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The role of gender, assets and location

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Preface

This paper is one of a series of working papers published by the Young Lives Project, an innovative longitudinal study of childhood poverty in Ethiopia, India (Andhra Pradesh State), Peru and Vietnam. Between 2002 and 2015, some 2000 children in each country are being tracked and surveyed at 3-4 year intervals from when they are 1 until 14 years of age. Also, 1000 older children in each country are being followed from when they are aged 8 years.

Young Lives is a joint research and policy initiative co-ordinated by an academic consortium (composed of the University of Oxford, the University of Reading, the London School of Hygiene and Tropical Medicine, London South Bank University and the South African Medical Research Council) and Save the Children UK, incorporating both interdisciplinary and North-South collaboration.

Young Lives seeks to:

- Produce long term data on children and poverty in the four research countries
- Draw on this data to develop a nuanced and comparative understanding of childhood poverty dynamics to inform national policy agendas
- Trace associations between key macro policy trends and child outcomes and use these findings as a basis to advocate for policy choices at macro and meso levels that facilitate the reduction of childhood poverty
- Actively engage with ongoing work on poverty alleviation and reduction, involving stakeholders who may use or be impacted by the research throughout the research design, data collection and analyses, and dissemination stages
- Foster public concern about, and encourage political motivation to act on, childhood poverty issues through its advocacy and media work at both national and international levels.

In its first phase, Young Lives has investigated three key story lines – the effects on child wellbeing of i) access to and use of services, ii) social capital, and iii) household livelihoods. This working paper is one of a series which consider an aspect of each of these story lines in each country. As a working paper, it represents work in progress and the authors welcome comments from readers to contribute to further development of these ideas.

The project received financial support from the UK Department for International Development and this is gratefully acknowledged.

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Acknowledgements

The authors would like to thank Arabella Duffield of Save the Children UK, Howard White of the Institute of Development Studies, Sharon Huttly and Bridget Fenn of the London School of Hygiene and Tropical Medicine, Rachel Marcus and Colette Solomon for their helpful comments. The paper was edited by Colette Solomon.

Abstract

As one of the poorest countries in the world, Ethiopia's rate of child malnutrition is one of the highest, even within sub-Saharan Africa. The causes and relative importance of various determinants of malnutrition in Ethiopia are not well understood. This paper specifically explores some of the less obvious factors affecting children's nutritional status in Ethiopia. It is based on information collected in 2002 from 1001 households with eight-year-old children mainly from food insecure communities in Tigray, Amhara, Oromia, SNNP and Addis Ababa Regional States. As part of the Young Lives Project, this study is particularly important because the determinants of the nutritional status of eight-year-old children is much less researched than that of younger children, not only in Ethiopia but in other developing countries.

The results from simple correlation analysis indicated that a number of variables were significantly related to weight-for-height z-score (WHZ) (as an indicator of wasting). In addition to analysing WHZ for the whole sample, we have also separately analysed WHZ for urban and rural households, and found that the determinants differed.

The results show that weight-for-height z-scores depend on the sex of the child and suggest that short term malnutrition is higher for male children than for female children. We conclude that variables such as physical and natural capital (wealth index, ownership of radio, television and land), human capital (education of members of the household), social capital (strength of a caregiver's ties to social organisations and networks), age-sex composition of households (the number of girls, the number of female adults) and location of residence (rural or urban) are important in influencing WHZ in eight-year-olds.

We conclude that addressing child malnutrition, especially WHZ, requires a multi-dimensional approach that takes into account food security, public health and gendered intra-household dynamics if it is to be effective. Moreover, a cross-sectoral nutrition policy is needed to improve policy synergies.

Contents

1. Introduction

Ethiopia is one of the least developed countries in the world as measured by the (Purchasing Power Parity) GNP per capita or Human Development Index (UNDP, 2002; World Bank, 2004), with about 44 per cent of the population living below the poverty line (MoFED, 2002a). In 2001, the under-five mortality rate in Ethiopia was about 17 per cent (World Bank, 2004). As is the case in most developing countries, most of the causes of under-five mortality in Ethiopia are related to acute lower respiratory tract infections (ARI), malaria, diarrhoea, malnutrition[1] and measles (MoH, 2002). Malnutrition is alone responsible for over 50 per cent of deaths of under-fives in developing countries, making it one of the most important public health problems (Pelletier, 1994; Shanghvi and Murray, 1997). The consequences of child malnutrition include poor physical development and limited intellectual abilities which can have negative impacts on economic growth because they diminish the working capacity of these children when they reach adulthood (Girma and Genebo, 2002; Alderman *et al.*, 2004).

Wasting (acute malnutrition with low weight-for-height) and stunting (chronic malnutrition with low height compared to standard height-for-age) in children aged 6-59 months were estimated to be 9.6 and 56.7 per cent respectively for Ethiopia in 1999/2000. These figures are among the highest in the world and even within sub-Sahara Africa (MoFED 2002a, 2002b; World Bank, 2004). According to the Central Statistics Authority's Demographic and Health Survey (CSA, 2000), more than 50 per cent of children under five were stunted, some 11 per cent were wasted, and 47 per cent were underweight (low weight-for-age). This compares poorly with the sub-Sahara average incidence of underweight and stunted children in the 1990s, which was 33 per cent and 39 per cent respectively (Christiaensen and Alderman, 2004).

At the national level, the proportion of wasted children increased (from 9.2 per cent to 9.6 per cent) between 1995/1996 and 1999/2000 (MoFED, 2002a). However, the proportion of severely wasted children declined significantly from 3.4 per cent to 1.8 per cent in the same period. This directly reflects the achievements observed in rural Ethiopia where wasting increased from 9.5 per cent to 9.9 per cent, but severe wasting decreased from 3.6 per cent to 1.8 per cent. As far as urban areas are concerned, wasting declined by 10.3 per cent, and severe wasting by 34.8 per cent during the same period. Gender disaggregation shows that females were better off in 1999/2000, while males fared better in 1995/1996 for both wasting and severe wasting. A negative (but weak) correlation was found between child wasting and expenditure quintiles for Ethiopia (MoFED, 2002a).[2]

Given these bleak statistics, there has been much debate about how best to address child malnutrition in Ethiopia (UNICEF, 1994; EPHA, 1996). Historically, in the 1950s, child malnutrition policy initiatives initially focused on developing a low cost indigenous supplementary diet (EPHA, 1996). However, following the establishment of the Ethiopian Nutrition Institute within the Ministry of

1 The term 'malnutrition' embraces under-nutrition, over-nutrition and lack of essential nutrients (WHO, 1995). In this paper, however, we are primarily interested in determinants of under-nutrition, which has as its primary proximal determinant, inadequate food supply.

2 When regional profiles are considered, the highest proportion of wasted children was observed in Gambella (13 per cent) followed by Dire Dawa (12.3 per cent), Afar (11.8 per cent) and Tigray (11.7 per cent). Dire Dawa was found to have the largest proportion of severely wasted children (3.1 per cent), followed by Tigray (2.3 per cent) and Amhara, Benshangul Gumuz and Somali with 2.2 per cent each (MoFED 2002a). We do not have information on the reasons for these regional differences. MoFED (2002a) suggested that the deterioration in the incidence of short term malnutrition (indicated by wasting) in 1999/2000 could be attributed to the decline in international aid due to the war with Eritrea as well as the drought experienced in the country.

