through the education channel rather than through health and nutrition gains alone. This has a direct implication for education-sector budgeting: ministries of education, not only ministries of health or social protection, have a strong efficiency case for co-financing and administratively integrating school meal programmes.

Several limitations of the underlying evidence base, and by extension of this review, should be acknowledged. First, the reviewed studies vary substantially in research design, ranging from randomised controlled trials to cross-sectional and propensity-score-matched comparisons, and the strength of causal inference varies; accordingly, cross-sectional designs, as the Ethiopian literature itself notes, are more vulnerable to confounding than the prospective cohort and quasi-experimental designs (Desalegn et al., 2021). Second, publication and citation patterns in this literature may favour studies reporting positive findings, and a genuinely comprehensive account would require a formal systematic review with explicit risk-of-bias assessment rather than the narrative synthesis undertaken here. Third, most of the learning-outcome evidence comes from South Asia and sub-Saharan Africa, with comparatively less rigorous, recent

evidence available from Latin America, East Asia, and high-income settings, limiting the generalisability of conclusions about the learning pathway. Finally, because school feeding is rarely implemented as an isolated intervention, it is frequently bundled with school health, water and sanitation, or broader social protection reforms; isolating its independent contribution to learning, as distinct from these co-occurring reforms, remains methodologically difficult even in well-designed studies.

5. CONCLUSION

This secondary desktop review of 15 peer-reviewed studies finds robust, geographically consistent evidence that school feeding programmes increase primary-school enrolment and attendance, with particularly strong effects in food-insecure settings and among girls. Evidence on retention is supportive though less extensively studied. Evidence on learning outcomes is real but considerably more conditional, appearing strongest where programmes have operated consistently over multiple years and weakest in short-duration or cross-sectional evaluations, and it is evidently moderated by complementary inputs to the classroom that lie outside the feeding intervention itself. Multi-sectoral economic evaluations indicate that the returns to school feeding, even when conservatively estimated, justify treating it as a core education investment rather than a peripheral welfare measure.

For policymakers, three implications follow directly from this evidence base. First, school feeding should be embedded within education-sector planning and budgeting, with explicit enrolment, attendance, retention, and learning targets attached to programme design, rather than administered solely as a nutrition or social-protection line item. Second, because the strongest learning effects in the reviewed literature are associated with sustained, multi-year programme exposure, financing arrangements should prioritise predictability and continuity over short-term or fragmented funding cycles. Third, given the evident interaction between school feeding and complementary interventions compulsory and tuition-free schooling policy, sanitation, teacher and material availability, and gender-responsive design school feeding is best understood, and best evaluated, as one component of a coordinated education-investment package rather than as a stand-alone remedy for either access or achievement gaps. Future research would benefit from more prospective cohort and randomised designs with multi-year follow-up specifically powered to detect learning effects, alongside more systematic, harmonised outcome reporting that would allow a formal meta-analysis of the association between school feeding and academic achievement across regions.

DECLARATION

Conflict of interest

The author declares no conflict of interest of any form regarding this work, and is, thus, his (own) original work done independently.

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