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Leveraging smallholder livestock production to reduce anemia: A qualitative study of three agroecological zones in Ghana

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ABSTRACT

Livestock production and Animal-Source Foods (ASFs) like meat, milk, and eggs are excellent sources of essential micronutrients, including iron and zinc. There is evidence that encouraging increased access to and consumption of these ASFs may either positively or negatively impact anemia, or have no nutritional effects. Drawing upon first-hand experiences in Ghana, this study sought to: (1) identify the main motivations for raising livestock in Ghana; (2) describe the major barriers to consuming ASFs, especially among women of reproductive age (WRA); and (3) explore the feasibility of different livestock-centered interventions to reduce anemia. Key informant interviews and focus group discussions were held with relevant stakeholders at different geographical scales - the national, regional, district, and community levels. The results suggest that livestock enable savings, allow resource-poor households to accumulate assets, and help finance planned and unplanned expenditures (e.g., school fees and illness). Due to these multiple and often pressing uses, direct consumption of home-reared ASFs is not a major priority, especially for poor households. Even when ASFs are consumed, intra-household allocation does not favor women and adolescent girls, demographic groups with particularly high micronutrient requirements. The study participants discussed possible interventions to address these challenges, including (1) increasing livestock ownership through in-kind credit; (2) encouraging nutrition-related behavior change; (3) improving livestock housing; and (4) hatchery management. The paper discusses these interventions based upon potential acceptance, feasibility, cost effectiveness, and sustainability in the Ghanaian context.

1. Introduction

Anemia is among the most common global nutritional disorders and public health concerns. Two billion people worldwide are anemic, and disproportionately so in women of reproductive age (WRA) and young children (World Health Organization, 2015). Global anemia prevalence is 38% in pregnant women (32.4 million) and 29% in non-pregnant women (496 million) (Stevens et al., 2013), with marked variation among regions. Indeed, nowhere is anemia prevalence higher than in sub-Saharan Africa (SSA). The World Health Organization estimates that 38% and 46% of non-pregnant and pregnant WRA, respectively, are anemic in SSA (World Health Organization, 2015). Especially for WRA, anemia is of grave concern since it contributes to adverse birth outcomes, including low birth weight, stillbirth, preterm birth, and increased child and maternal mortality (Galloway et al., 2002; Stevens et al., 2013).

Many factors underlie anemia risk, including parasitic infections, inherited blood disorders, numerous vitamin deficiencies (e.g., folic acid, vitamins B12 and A) (Balarajan et al., 2011), and acute or chronic immune activation (Weiss and Goodnough, 2005). However, iron deficiency is the most common cause of anemia (World Health Organization, 2015). Iron-deficiency anemia interventions have centered primarily on nutrition-specific approaches (e.g., dietary or micronutrient supplementation (Galloway et al., 2002; Vieira et al., 2017)), targeting the most proximate determinants of the problem (Bhutta et al., 2013). Much attention has also been given to fortification

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of cereals and other food crops, for example, production of iron-rich beans and pearl millet (Haas et al., 2013). Despite evidence of benefits, several factors have hindered the effectiveness of these interventions including supply chain challenges, and the difficulty of reaching target populations (Bhutta et al., 2013).

Nutrition-sensitive interventions, in contrast, focus on the underlying determinants of nutrition, including poverty, household food insecurity, and unhealthy living environments (Ruel et al., 2013). Such interventions have in part included the promotion of increased consumption of fruits and vegetables through homestead gardens (Helen Keller International, 1993). There is evidence, however, that livestock-based interventions may effectively complement such interventions focused on plant-source foods by promoting consumption of animal-source foods (ASFs) (Berti and Cossio, 2017; Leroy and Frongillo, 2007; Nicholson et al., 2003). Case studies increasingly suggest that greater consumption of ASFs may sustainably diversify and improve diet quality, nutritional status, and overall health (Osei et al., 2016; Rawlins et al., 2014). Iron intake could be enhanced by increasing the availability and consumption of home-produced ASF (Murphy and Allen, 2003). ASFs such as beef, fish, and poultry are rich sources of bioavailable heme iron, which is more easily absorbed than the iron contained in plants (Murphy and Allen, 2003; Zhang et al., 2016). Also, the selling of self-produced animals or animal products can increase household income that then could be used to purchase micronutrient-rich foods (Nicholson et al., 2003).