Health in the late 1960s, interventions expanded to include the promotion of better weaning practices, research into the nutritional content of major staple foods in the country and the establishment of working relationships at the grassroots level between the Ministries of Agriculture (MoA), Health (MoH) and Education (MoE). To treat malnutrition, nutrition rehabilitation centres were also established at this time, mainly in the major cities to provide malnourished children with 6-8 meals per day (ESPC, 1971).

In the 1980s, in line with a global shift in nutrition programmes from vertical to multi-sectoral programmes, the focus in Ethiopia turned to access to food, improved childcare and health intervention (Levin *et al.*, 2003). In the 1990s, the Ethiopian Nutrition Institute amalgamated with the National Research Institute to form the Ethiopian Health and Nutrition Research Institute which was responsible for research (EPHA, 1996). Currently, the Institute's focus on research and nutrition has been conceptualised as a cross-cutting/cross-sectoral issue.

These advances notwithstanding, Ethiopia still lacks an integrated cross-sectoral policy to guide nutrition programmes and interventions. For example, while food security issues have received considerable attention, inadequate attention has been paid to health-related dimensions of nutrition (EPHA, 1996). Thus, although the Phase 1 Health Sector Development Programme which covered the period 1997/98-2001/02 defined nutrition as a cross-sectoral issue in the Family Health Section of the Ministry of Health, no staff were assigned to lead related programmes (MoH, 2000). Currently, government and international donor-supported nutrition programmes adopt one of three basic approaches: the food-based approach, the public health approach and the gender approach.

The food-based approach is enshrined within the Agricultural Development-led Industrialisation Strategy, the National Food Security Strategy, the Rural Development Programme and the Sustainable Development and Poverty Reduction Programme (SDPRP), all of which have (implicit or explicit) links to food security and economic growth. The argument is that because poverty and food insecurity are the underlying factors that expose people to hunger and malnutrition, nutrition intervention programmes must be linked to poverty reduction policies and strategies (USAID, 2003). It assumes that stimulating agricultural growth is instrumental to increasing household income and providing necessary household food from own production or purchase from the market (FAO, 1992; Admasu, 2000; MoRD, 2003). A limitation of this approach is that food availability is not the only solution to malnutrition; it also involves caring practices, healthcare and sanitation services (UNICEF, 1990; 1998). In Ethiopia, malnutrition has still been high even when a good harvest has been achieved. The Ethiopia DHS which was conducted in 2000, which was considered 'a good non-drought year, the level of malnutrition was extremely high among children' (MoH, 2004).

The **public health approach** assumes that malnutrition is a public health problem which should be solved through public and community measures, such as the control of diarrhoeal diseases, improving environmental and personal hygiene, immunisation against measles, promotion of exclusive breastfeeding, nutrition education and growth monitoring. In addition to health and care practices, the public health approach focuses on the prevention of micronutrient diseases through nutrition and health education, and the supply of fortified food and vitamin A and D capsules, with an emphasis on children under five (UNICEF, 1994; MoH, 2002). However, while young adolescent girls are targeted for iron supplements, there has been little attention paid to the nutrition of school-age adolescent

children. The public health approach is adopted by the Ministry of Health, supported particularly by USAID and UN organisations (eg WHO and UNICEF), and includes, in addition to the above activities and programmes, nutrition training in training centres for health professionals such as nurses and frontline health workers (MoH, 2002).

The gender approach, which draws on the significance of maternal control of resources and caring capacity, recognises this as critical for ensuring the good nutritional status of children (ACC/SCN, 1998). Although the responsibility of providing care for a child should be that of both parents, in reality the major responsibility of care usually rests with the mother who also has a role in income-generation, maintaining a clean environment for the household, caring for sick children, and preparing food for the household (*ibid*). All these responsibilities compete for the mother's time and may affect her caring capacity. Therefore, interventions aimed at improving mothers' caring capacity should be geared towards maximising their control of resources and enabling them to spend more time caring for their children. This approach emphasises the importance of gender-sensitive planning and mothers' formal education in contributing to decreasing the malnutrition risk of children (Kabutha, 1999). An important issue in this connection is the specific role of nutritional education and knowledge, as opposed to education in general. The Ethiopian Government has endorsed a National Policy on Women which has support in the Constitution of the Federation, while the Sustainable Development and Poverty Reduction Programme (SDPRP) has also taken gender as one of the cross-cutting issues requiring attention (MoFED, 2002b).

Objectives of this paper

While the problem of the nutritional status of children in Ethiopia is fairly well-documented, albeit for younger children, its specific determinants are not well understood; one must understand the causes in order to reduce malnutrition (Smith and Haddad, 2000; SC UK Ethiopia, 2002; Yamano *et al.*, 2003; SC UK, 2003). A review of the literature shows that there is little agreement on the relative importance of various factors affecting nutritional status. For example, some studies stress the importance of a mother's (or parents') education and/or nutritional knowledge (Block, 2002) and integrating women's perspectives and priorities into intervention initiatives (Caouette *et al.*, not dated), while others recommend the need to focus on improving the poverty/wealth status of households, particularly in poor countries like Ethiopia (SC UK Ethiopia, 2002; SC UK, 2003; Christiaensen and Alderman, 2004).

The question is not only of academic interest, but also of considerable policy relevance, both among national and international policy-makers. For example, SC UK (2003) questions the nutrition component of World Bank-funded projects in Bangladesh, Ethiopia and Uganda which incorporate growth monitoring as a key strategy to reduce malnutrition among young children. SC UK (2003: 5) notes that these projects are based on the questionable assumption that lack of knowledge, confidence and capacity to solve problems are major causes of malnutrition, and that providing counselling and motivation to women about how to care for their children will significantly improve nutrition, even when families are poor and services such as health and sanitation are very weak. SC UK (2003) challenges the notion that using growth monitoring and promotion to change the behaviour of mothers will have a significant impact on nutritional status, and argues that it is important to take the broader socio-economic determinants of malnutrition into consideration.

While the literature on child malnutrition suggests differences in malnutrition rates that depend on the sex of the child and location of residence, most have not explored this in detail, particularly in Ethiopia. Other variables such as household composition (sex and age), social capital, marital status, community characteristics, economic shocks and food aid are also presented in the literature as determinants of children's nutritional status. Knowledge of the magnitude and direction of the impacts of most of these variables, which may be different across time and space, is either absent or very limited and therefore hinders the development of effective policies and distribution of resources. The aim here is not to argue that one approach (food security, public health, gender) is better than another, but to show that ensuring better nutrition for children requires a strategic, evidence-informed combination of all of the approaches discussed above.

The overall objective of this paper is to examine the determinants of children's nutritional status using weight-for-height z-score (WHZ), which is an internationally accepted outcome indicator. WHZ was selected because the information collected for eight-year-old children focused on their (and their households') current circumstances as well as experiences of economic shocks in the previous three years. Stunting or growth retardation, which is an indicator of chronic malnutrition, was not considered an appropriate outcome measure as its underlying determinants may have occurred during infancy, which was outside the scope of the Young Lives survey of eight-year-olds. In other words, stunting occurs in young children due to recurrent episodes or prolonged episodes of nutrition deficiency (in terms of calories and/or protein available to body tissue), inadequate food intake or persistent or recurrent ill-health. WHZ is also of more interest from a policy perspective for eight-year-old children since, because it is an acute condition, it can be reversed given favourable conditions, whereas low height-for-age z-score (HAZ) is largely irreversible in children over three years of age (Martorell *et al.*, 1994).[3]

While examining the determinants of child wasting in general, the paper focuses on considering differences between boys and girls and across locations of residence (urban versus rural). Since many of these children are engaged in paid or unpaid work, an attempt is also made to find out whether there is any relationship between child wasting and child work. The paper uses the sustainable livelihoods approach (SLA) as a conceptual framework. We also make use of UNICEF's conceptual framework as a guide for empirical analysis for looking at the underlying determinants of malnutrition (UNICEF, 1990; 1998).

