Inland fisheries critical for the diet quality of young children in sub-Saharan Africa

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Background

- In sub-Saharan Africa, 75% of children <5 years old do not have adequate diet diversity.[1]
- From 6 months of age, children require consumption of nutrient-rich foods such as animal-source foods (ASF) which provide critical vitamins, minerals, essential fatty acids and protein for optimal growth.[2]
- This study examined links between sources of ASF and the diets and growth of rural children (n=6,328) aged 6-23 months in Malawi and Zambia.
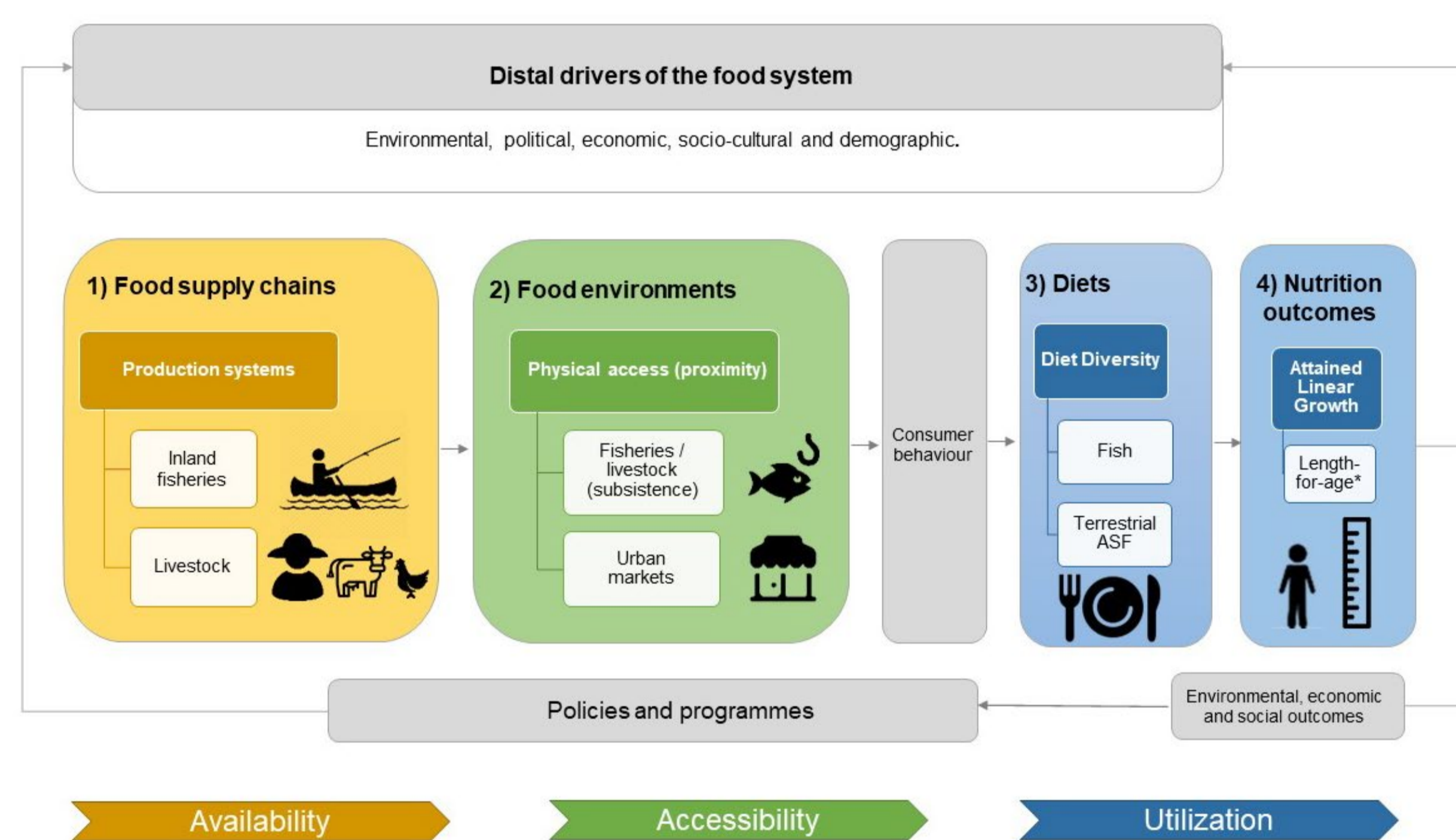

Fig 1: Conceptual framework adapted from the HLPE Food Systems Framework[8].

