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School meal programme models and food environments in semi-arid region, Kilifi county, Kenya

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Abstract

School meal programmes are crucial for improving food and nutrition security and contributing to Sustainable Development Goals, particularly SDGs 2, 3, 4, and 5. In climate-vulnerable, Arid and Semi-Arid Lands (ASALs), aligning these programmes with planetary-friendly dietary principles defined as nutritionally adequate, diverse, plant-rich diets with low environmental impact drawn from locally available foods is both urgent and understudied.

This exploratory cross-sectional study, conducted between May and July 2025 in Kilifi County, Kenya, aimed to: (i) identify and compare existing school meal programme models; (ii) characterise school food environments, and (iii) assess the extent to which current practices align with planet-friendly school meal standards.

Using purposive and random sampling, 48 public primary schools were selected across four sub-counties. Data was collected via structured questionnaire administered to head-teachers and teachers responsible for school meal programmes. Descriptive statistics was employed to summarise programme characteristics and comparative analysis to identify patterns across models and school food environments.

Four models of school meal programmes were identified: government-funded (all schools at Early Childhood Development Education level), donor-supported (29 %), parent-led (4 %), and garden-based (10 %). Across all models, meals were predominantly blended sorghum, millet maize porridge (100 %), maize, rice and beans. Findings reflect centralised procurement systems and dependence on rainfall-sensitive staple crops. Dietary diversity was generally low, with vegetables seldom included (10 %) and fruits largely absent. Garden-based programmes improved access to indigenous vegetables such as amaranth, cowpeas, and black nightshade, though production volumes remained insufficient for school wide consumption. School food environments were characterised by vendors offering predominantly energy-dense, nutrient-poor foods including confectionery items, doughnuts, fried potatoes and cassava, with fruits (mangoes and bananas) available only inconsistently. There was no difference among schools in the foods sold around school premises (within 100 metres). All schools relied on firewood for cooking, contrary to clean energy policy directives.

These exploratory findings reveal school meal programmes in Kilifi County's ASALs fall substantially short of planet-friendly standards. Strengthening school food policies, diversifying procurement systems, and scaling nutrition-sensitive, climate-resilient strategies

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are critical priorities for ASALs school meal programmes. To understand which integrated strategies work best locally, longitudinal and interventional research is needed.

Keywords: Dietary diversity, food environment, Kenya, planet-friendly, school meal programmes, semi-arid region