Section 2 provides a brief review of the literature. Section 3 presents the approach and method used in the paper, while the empirical results are presented in Section 4. The paper ends with a summary of the results and a discussion of the policy implications, which attempts to integrate the insights of the food-based, public health and gender approaches (Section 5).

3 Note, however, that researchers such as Yaqub (2002) suggest that, in some cases, reversal may be possible – ie children may be able to make up for prior under-development at later stages.

2. Review of the literature

This section briefly reviews the literature on the determinants of children's nutritional status. Variables related to household economic welfare, household composition and education, access to services and food aid are considered in turn.

2.1 Household economic welfare

Wealth/income of the household

As acknowledged in many studies, an increase in household income/wealth is expected to reduce child malnutrition (Moen, 1993; Haider *et al.*, no date; Glewwe *et al.*, 2002; Christiaensen and Alderman, 2004). For example, Haider *et al.* (based on their study undertaken in Holetta *woreda* (district), Oromiya region) reported that child malnutrition (measured by stunting) is significantly lower in households with crossbred cows (ie better quality) than in those without. It was also shown that households with crossbred cows had a higher level of consumption of calories, protein and other nutrients. The higher consumption, they noted, was due to the higher income because of the ownership of crossbred cows. According to Christiaensen and Alderman (2004), sustained income growth of 2.5 per cent per adult over a fifteen-year period could be associated with a 3-6 per cent decline in chronic child malnutrition in Ethiopia. They argued, however, that income growth alone might not be sufficient to alleviate child malnutrition. Similarly, Glewwe *et al.* (2002) observed that, due to rapid economic growth in Vietnam since 1986, a dramatic decline in poverty and child stunting was achieved. Based on their empirical investigation, they concluded that growth in household income, although not very large, had a positive impact on child nutrition in Vietnam during the 1990s. They also noted that, over time, child stunting declined within each quintile even after adjustment for change in income was made, which suggests that there are other factors, in addition to income growth, which led to improvements in child nutrition.

Shocks

Different shocks, such as drought, are also considered to be important in influencing the nutritional status of children (Hoddinott and Kinsey, 2001; Alderman *et al.*, 2002; Dercon and Hoddinott, 2003; Yamano *et al.*, 2003; Carter and Mallucio, 2003). Dercon and Hoddinott (2003) considered the impact of shocks on health status using data from Ethiopia and Zimbabwe, and found that the impact of shocks within the household is not uniform. They found that younger preschoolers were more adversely affected by shocks such as drought than older preschoolers were.

2.2 Household factors

A growing number of studies recognise the important role that household composition and parental levels of education play in shaping children's nutritional outcomes.

Household composition

The evidence on household composition and child malnutrition is mixed. Christiaensen and Alderman (2004) found that larger family size results in less stunting among children in Ethiopia. They argue

that economies of scale in time for childcare and expenditure can be enjoyed in large families and that children benefit from parents' accumulated experiences in care of young children. However, Desai's (1995) cross-country study found that the nutrition of a child aged between 6 and 36 months is likely to be negatively affected by the presence of a sibling aged 0-5 years as siblings of a similar age are likely to compete for parental resources. Having siblings of 6-12 years has a less clear effect, which is sometimes negative. The presence of siblings of 13-15 years has a positive effect on a child's nutritional status.

> *"Since children in many less developed countries tend to become economically productive at a very early age, it is not surprising that competition for parental resources is strongest from children less than five years old, well before the age when they can be self-supporting"* (ibid: 201).

Desai argues that the ability for parents to provide adequate nutrition for young children in large families may be enhanced by the existence of extended kinship networks or, alternatively, state subsidies for child-related expenses.

Sex of a child

A number of studies in Africa suggest that rates of malnutrition among boys are consistently higher than among girls (Svedberg, 1990; MoFED, 2002a; Glewwe *et al.*, 2002; Sahn and Stifel, 2002; Christiaensen and Alderman, 2004). Sahn and Stifel (2002) present three possible explanations for such a result. The first is that there is a problem with the gender-specific standard for the African population – similar to the inconsistencies noted regarding the weight-for-height curves for young children (<2 years) in a number of African countries (Macfarlane, 1996). The second is that girls are genetically more robust than boys are. There is some evidence that among pre-adolescent children there is an increment of fat in preparation for the growth spurt; this was also true for our sample. This increase of fat is greater for girls than boys (Whitney, 2002, cited in Brown, 2002). The third is that there is greater investment in young girls than boys, although this would be counter-intuitive since girls are widely regarded as a 'poorer investment' since they eventually marry and leave to join their husbands' family. We may also add a fourth possible explanation: that it reflects boys' and girls' gender-specific roles – ie girls' better access to food through their roles in cooking, together with a combination of boys' higher energy expenditure and lack of food during the day when they are involved in tasks such as herding animals.[4] Note also that the energy requirement is different for boys and girls. For the age-group between five and nine years of age, which is relevant for this paper, the requirement is 1980 kcal for boys compared to 1730 kcal for girls (WHO, 1985).

Household education

Various studies have concluded that parental education, especially mothers' education, is a key element in improving children's nutritional status (Moen, 1993; Christiaensen and Alderman, 2004). Glewwe (1999) investigated the mechanisms through which education (schooling) results in better child nutrition and/or health. Specifically, Glewwe (*ibid*) identified three possible pathways: 1) direct lessons in nutrition and health in schools to future mothers; 2) gaining nutritional knowledge because of literacy and numeracy skills acquired in school; and 3) exposure to, and familiarity with, modern society through school which facilitates the use of modern medicines. The implication is that schooling is associated with child nutrition only if it can improve mothers' nutritional knowledge. Glewwe (1999) further suggested that such knowledge could be attained outside the classroom. As will be

4 We recognise that this gender division of labour is not rigid because girls are also involved in herding; in general, however, more boys are involved in the activity.

discussed in the concluding section on policy implications, this finding may be of significance for a poor country like Ethiopia, where formal education is limited, but where it is possible to improve nutritional knowledge through specific nutrition education programmes (Christiaensen and Alderman, 2004) without formal schooling.

However, the impact of mothers' schooling on child nutrition is not only through nutritional knowledge. An educated mother is likely to have a higher income (which can directly affect her children's health and nutrition) and higher status and power in the household and community (which will put her in a better position to make decisions about her children's needs) (Moen, 1993). The literature also notes that, particularly where the general level of education of the community is low, the level of education of female and male members of the household could be particularly important in indirectly influencing child nutritional status (Basu and Foster, 1998; Gibson, 2001).

More specifically, Christiaensen and Alderman (2004) found that the effect of maternal education is about twice as important as that of paternal education. Moreover, they found that primary school completion of at least one adult female in a household results in a 6-11 per cent decline in stunting, while completion of primary school by at least one male adult reduces child stunting by only 2-8 per cent.[5]

2.3 Access to services

Water and sanitation

A household's access to facilities is likely to be correlated with community characteristics. Households living in wealthier communities might have a relatively healthy environment, which implies better sanitation facilities, access to clean water and healthcare facilities (Glewwe *et al.*, 2002). Water and sanitation play a particularly important role in child nutrition due to their impact on diarrhoeal diseases.