Methods

- Using a food systems approach (Fig 1), we employed a novel method of combining existing datasets of water resources and urban markets with diet data.
- We merged child nutrition and socioeconomic data from nationally-representative Demographic and Health Surveys for Malawi[3] and Zambia[4] with spatial variables:
  - Proximity to inland fisheries (meters to a permanent water body, with an aggregate area ≥0.1 km2);[5] and,
  - Proximity to urban markets (walking time to an urban center)[6]
- Sample was restricted to last-born children aged 6-23 months that reported on fish consumption (defined as 'child was given fish the day before') – from rural areas.
- Diet diversity defined as per World Health Organization cut-offs.[7]
- Data analysed with STATA v14 and five multivariate regression models.. Significant associations reported at p <0.05.
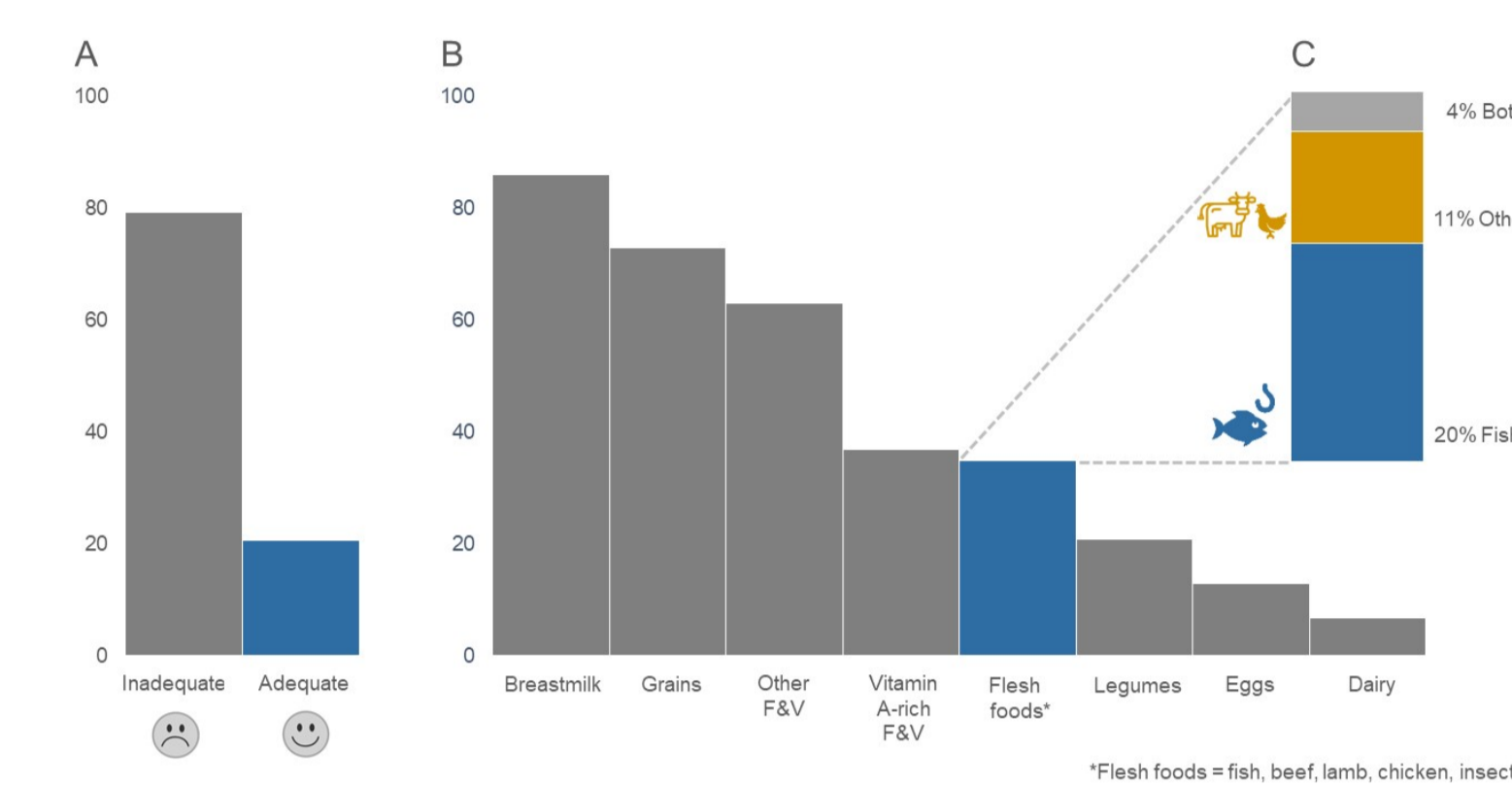
Results – Diet Diversity