Despite the nutritional benefits of ASFs, livestock production may also negatively influence anemia risk (Fig. 1). First, not all ASFs are rich in iron. Cow milk, for example, contains little iron, and can actually enhance iron-deficiency among infants and toddlers through intestinal bleeding and competition of calcium with iron (Ziegler, 2011). Second, because women and girls commonly bear animal husbandry responsibilities, increased livestock production may decrease the amount and quality of time available for child care and feeding activities (Njuki et al., 2016). Third, keeping livestock could also increase risk of clinical and sub-clinical infection, either through contact with feces, or contamination of food and water sources (Randolph et al., 2007). The close proximity of domestic livestock to humans has been associated with transmission of *Campylobacter*, causing acute bloody diarrhea (Harvey et al., 2003). This is particularly problematic for young children, among whom fecal-oral transmission may commonly occur during play (Marquis et al., 1990). In sum, the multiple causal pathways involved make it difficult to accurately determine how livestock production may affect anemia risk in a given setting.

Accordingly, this study aimed to better understand the prospects and challenges of raising livestock to reduce anemia, while not increasing exposure to adverse health threats. Drawing upon a subset of qualitative data collected from experienced Ghanaian stakeholders, we sought to:

1. Identify the main motivations for raising livestock in Ghana;
2. Describe the major barriers to consuming ASFs, especially among WRA; and
3. Explore the feasibility of different livestock-centered interventions to reduce anemia through diverse pathways.

The conceptual framework in Fig. 1 is motivated by an evidence-based understanding of the linkages between animal agricultural production and capture, and anemia (e.g., Leroy and Frongillo, 2007; Nicholson et al., 2003). This case study was therefore designed to understand whether and how any of the casual linkages in the conceptual framework plays out across different regions of Ghana. As an open-ended qualitative study, however, we did not restrict data collection

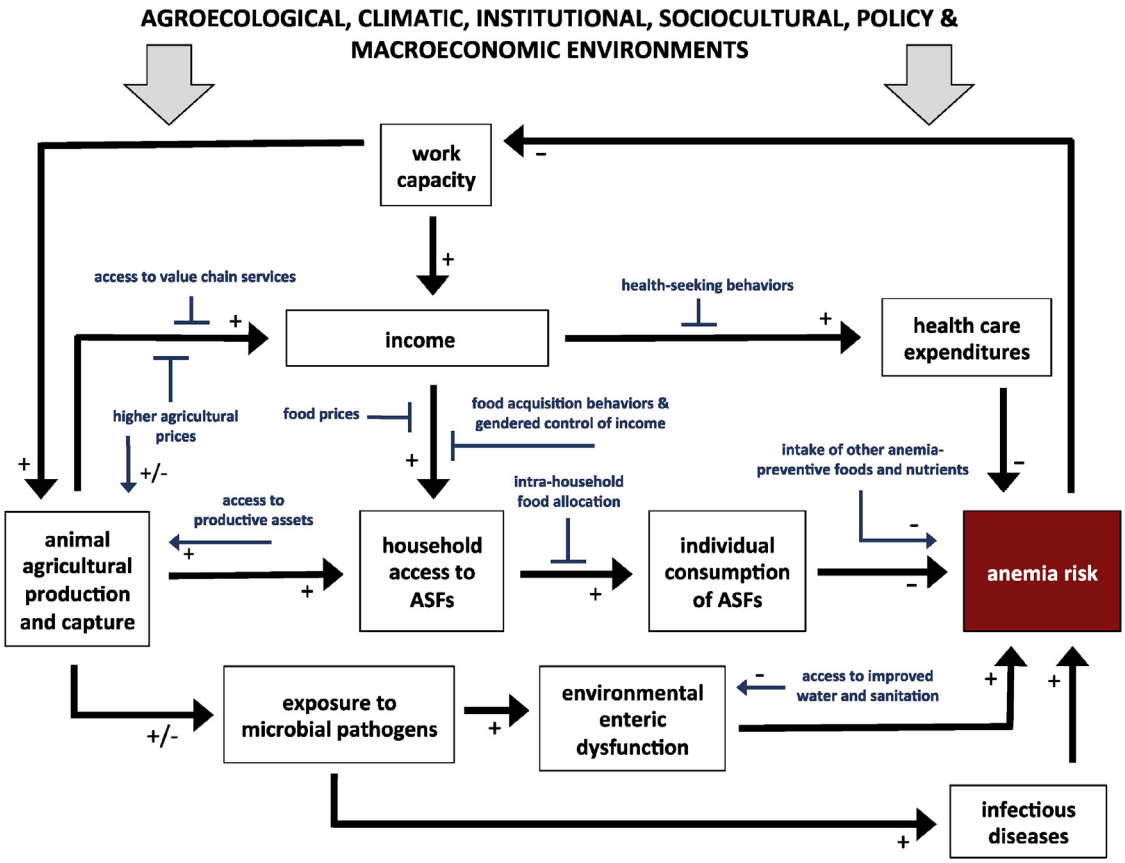

Fig. 1. Conceptual framework of hypothesized causal linkages between animal agricultural production and capture, and anemia among adolescent girls and women of reproductive age.