Christiaensen and Alderman (2004) noted that in Ethiopia, 14 per cent of households in urban communities get water from their own tap and 3 per cent have flush toilets. However, no households in rural areas had piped water in their home and only 1 per cent had flush toilet facilities. Their findings indicate a significant and positive impact of these facilities on child nutrition. Glewwe *et al.* (2002) considered the impact of clean water, a sanitary toilet and electricity on child health in Vietnam. They found that, when the three variables are included separately, the lack of a sanitary toilet and electricity had significant negative effects on child health while clean water had no significant effect. When the three variables were added simultaneously, electricity lost its statistical significance while a sanitary toilet remained significant. They concluded that policies directed at improving sanitary toilets in a community would have better health outcomes than either water or electricity alone.

Esrey (1996) and Esrey *et al.* (1992) found in a multi-country study that improved sanitation had a substantial effect on nutritional status, while improvement in water supply enhances these effects. They also note that when considered separately, water supply has a smaller effect on nutritional status than sanitation.

5 Primary school completion by all Ethiopian women would result in a 7 per cent decrease in the (stunting) gap of 2.48 HAZ points (according to Christiaensen and Alderman's estimate) between the HAZ score of the Ethiopian population and the standardised norm of a healthy population. Post-secondary schooling also has an additional impact to that of primary or secondary schooling. These results could possibly be due to a positive correlation between education level and income, and the fact that higher income results in better-nourished (healthy) children.

Access to health services

Access to health services is the main determinant of whether the public is going to utilise the services. However, one also has to consider the quality and prices associated with the service, although they obviously have little relevance if access is limited (MoFED, 2002a; 2002b). Access to health services is expected to influence nutritional status, as children without access to such services are more likely to be malnourished, reflected through weight loss which is associated with untreated diarrhoea and other infectious diseases.

In Ethiopia, it is estimated that only 38-47 per cent of the total population have access to health services (Degefe and Nega, 2000). Health services are also unevenly distributed, as more than 50 per cent are concentrated in a few urban areas, most of them in Addis Ababa, in a country where urban dwellers comprise only about 15 per cent of the population. The ratio of national population to hospital beds is about 6000:1 (the highest ratio in the world), which is about four times larger than the average for sub-Sahara Africa. The total population per primary healthcare facility is about 21,992, which is three times higher than the average for sub-Sahara Africa. Urban areas are served by 72 per cent of medical doctors, 89 per cent of health officers and 58 per cent of nurses, while about 35 per cent of all hospital beds are located in Addis Ababa (Degefe and Nega, 2000).

One of the important measures of access to health facilities used in the literature is the distance between the household's home and the nearest healthcare facility (MoFED, 2002a; Roberts, 2003; Christiaensen and Alderman, 2004). This indicator, a proxy for availability of healthcare, which affects healthcare choices, is widely used in malnutrition studies (Christiaensen and Alderman, 2004), and is particularly useful for a country like Ethiopia where transportation networks are poor in terms of coverage, road quality and safety (MoFED, 2002a). The average distance from a household to the nearest health centre, as reported by MoFED (2002a) and based on the welfare monitoring survey of 1999-2000, is given in Table 2. However, Christiaensen and Alderman (2004) found that after controlling for a number of other determinants of child malnutrition, distance to the nearest health centre is not a significant determinant. They suggest that this lack of explanatory power of the distance variable might be explained by the fact that the proxy for access to health centre does not capture the quality of healthcare provided, which is as important as distance.

2.4 Food aid

Given the importance of disaster relief in many developing countries, food aid programmes are significant. Food aid is expected to affect the general nutritional status of households receiving it. However, the distribution of food within the household is also an important issue, particularly for children as their welfare depends on the decisions and actions of adult members of the household. Using panel data, Quisumbing (2003) studied the effects of food aid on child nutritional status (ie stunting and wasting) in rural Ethiopia. In addition to a consideration of the effects of total food aid, she also looked at the possible differential effects of free distribution (FD) and food-for-work (FFW) on the nutritional status of boys and girls. She concluded that the effects of food aid on child malnutrition are different depending on the modality of food aid and the gender of the child. In particular, she finds that both FD and FFW have a positive impact on wasting, a measure of malnutrition expected to respond more to such interventions in the short term. However, households seem to invest FD in girls' nutrition while proceeds from FFW are invested in boys' nutrition. Two

possible explanations that Quisumbing provides for the differential impacts of food aid on boys and girls are: 1) that households are attempting to redress imbalances existing in the nutritional status of children (which are worse for boys than for girls); and 2) FFW, which is increasingly targeted towards women, may go more to boys who may be favoured as they are important sources of old age security. However, FD which leads to a general increase in household income/wealth may be used to improve the nutritional status of both boys and girls. Similarly, Yamano *et al.* (2003) used data for 1995-96 in Ethiopia and found that food aid has a substantial effect on the growth of children aged between 6 and 24 months.

In summary, the literature review has helped us identify important factors that are associated with child malnutrition in developing countries, including factors related to household economic welfare, household composition and education levels, access to services (health, water and sanitation) and food aid provision. Drawing on the Young Lives sample of 1001 eight-year-olds from five different regions of the country, this paper will contribute a more comprehensive analysis of the determinants of wasting of eight-year-old children in mainly poor Ethiopian households, as well as provide insights into their interactive impact and relative importance.

In addition, we identify three major gaps in the literature on child malnutrition in Ethiopia. First, while most nutritional studies focus on under-fives or adolescents, we are looking at children between the ages of 7.5 and 8.5 years. This is one of the important and unique contributions of this study.

Second, child labour has not been explored as a determinant of child malnutrition. It has the potential to influence children's nutritional status both positively and negatively: working may generate more income for the family to buy food, but may also result in more energy consumption. The net result of such positive and negative impacts can be measured by wasting.

Third, our review of the literature suggests that, with very few exceptions, social capital has not been explored as a possible determinant of child malnutrition. (The Young Lives definition of social capital is presented below). One could expect social capital to influence the nutritional status of poor children because it may serve as a substitute for one or more of the following problems: low levels of household education by allowing for sharing of information, low levels of household income by pooling labour or assets, imperfections of credit markets (eg through involvement in informal rotating credit schemes), and the absence of formal insurance against risks and shocks (Carter and Mallucio, 2003).

Lastly, it can be argued that in addition to knowing the specific effects of child labour, social capital and urban/rural differences, the effects of other variables used in the literature could be different when these three variables are included in our analytical model.

3. Approach and method

3.1 Sustainable livelihoods approach

This paper uses the sustainable livelihoods approach (SLA) as the conceptual framework. SLA is a holistic approach that helps development policy address the issues of development, sustainable resource management and poverty alleviation simultaneously (UNDP, 1997). The framework represents an attempt to provide a holistic and dynamic understanding of the causes and dimensions of poverty, as opposed to the previous narrow conceptualisations which tend to characterise poverty uni-dimensionally in terms of income and consumption criteria (Farrington *et al.*, 1999; Majale, 2002). It incorporates households' physical, natural, financial, human and social capital assets, and the way households combine these resources as they pursue productive and reproductive livelihood strategies. As noted earlier, we also base the empirical analysis on UNICEF's malnutrition framework, which considers inadequate nutrient intake and disease as immediate trigger factors causing malnutrition. The framework considers these immediate causes to be responsive to the following underlying causes: insufficient household food security, inadequate maternal and childcare, insufficient health services and an unhealthy environment (UNICEF, 1990; 1998).