Fig 2: Prevalence of children with adequate diet diversity (A), and breakdown of food group (B) and flesh food consumption (C).

*Flesh foods = fish, beef, lamb, chicken, insects

- The median diet diversity score was 3.0, meaning that 79% of children had inadequate diet diversity (Fig 2A),
- Flesh foods were the most consumed animal-source food group (35%) (Fig 2B),
- Fish was the most consumed flesh food with 20% of children relying on fish for a higher diet diversity score (Fig 2C).

Results – Spatial Analysis

- Children were more likely to consume fish if they lived close to permanent water bodies that support active fisheries (Malawi, β=-0.020, p=<0.001; Zambia, β=-0.008, p=<0.001), or far from urban markets (Malawi, β=0.004, p=<0.001; Zambia, β=0.002, p=<0.001) (Fig 3).
- The marginal change in the prevalence of fish consumption was -0.02 in Malawi and -0.008 in Zambia per meter of distance from inland fisheries, meaning that the prevalence of fish consumption dropped by 20% in Malawi and 8% in Zambia for every 1 km further away a child lived from inland fisheries.
- We found considerable geographic variation in fish consumption (Fig. 4).
  - In Malawi (Fig 4A), over 82% of children in Likoma district, close (≤5 km) to Lake Malawi ate fish, compared with Ntichisi district (6%) which is further away (>5 km).
  - In Zambia (Fig 4B), prevalence of fish consumption was highest in the Western district (38%) which is rich in fish from the Zambezi River Basin, compared with the Eastern district (6%).
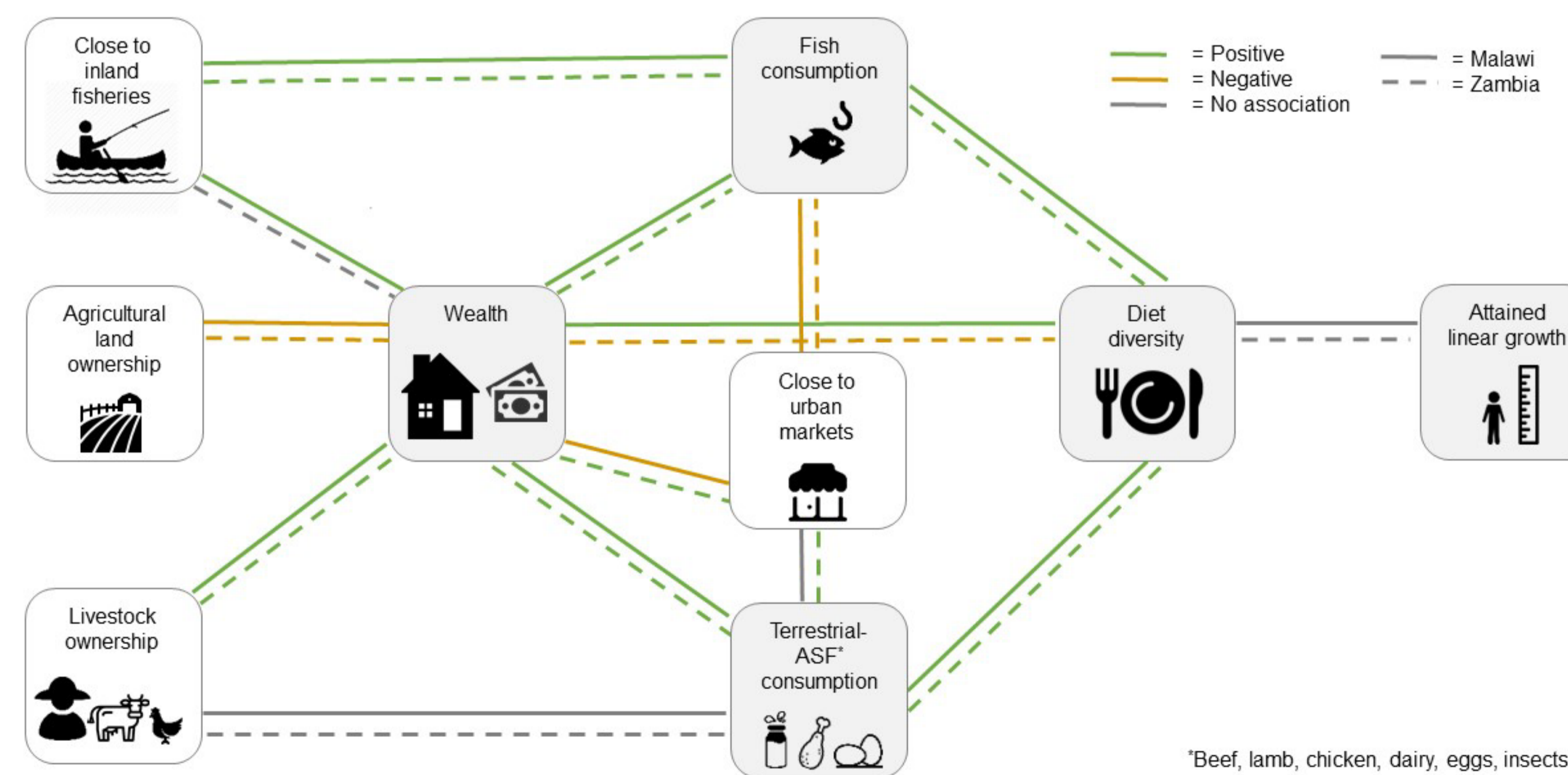

