General Information

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1. Migwani Sub-county Hospital. P.O. Box 16, Kitui, Kenya
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Rationale & background information

Globally, malnutrition accounts for 45% deaths of <5 year old children annually (World Health Organization, 2013). Africa most affected; 48 million undernourished children (UNICEF, 2019). In Kenya 26% of children stunted, 4% wasted, 11% underweight (Kenya National Bureau of Statistics (KNBS) and ICF Macro., 2014), 19.5% vitamin A deficient and 24.2% iron deficient (Ministry of Health, 2011). Kitui County an arid-semi arid region leads in prevalence of children malnutrition attributed to high poverty (47%) and high food insecurity (69%) (FAO, 2021). Nutritional status of Preschool children in Kitui County public health concern. Stunting 46%, wasting 3.4%, underweight 19.7% (Kenya National Bureau of Statistics (KNBS) and ICF Macro., 2014), vitamin A deficiency 35.1% (World Health Organization, 2006) and iron deficiency 29.5% (Maina, 2011). High prevalence of malnutrition due to sub-optimal diets of children they are inadequate, deficient in essential nutrients and lack diversity. It is costly to treat malnutrition.

Strategies to address malnutrition including supplementation, mass fortification among others adopted however prevalence of malnutrition among children is still high. A study by Swapna et al. (2022) among pregnant women in India reported that incorportation of pumpkin seeds flour into daily diet improved haemoglobin levels from 8.53 to 11.41. Another study by Syam, Kurniati and Zainal (2021) among adolescent girls in Turkey reported a significant increase in protein intake from 35.37% to 45.84% and iron from 3.33 to 8.60 following four weeks of pumpkin seed-wheat biscuit feeding. Also a study by Fandir et al. (2022) among 12-59 months old children in Indonesia reported that intake of pumpkin seed-wheat biscuits for two months led to significant reduction in underweight prevalence levels. A study by Buzigi, Siwela and Pillay (2022) reported that pumpkin pulp flour has potential to increase dietary intake of vitamin A, combating vitamin A deficiencies among children.Formulation of food products using locally available nutrient rich foods-pumpkin (neglected and underutilized) to enrich staple foods such as sorghum has potential to address nutritional inadequacies. Need for evidence on efficacy of nutrition interventions that utilize locally available foods in prevention/management of malnutrition. Few efficacy trials done in Kenya utilizing flour blend of sorghum and pumpkin pulp & seeds in improvement of nutritional status of children.

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Study goals and objectives

i). To evaluate the nutrient content of pumpkin, white and red sorghum grains

ii). To formulate and evaluate the nutrient content, sensory acceptability and microbial properties of sorghum-pumpkin flour blends.

iii). To determine the characteristics of children caregivers in Kitui County

iv). To evaluate the water hygiene and sanitation practices of children caregivers in Kitui County

v). To assess effect of effect of sorghum-pumpkin flour blend porridge intake on Vitamin A status, iron and wasting status of 36-47 month old children in Kitui County.

Study design

Cluster randomized trial. Study participants were child-caregiver pairs. Caregivers were above 18 years of age, while children were between 36-47 months old. Both health and moderately malnourished children participated in the study. The study involved providing porridge to children and feeding the same to them on a daily basis for six months. Assessment of dietary practices periodical on monthly basis. Morbidity patterns of the child were recorded every two weeks. Anthropometry measures of weight and height recorded periodically that is on monthly basis.Micronutrient status of the children that is the hemoglobin, vitamin A and iron levels determined both at the beginning and end of the study. The children in the control group received porridge prepared from sorghum flour while those in the intervention group were fed on pumpkin-sorghum flour blend porridge. Benefits of participating in the study included improvement of nutrient intake and nutritional status of children that due to porridge consumption. The study results will be of benefit to the society since it may provide for information on measures that may improve nutrient intake and help in reducing risk/managing malnutrition. Risks included discomforts that may occur during blood drawing process, trained

medical personnel were engaged. Other discomforts that may be experienced may include allergic reaction upon porridge consumption. However, no allergic reactions were recorded. Sampling techniques included purposive sampling and simple random sampling. Inclusion criteria -children aged 36-47 months, those whose caregivers agreed to periodical home visits and gave consent/assent to the study. Exclusion Criteria-Those who did not consent/assent to participate in study, those that had not resided in the area for a period of more than six months, those that were planning to move during the study period, visibly very sick children and those that had severe malnutrition