3.2 Data and methods used

The data used for this study derive from a survey of 1001 households with eight-year-old children in mainly food insecure communities in Tigray, Amhara, Oromia, SNNP and Addis Ababa Regional States. The data cover 20 sentinel sites (12 rural and 8 urban areas) which were purposefully selected; these sites generally contain poor households. The selection of households within a site was done by going door-to-door in each area to identify those households with children between 7.5 and 8.5 years of age at the time of the survey (in the second half of 2002).[6]

Variables that influence household economic welfare, such as wealth, land and cattle ownership, food availability and economic shocks, are also included in the analysis, as they are likely to influence wasting. A wealth index was used to assess the economic status of the household because of the difficulties in obtaining data on expenditure or income and the relative unimportance of cash income in very poor rural households.

The wealth index was constructed from variables that are broader than production assets, such as home ownership and the durability of the home, plus access to infrastructure such as water and sanitation.[7] The weights we attach are not based on the relative importance of the items included in the wealth index as we assign a value of 1 if the person has the item and 0 if not irrespective of its characteristics, such as how expensive it is. As the contributing variables are correlated this may not be a (serious) problem.

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6 For a detailed discussion of the selection and nature of the sites selected, see Alemu et al. (2003).

7 The wealth index is constructed from: (1) the number of rooms per person as a continuous variable; (2) a set of eleven consumer durable dummy variables, each equal to one if a household member owned a radio, fridge, bicycle, TV, motorbike/scooter, motor vehicle, mobile phone, landline phone, modern bed, table or chair, and sofa; (3) a set of three dummy variables equal to one if the house had electricity, brick or plastered wall, or a sturdy roof (such as corrugated iron, tiles or concrete); (4) a dummy variable equal to one if the dwelling floor was made of a finished material (such as cement, tile or a laminated material); (5) a dummy variable equal to one if the household's source of drinking water was piped into the dwelling or yard; (6) a dummy variable equal to one if the household had a flush toilet or pit latrine; (7) a dummy variable equal to one if the household used electricity, gas or kerosene.

The survey included weighing all the eight-year-old children and measuring their height. Child weight was measured using calibrated child scales and recorded to the nearest 0.1kg. Child height was measured to the nearest 0.1cm using height boards made for the purpose. These measures were used to compare the weight-for-height of the sampled children with an international standard population using the Centre for Disease Control/World Health Organisation reference points and the Epi-Info statistical package (Dibley *et al.*, 1987). While height-for-age is primarily indicative of chronic or long term nutritional status, weight-for-height can assess recent nutritional status. We elected to investigate weight-for-height since this is more likely to be influenced by current socio-economic circumstances which we would be able to assess, whereas low height-for-age is often caused by conditions during infancy, about which we had no information for these children.

We were able to obtain complete and useable child age, weight and height measurements for 920 out of a total of 1001 eight-year-olds. Although we had to discard some observations because of probable measurement errors and missing values, most of the observations excluded were because of the inability of the enumerators to measure all the children in one sentinel site because of a malaria epidemic at the time. According to a WHO Expert Committee (WHO, 1995), weight-for-height z-scores less than -4 SD below the mean should be excluded, since they may be due to measurement errors. However, in our analysis, we found that there were many children (67) whose recorded weights and/or heights were very low but were considered valid, given that the sample specifically targeted households in some very poor food insecure areas. By including children with very low weight-for-height in the model, more consistent results were obtained.

This paper uses descriptive statistics and bivariate and multivariate statistical analyses. The empirical results are presented in the next section.

4. Empirical results

4.1 Description of the data

This section presents a description of the relevant variables for this study. Table 3 shows the mean, standard deviation, minimum and maximum values for the nutritional status (weight-for-height) of the child and variables expected to be related to WHZ. A weight-for-height z-score of -2 SD was used as the cut-off for defining wasting (see Appendix for further details).

Anthropometric measures

The results show that about 21 per cent of the eight-year-old children were wasted. The mean of the weight-for-height z-scores is -1.27 (Table 3); these values are well below the international standard and consistent with a severely undernourished population.[8]

We may also note that there are differences in WHZ by location of residence and sex of child. The mean weight-for-height z-score for rural areas was -1.4 compared with -1.1 for urban areas. Similarly, about 23 per cent of children were wasted in rural areas, while about 19 per cent were wasted in urban areas.

In terms of sex of the child, mean weight-for-height z-scores of female and male children were -1.2 and -1.4. Similarly, the percentage of wasted female and male children was 20 and 23 respectively.[9]

Household composition and education/knowledge

The average age of the mother was about 35 years. Average household size for the sample was 6.4. We also use the caregiver's (which in 98 per cent of YL households was the child's mother) perception of the health of the child and compared it to other children of the same age as an indicator of the knowledge of the caregiver about the health status of the child. About 14 per cent of the caregivers perceived the health of the child as worse than that of other children, while approximately 38 per cent felt it was better and the remainder felt it was the same.

The mean of the maximum level of education of any male member of the household was 5 years while the corresponding figure for any female member of the household was 4.3 years. Use of this variable is particularly suggested for contexts where the level of education in the community is generally low, which is the case for our sample (Basu and Foster, 1998; Gibson, 2001; Christiaensen and Alderman, 2004).[10] For purposes of comparison, we also used the education level of mothers and fathers. The average level of education of mothers was 2.4 years while that of fathers was 3.9. About 75 per cent of household heads were male, who were also typically the fathers of the children. About 77 per cent of the caregivers had a permanent partner.

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8 We may note here that, compared with the national figures for 1999/2000 (shown in Table 1), the percentage of wasted children in the Young Lives sample is higher. While this is generally to be expected due to the nature of our sample which is biased towards the poor, the figures in Table 1 are not comparable to our Young Lives data as the former refers to children aged 6-59 months.

9 A comparison of these results with the national figures for 1999/2000 (shown in Table 1) shows a consistent result where wasting is generally more serious in rural areas and male children are more wasted. However, the caveat on comparability mentioned in footnote 8 above also applies here.

10 The literature suggests the use of measures of (the maximum years of) schooling of a member of the household since positive externalities are expected (Basu and Foster, 1998; Gibson, 2001).

Household economic welfare

The average wealth index was 0.18 – ranging from 0.01 to 0.77. We also used ownership of cattle and land as additional indicators of assets or resources. About 57 per cent of the households owned or rented land. About 72 per cent owned cattle with the average number of cattle owned being about 1.5.

Economic shocks are also expected to influence wasting. The indicators of economic shocks most frequently reported were a decrease in the availability of food and crop failure during the three-year period before the survey. About half of the households faced a decline in food availability while crop failure was experienced by 41 per cent of households.

Child work

In the Young Lives questionnaire, parents were asked to assess the number of days children spend (per month) working either for money or goods; children were asked about the number of hours per day and per week they were engaged in household chores. In an attempt to examine the links between child work and wasting, information on whether the child worked and for how many hours, was used in the analysis. About 68 per cent of the eight-year-old children had done some work with or without pay. Approximately 45 per cent were engaged in housekeeping activities or chores for their household for an average of 1.7 hours per day.

Food aid and school feeding

It is also expected that food aid and school feeding programmes should have some influence on wasting. Our data show that about 23 per cent of the households received food aid during the one-year period before the survey, while about 6 per cent of the children participated in school feeding programmes.

Social capital

Measures of social capital are also included as possible explanatory variables.[11] Social capital was assessed in relation to the caregiver because s/he has a direct influence on the Young Lives index (one-year-old) child.

