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Malnutrition among children in rural Malawian fish-farming households

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Summary To estimate the impact of fish farming operated at household level on nutritional status among children 6—59 months of age, a cross-sectional study was conducted in Zomba district, Malawi. Anthropometric measurements of 66 children in each type of household (fish-farming and non-fish-farming households) and structured interviews with their parents were undertaken. A total of 21 background variables were employed and examined using bivariate and multivariate analyses. Overall, a lower prevalence of malnutrition was detected among the children in fish-farming households than those in non-fish-farming households in all the malnutrition indicators, i.e. stunting, underweight and wasting. In particular, a significantly lower prevalence was detected among the children in fish-farming households than those in non-fish-farming households in both severe ($P = 0.045$) and global underweight ($P = 0.042$). 'Higher proportion of income from fish farming to total income', 'more frequent intake of oil and fats other than never/seldom' and 'breastfeeding practice for the appropriate duration' are the protective factors against being underweight. Household fish farming may have indirectly contributed to lower prevalence of underweight through increasing frequency of intake of oil and fats by strengthening households' purchasing power. The study supports 12 months as the threshold for appropriate breastfeeding duration.

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1. Introduction

It has been generally recognized that household fish farming can contribute to the improvement of nutritional status among local populations through ensuring access to fish protein (direct contribution) and increasing household purchasing power for obtaining the other types of foods (indirect contribution).[1] Earlier studies reported that children under 5 years of age in fish-farming households had more frequent intake of fresh fish and that their nutritional status was better than that of non-fish-farming households.[2,3] However, they did not clearly present the mechanism and the extent to which fish farming contributes to the improvement of nutritional status.

Food production in Malawi has been severely constrained by the limited cultivatable land and unstable climatic conditions, such as frequent droughts and floods.[4,5] In addition, the low economic performance of the country, as reflected in the third lowest gross national income per capita (US$160) consecutively from 2004 to 2006,[6,7] implies that it is difficult to ensure access to foods among general populations, particularly the rural poor.[8] As a result, both the prevalence of malnutrition and mortality rate among children under 5 years of age in Malawi remain high[9–11], i.e. 21% of children die before their fifth birthdays and malnutrition accounts for 56% of the causes of their deaths.[12]

Since its introduction in the early 1940s, household fish farming has been extended nationwide in Malawi for the purpose of improving the nutritional status of the rural poor. The importance of fish farming in relation to food security has been emphasized since the 1960s.[13] Yet the relationship between household fish farming and the nutritional status of children in Malawi has rarely been addressed in earlier studies.[1]

This study compares major anthropometric indicators among children 6—59 months of age between fish-farming and non-fish-farming households in rural Malawi. Further analyses were undertaken to identify variables that are significantly associated with not being malnourished.

2. Materials and methods

2.1. Study area

The study area is located in the Mulumbe Traditional Authority, Zomba District, Southern Region, 288 km to the southeast of Lilongwe, the capital of Malawi. Zomba district is known as one of the most food-insecure areas in the country.[14] Its topography varies from mountainous and hilly areas to broad, flat plains. Of 902 communities in the authority, eight were selected as the study areas because fish-farming and non-fish-farming households were more homogeneously distributed in these communities than in others. The eight communities selected were composed of Yabu, Kuikanga, Malundu, Howe, Ndoka, Mikundi, Matola and Chisanje. In 2003 the estimated total population of the study area was 2317, which accounted for approximately 8% of the total population in the authority.

As one of the least developed districts in the country, infrastructure and socioeconomic conditions in Zomba District are less developed and poorer compared with other districts.[15,16] Tilapia farming was introduced in 1950s in the Mulumbe Traditional Authority, and was estimated to be operated by 7.8% of the households in the area, as of 2001.[17]

2.2. Sample selection

The sample size was calculated to detect a difference in prevalence of underweight (<—2 WAZ) among children 6—59 months of age between fish-farming and non-fish-farming households, with α (error) = 0.05 and 1-β (power) = 0.80. By applying the prevalence of underweight derived from the results of the pilot pretests (fish-farming households, 22%; non-fish-farming households, 43%), 77 children 6—59 months of age were obtained as the required sample size from both fish-farming and non-fish-farming households. Given an average of 1.3 children 6—59 months of age per household, which was estimated in the pilot pretests, the required number of households was estimated at 59 (77/1.3) for each type of household.

However, only 44 fish-farming households with one child or more 6—59 months of age were identified in the eight communities. Therefore, 66 children in all the 44 fish-farming households were selected as samples. Then, to control the variation of demographic variables, children 6—59 months of age in non-fish-farming households were randomly selected by matching their sex and age with those in fish-farming households. To undertake this procedure, first the sampling frames by age and sex of children in non-fish-farming households were prepared. Second, children of the same sex and age as each of those in the fish-farming households were selected randomly from the sampling frames.

2.3. Data collection

Anthropometric measurements of children and structured interviews with their parents were conducted during the period between 17 March and 1 May 2003, which is the early dry season in Malawi.

The weight and height/length of children 6—59 months of age were measured in both fish-farming and non-fish-farming households. Weight measurements were undertaken to the nearest 0.1 kg using a standardized 25 kg Salter spring balance (Salter Weight-Tronix Ltd, West Bromwich, West Midlands, UK). Height was measured using the UNICEF height scale. For children younger than 2 years of age or shorter than 85 cm, length was measured to the nearest millimetre in the recumbent position using a standard height board.[18] Children 85—110 cm were measured in a standing position.

To cross-check the parents' memory on the dates of birth of their children, immunization cards were referred to, when they were available. Four children in non-fish-farming households whose dates of birth were not adequately recorded or remembered by their parents were excluded from the samples. Then, replacement child samples were taken. This was an essential step to ensure the reliability