Fig 3: Linear regression results. Gray boxes indicate the five key outcome variables.
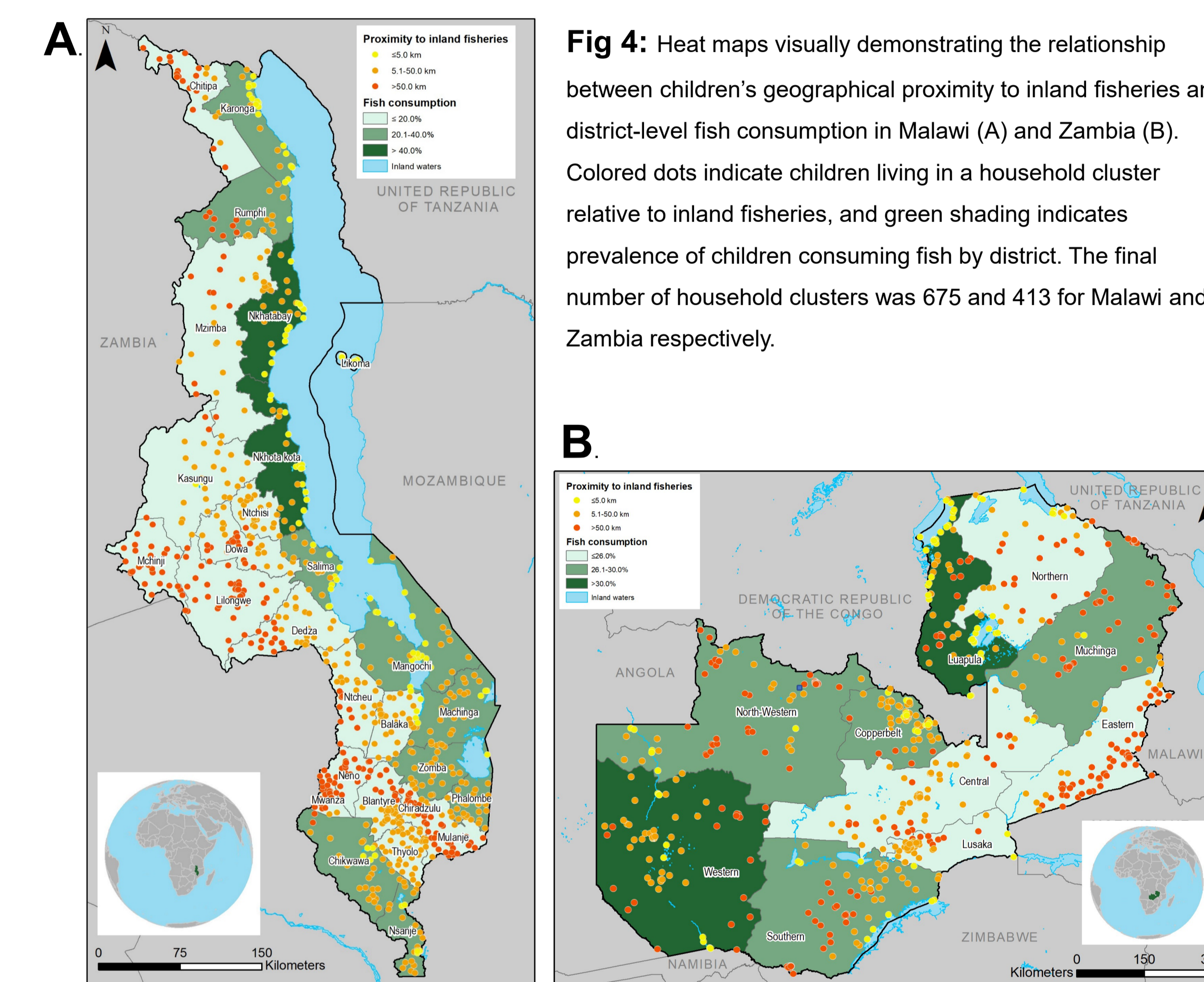
*Beef, lamb, chicken, dairy, eggs, insects