The following types of social capital were assessed:

- Absolute structural social capital (ASSC) is based on the number of groups of which the caregiver is a member. We used membership of the following four groups which had the highest participation of women in our sample: community associations or co-operatives (17 per cent), women's groups (28 per cent), religious groups (40 per cent) and funeral groups (65 per cent).
- Social support (SS) is measured by the number of groups or individuals from which the caregiver has received support (emotional, economic or other) in the year before the survey. About 71 percent of the households received some social support. The mean score on our social support measure was 2.5, which was well below the maximum value of 12.

11 The Young Lives questionnaire focused on the bonding aspect of social capital (relationship within community), not the bridging aspect (relationship between communities) because bridging requires questions regarding the relationship between communities that were not feasible given the available time and budget. Hence, the frame of reference for social capital in this paper is the community, and it was the caregiver's perception of their own social capital in their respective communities that was assessed.

- Cognitive social capital (CSC) is measured as an index of a combination of the responses to four questions on whether the caregiver feels s/he is part of the community, whether s/he feels people can generally be trusted, whether s/he feels people would try and take advantage of her/him if they could, and whether s/he feels people generally get along with each other. The mean value of cognitive social capital is 3.5, which is close to the maximum value of 4.

Access to services

Availability of safe sources of drinking water and sanitation facilities is also expected to influence wasting. About 39 per cent of households had either a flush toilet or pit latrine (private or communal),[12] while about 56 per cent had a safe source of drinking water (which includes tap water and protected wells/springs).

Distance to public health facilities was used as an indicator of access to health services. This distance measure is an average measure for a particular sentinel site. Since the poor were over-sampled in our data, we only considered the distance to the closest public health clinic because private hospitals and clinics are typically not accessible to the poor. We used a dummy variable of 1 if the study site is within 10km distance from a public health clinic,[13] and 0 in other cases. The data show that 53 per cent of the sites are within 10km of a public health clinic.[14]

Access to information

Ownership of radio and TV was used as an indicator of access to communication infrastructure, which may be expected to facilitate the acquisition of nutritional information and which could influence the nutritional status of children.[15] While about 43 per cent of households owned a working radio, only about 6 per cent owned a working television.

Child illness

To look at the association between child illness and wasting, we used information about illness of the child in the two-week period before the survey. The data show that about 18 per cent of children were ill in the two-week period.

Perception about availability of food

While ideally we would have liked to measure children's food intake, this was beyond the scope of the study. Instead, as a proxy we used children's perceptions of the amount of food they eat. The children were asked whether they have enough food to eat. The responses show that about 76 per cent of the children felt that they have enough food to eat.

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12 Note that in the Ethiopian context, the important issue is whether households use latrines or not.

13 Ten kilometres is an international definition of access to healthcare services which was developed in order to reach the Health for All target of the 1978 Al Mata Declaration.

14 The data on distance to health facilities was given as a range, and we considered the average value of the range.

15 Ownership of radio and TV and availability of safe water and sanitation facilities are included in the wealth index used in this paper. However, the correlation between the wealth index and these four variables is not high and this suggests that multi-collinearity is not a problem. Moreover, exclusion of these four variables from the wealth index reduces the correlation between the wealth index and the four variables only by a very small amount.

Location

We also used a dummy variable for location of residence (urban or rural) to capture possible influences of location-specific variables as opposed to the household-level variables reported above. The data show that about 37 per cent of households were in urban areas (which include small towns).

4.2 Bivariate analysis of WHZ and its determinants

In an attempt to examine the association between the weight-for-height ratio and its possible determinants, we calculated the simple correlation coefficient. The results[16] (see Table 5) show that the following variables were significantly correlated to weight-for-height (with the direction of the relationship shown in parentheses).

Positively correlated with WHZ	Negatively correlated with WHZ
maximum level of education of a female member of the household	male child
maximum level of education of a male member of the household	marital status
level of education of the mother	number of boys
level of education of the father	number of girls
wealth index	number of children
ownership of radio	land area owned or rented in hectares
ownership of television	number of cattle owned
crop failure	cognitive social capital
membership of religious group	average distance to public health clinic
toilet facility (flush toilet or pit latrine)	
living in an urban area	

4.3 Multivariate analysis of WHZ and its determinants

Estimation results are presented with weight-for-height z-scores as the dependent variable using the Ordinary Least Squares (OLS) method. The estimates indicate the effect of the explanatory variables on weight-for-height z-scores.

Sex of the household head was not included in the estimation due to a high correlation with the dummy variable which represents whether the caregiver has a permanent partner. The latter variable is included in the analysis. Due to a high correlation between years of schooling of the mother and father on the one hand, and the maximum years of schooling of female and male members of the household on the other, we used the latter group of variables to measure education. As noted above, the literature suggests the use of measures of (the maximum years of) schooling of a member of the household since positive externalities are expected. For comparison, we have also reported the results when years of schooling of the father and the mother are included instead of the maximum years of schooling of a male and a female member of the household.

The explanatory variables used in the analysis of WHZ are the ones whose descriptive statistics were reported in section 4.1 above. The selection of the variables included is based on the empirical

16 Note that our discussion is limited to the multivariate analysis.

literature on both child malnutrition and practical considerations. We used a robust estimation method in which the standard errors are corrected for heteroscedasticity of unknown form. We have also tested for omitted variable bias. In order to examine the effect of interactions between variables, we also used interaction terms to assess the relationship between measures of shocks and assets (wealth index and education) as well as between food aid and measures of shocks and WHZ.

Results for the whole sample

The results for WHZ for the whole sample are reported in Tables 6 and 7. In Table 6, we present the results with interaction terms included in column 1 and those without interaction terms in column 2. While the education variables included in Table 6 measure the maximum years of schooling of male and female members of the household, the education variables in Table 7 measure years of schooling of the mother and the father.[17]

We find that weight-for-height z-scores are lower for males than for females, which suggests that male-female differences are important for short term malnutrition. To assess whether there is a need to estimate separate functions for male and female children, we conducted a Chow test and found that the differences are not significant; hence, we did not do a separate estimation.[18] Older children have higher weight-for-height with the rate of increase decreasing as children grow older.

The maximum years of schooling of a female member of the household is positively associated with weight-for-height ratio. However, the results show that the maximum years of schooling of a male member of the household is not significantly associated with weight-for-height z-scores. These results confirm the importance of educating female members of the household to improve the nutritional status of children. As indicated above, we have also used schooling of the mother and the father to assess whether the results are different. A comparison of these results (Tables 6 and 7) shows that the coefficient for father's education is not significant, as is the maximum level of education of a male member of the household. On the other hand, the effect of one more year of mother's education on weight-for-height is 0.07, while that of the maximum level of education of a female member of the household is slightly higher (0.08). This difference may reflect the spill-over effects of education of other female members of the household.[19]

The results suggest that marital status and age of the mother are not associated with weight-for-height ratio.[20] On the other hand, households with more female adults (over 15 years of age) and more girls (between 5 and 15 years old) have eight-year-old children with lower weight-for-height. If the contribution of females to household income earnings is lower than that of males (which is frequently the case in Ethiopia), these results may also reflect the effect of lower income/expenditure on a per capita basis. However, there are insufficient data to explain the negative association between malnutrition and the number of girl children in the household.

17 We should note that child labour and food aid are included as possible determinants of wasting which could introduce endogeneity. This is because there may be two-way causation since the decision on involvement in child labour and the receipt of food aid may also be influenced by the nutritional status of the child.

18 The calculated F value was F(47, 826)=1 which is not significant at 95 per cent.

19 It must be noted, however, that the effect of education could be different if we controlled for nutrition knowledge of mothers, for which we do not have data (Charmarbagwala *et al.,* 2004).

20 Note here that in our data, in almost all cases, children with single parents are those from households headed by women. For this reason, we included martial status in the analysis and excluded the sex of the head of the household. The results did not change when we included the latter and excluded the former.

As expected, we see from the results in Table 6 that the wealthier households, as measured by the wealth index, have eight-year-old children with better weight-for-height.

From the four indicators of absolute structural social capital used, membership of religious groups had a significant positive association with weight-for-height of children, while membership of funeral groups had a significant negative association. One possible hypothesis is that because members of religious groups such as *mahber* (women's religious associations that meet monthly to celebrate holy days) is partially determined by wealth status, the lower WHZ in this sub-group could be because of the greater level of resources available to group members. Conversely, in the case of funeral groups where non-attendance is penalised, the poor may be more likely to attend than the better-off for whom the penalties are not so significant. Moreover, because attendance at funerals is relatively time-consuming, it may have a negative spill-over impact on the time available to parents to take care of their children.

We used a dummy variable to represent average distance of a site to a public health clinic as an indicator of access to public health clinics. The results show that sites that have public health clinics within a 10km average distance have fewer wasted children.

We must also note that crop failure has a significant association with WHZ, but in the counter-intuitive direction. One possible explanation for the positive association of crop failure is that these households are getting various types of support that were not fully captured in our data. To assess whether there is an interactive effect, we included interaction terms between shocks and assets, as well as between food aid and shocks. These interaction terms, however, were not significant (Table 6), suggesting the need for future research.

Although the dummy variable included in the regression to ascertain whether residence in urban or rural areas makes a difference is not significant, a Chow test indicated that there are significant differences in the coefficients of the variables included between urban and rural areas.[21] For this reason, separate regressions were estimated. These results are presented in Tables 8 and 9 and discussed below.

Results stratified by location

Estimation results by location (urban and rural) are presented in Tables 8 and 9. Table 8 presents results of maximum levels of education of male and female members of the household, while in Table 9 we use parental years of schooling. The results presented in Table 8 show that there is no significant difference between male and female children, both in urban and rural areas. We find that children of older mothers are more wasted in rural areas.

The results for education show that households with better-educated female members have children with higher weight-for-height both in rural and urban areas. However, for urban households, the presence of better-educated males in the household has a negative and significant association with children's nutritional status (as measured by weight-for-height), while the same variable does not have a significant association in rural areas. While this is one of the results we found difficult to explain, a possible hypothesis is that children of more educated male members of the household are eating less 'traditional' food in favour of processed food items which may have a negative effect on weight-for-height. Initial findings from the Young Lives qualitative work suggest that as male incomes

21 The calculated F value was F (47, 826)=4.4 which is significant at 99 per cent.

rise, additional earnings are not necessarily used to augment household expenditure (including child-related expenses). Rather, there is a tendency for men to spend this money on items such as alcohol (for further discussion of the gendered patterning of household expenditure see Kabeer, 2003).

In terms of the age-sex composition of household members, while there is a negative association between WHZ and the number of female adults in both rural and urban areas, the number of girls in the household has a significant negative association with WHZ only in rural areas.

We also find that there is a significant and positive association with wealth index in urban areas, but the association is not significant in rural areas. This may partly be because the nature of the wealth index we used for this study was more sensitive to urban wealth indicators than rural ones. The area of land owned or rented also has a significant positive association in urban areas but not in rural areas. We also note from Table 8 that a number of the coefficients of the interaction terms between assets and shocks are significant, particularly for urban areas. The results also suggest that ownership of a television has a significant positive effect on the nutritional status of urban children. We find the opposite result for rural areas, but the data show that only one household owned a television in rural areas. For urban areas, children who spent more time on household chores have higher WHZ, while in rural households children who received food aid have higher WHZ. While the results for food aid are expected, the results for children engaged in household chores initially appear counter-intuitive.

Crop failure has a significant association both in rural and urban areas, but the direction of the association is not as expected, as noted above. Children's responses to the question whether they received enough food to eat was not significantly associated in urban areas, while this variable is significant but negative for rural areas. Cognitive social capital has a negative and significant association with weight-for-height of rural children. Membership of religious groups is significantly and positively associated (at 1 per cent) in rural areas while membership of women's groups has a significant and negative association in urban areas. The negative association of cognitive social capital and membership of women's groups may be a reflection of the time caregivers give to activities that contribute to the formation of these two types of social capital, which may, however, have a negative effect on children's nutritional status. For example, we may expect that women's group members in urban areas may not have the same access to relatives or neighbours to substitute for childcare while they attend group meetings, which may take several hours. This might have some effect on the regularity and quality of the child's food intake. We also find that distance to a public health clinic has the expected negative and significant association with weight-for-height in rural areas, but the result is the opposite for urban areas. While access to safe drinking water has the expected positive and significant association in rural areas, the result is the opposite for urban areas, which is not expected. We also find an unexpected negative and significant association for access to better sanitation facilities in rural areas. This might be because in rural areas people may still prefer to use the open field rather than unfamiliar pit latrines.

Summary

This paper has used an econometric model to analyse the correlates of child WHZ.[22] The results show that household wealth, the level of female adult education and caregivers' membership of religious groups are positively and robustly correlated (at the 1 per cent significance level) with weight-for-height. In other words, children living in households within the highest wealth category, with higher adult female education and caregiver membership of religious groups, are likely to have

22 As with all cross-sectional studies, causality cannot be attributed to the associations found in this paper. In addition, the over-sampling of poor respondents for the Young Lives study means that these results cannot be generalised to the population of Ethiopia as a whole, but are indicative of the situation of poor children.

higher WHZ. At the 5 per cent and 10 per cent significance levels, the following variables were positively correlated with weight-for-height in declining order of magnitude: the size of land that households possess, food aid received and children benefiting from school feeding programmes. In addition, the number of female adults in a household is negatively associated with weight-for-height and the association is significant at the 1 per cent level. Lastly, some variables behaved differently than expected in the regression analysis. In particular, the number of female adults in a household, access to safe drinking water and absence of crop failure have shown significant and negative correlation with weight-for-height. However, in the latter case, given that a cross-tabulation of crop failure and food aid showed a positive correlation, food aid may act as a buffer against child malnutrition in the case of shocks.

5. Policy implications

This last section discusses the implications of these findings for policy interventions. The discussion is divided into three factors that relate to the food-based approach, public health approach and gender approach. It concludes with reflections on the importance of developing an inter-sectoral approach to address child malnutrition, including a consideration of social capital variables.

5.1 Food security

Our findings confirmed the importance of household income/wealth for child nutritional wellbeing which suggests that, in order to improve child WHZ, the problem must be considered within broader policy programmes that focus on income-generation to facilitate household economic wellbeing and the ability to provide children with sufficient food.

In this regard, one crucial concern involves land productivity. While our findings showed that land ownership and land size have a positive impact on child WHZ because of greater capacity to produce food, policy interventions will also need to consider alternatives for people with little or no land. Indeed, land shortage is a problem across many of the Young Lives survey sites.