Fig 4: Heat maps visually demonstrating the relationship between children's geographical proximity to inland fisheries and district-level fish consumption in Malawi (A) and Zambia (B). Colored dots indicate children living in a household cluster relative to inland fisheries, and green shading indicates prevalence of children consuming fish by district. The final number of household clusters was 675 and 413 for Malawi and Zambia respectively.

Conclusion

- We demonstrate a novel method of leveraging existing datasets to spatially analyse links between food sources and diet quality – a resource-efficient method that may be used to monitor the effect of food system changes on nutritionally vulnerable groups.
- Our study highlights the need to safeguard natural resources (inland fisheries) as critical sources of nutrient-rich food (fish) for children.
- Spatial analysis identified geographical disparities, suggesting that food systems failed to provide ASF to a large proportion of children.
- For children living > 5 kms from inland fisheries and or urban markets, strategies are needed to develop fish value chains to improve diet quality of rural children in Malawi and Zambia.

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References

[1] UNICEF, 2019. State of the World's Children 2019. Children, Food and Nutrition: Growing well in a changing world. New York.
[2] Dewey, K.G., 2013. The challenge of meeting nutrient needs of infants and young children during the period of complementary feeding: An evolutionary perspective. J. Nutr. 143, 2050–2054.
[3] National Statistics Office (NSO) Malawi and ICF International Inc, "Malawi Demographic and Health Survey 2015-16" (2017).
[4] Central Statistics Office (CSO) Ministry of Health (MoH) Zambia and ICF International Inc, "Zambia Demographic and Health Survey 2013-14" (2014).
[5] World Wildlife Fund, Global Lakes and Wetlands Database (2019).
[6] Malaria Atlas Project, Plasmodium falciparum PR2-10 (2015).
[7] WHO, 2017. Global Nutrition Monitoring Framework: operational guidance for tracking progress in meeting targets for 2025. Geneva.
[8] HLPE, 2017. Nutrition and Food Systems, A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security. FAO, Rome.

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