Currently, the government is undertaking initiatives to promote resettlement programmes as part of its food security strategy. Destitute people are moved under the New Food Security Programme from drought-prone food insecure areas to uncultivated non-drought-prone areas within the same regions (MoRD, 2003). While proponents of this programme argue that it will help to solve the issue of insufficient land size and infertility of soil, particularly in the highland areas, other observers are more cautious because the efficacy and outcomes of the strategy have not yet been established. There were also many deleterious impacts of a similar scheme carried out under the Derg in the 1980s. The concern is that people are being moved to uninhabited, malarial areas where basic services are undeveloped. It will therefore be imperative to monitor carefully the impacts of resettlement on children and their families.

Our data also show that receipt of food aid is positively associated with WHZ, particularly for rural children. While there are now concerns in Ethiopia that food aid is leading to a culture of food aid dependency, caution is also needed with regard to alternatives such as employment generation schemes (EGS) and food-for-work (FFW) programmes and whether they are in the best interests of children. Such programmes need to be carefully monitored to ensure that children benefit from the change in the modality of food aid delivery, and that children's paid or unpaid labour is not exploited by their and/or their family's participation in the scheme.

To what extent does the New Coalition for Food Security in Ethiopia (MoRD, 2003) – a new partnership of government, donors, civil society, the private sector and communities, mandated to develop a new strategy to address the underlying causes of food insecurity – incorporate the policy components identified above as essential for tackling child nutrition? Overall, it seeks to reduce wasting by ensuring food availability through crop and livestock production, thereby increasing food accessibility at the household-level. It argues that surplus production can be enhanced by increasing productivity of land and labour, and expanding road and markets infrastructure. Land productivity is to be increased through technological inputs such as fertilisers and improved seeds,

while labour will be strengthened through capacity-building and improved health and nutrition. This self-sustainability-oriented strategy will be accompanied by non-agriculture income-generation mechanisms such as wage employment in manufacturing industries (MoFED, 2002b).

In practice, however, there are limitations regarding the feasibility of meeting the nutritional requirements of poor households through self-production (Riley, 2000). While the carrying capacity of the land is degraded and fragmented beyond limits, the overwhelmingly rural population is growing at a rate of 2.7 per cent per annum, and is dependent on intensive farming of small plots of land for the production of food for household consumption and for sale to purchase non-food essentials. In any average year, out of the total rural households surveyed by the Central Statistics Authority, more than 2 million or 22 per cent of the households have food for about 3 months, 33 per cent of the households (3 million households) have produced food for 4-6 months, and 21 per cent of the households (about 2 million households) produce sufficient food for 7-9 months (CSA, 2001). Compounding this vulnerability, is an ill-functioning labour market and scarce income-generating opportunities for the unskilled rural population. Although the New Coalition for Food Security seeks to address these issues by introducing a productive safety net and transfers to vulnerable groups such as children in school, lactating and pregnant women and chronically poor mothers (MOR, 2003), coverage of this programme is still low (Woldehanna *et al.*, 2005).

5.2 Public health services

While extant primary healthcare facilities place considerable emphasis on nutrition promotion for children under five, there is often less emphasis on nutrition interventions for school-age children. However, if health-related problems are allowed to affect the nutritional status of pre-adolescent children, they may miss the opportunity of catching up on normal growth and development. Given that our Young Lives findings showed that access to health facilities correlates positively with the nutrition of eight-year-olds, it would appear that greater attention to such health-related needs of older children is necessary if malnutrition in this age-group is to be effectively tackled.

Specific nutrition-related services, which are currently included in the health service extension package for early school-age children, consist of de-worming and health education; but more needs to be done. A more co-ordinated approach among schools, health facilities and parents could help reduce the effect of poor health on child nutrition among school-age children. However, given the link we found between wealth and wasting and a similar link between wealth and child schooling (Woldehanna *et al.*, 2005), it is likely that some of the most negatively-affected children will not be in school and will therefore be missed by school-based nutritional interventions. It will therefore be important to develop nutrition promotion programmes which are integrated with other development packages, such as agricultural extension and interventions by non-governmental organisations, for example, school feeding programmes and supplementary foods for households eligible for relief food. Moreover, as discussed above, although the National Food Security Programme links *woreda* health offices and health facilities with the Ethiopian Health and Nutrition Research Institute (EHNRI) (MoRD, 2003), to date this initiative has been under-funded, under-staffed and weakly co-ordinated, thus seriously limiting the role the EHNRI could theoretically play in developing nutrition research to inform community nutrition interventions.

Health problems, especially parasitic and diarrhoeal diseases, can be further exacerbated by poor environmental conditions, including unsafe water supplies. Although our results counter-intuitively found that children with access to a clean water source and functioning toilet appeared to be more wasted, we expect that it is related to an unaccounted for confounding variable and would therefore not wish to downplay the importance of sanitation services in contributing to better child health outcomes.

5.3 Gender

While the literature emphasises the importance of maternal education for child malnutrition outcomes, we found that the maximum schooling level of adult females (not only mothers) in the household had a positive impact on child WHZ. There are three possible reasons for this relationship. First, educated female adults tend to have better health-seeking behaviour. For example, they are more likely to have their children vaccinated which will reduce the likelihood of diarrhoea and fever, both of which can decrease WHZ. A second possibility is that female adults with higher levels of education are likely to have better access to paid work or are engaged in the informal income-generating sector, eg petty trade. We can assume, as other studies have found (Kabeer, 2003), that this higher income will be used to improve the welfare of the household in general, and the child in particular. Third, better-educated women are more likely to have superior access to information about childcare and child health practices, and thus we could argue that they are better placed to take measures to improve the WHZ of their children, assuming sufficient food availability.

The policy implications of this finding are twofold. As we argue in a forthcoming paper on child education, given the importance of female adult education for both child schooling and child nutritional status, it is imperative that the government invest in both girls' education as well as adult education programmes which target women. Second, income-generation programmes should pay particular attention to developing productive economic opportunities for women.

5.4 The need for an integrated cross-sectoral approach

It is clear from our findings that wasting is not only related to food sufficiency, but also to food insecurity, inadequate care and poor health (Johnson-Welch, 2000), while indirect causes include lack of employment opportunities and the low status of women. Hence, there is a clear need to develop a genuinely cross-sectoral approach to addressing wasting. As discussed in the introduction, nutrition is generally discussed within the domains of public health and food security. While different sectors and organisations may be involved in nutrition-related programmes, accountability to, and responsibility for, co-ordinating activities have been transferred back and forth between the health and food security sectors. Because of the gravity of food insecurity in Ethiopia, nutrition and food security have become synonymous, although they are not: food security alone does not guarantee good nutrition.

The food available to the household must be shared according to individual needs, must be of sufficient quantity and quality, and individuals must be healthy in order to benefit from it. Moreover, as our findings on social capital suggest, nutrition programme deliverers will need to pay particular attention to the community groups through which they channel delivery of information and nutrition services. For example, while we found that children whose mothers belonged to traditional and religious associations were less wasted, Woldehanna *et al.* (2005) found that the same groups were

negatively associated with child school enrolment. We would argue that, given the high absolute numbers of caregivers participating in funeral societies, and religious, community and women's groups, government organisations, NGOs and donors would be well advised to work alongside such groups when implementing new policy programmes.

The cross-cutting nature of nutrition would suggest that the recent policy proposal by the Ministry of Health to introduce an overarching nutrition policy should be supported in order to regulate effectively and co-ordinate programmes, and avoid fragmentation and duplication. There is considerable debate among the Ministry of Health, the Public Health Association and international donors about how best to realise this proposal and which government body should have primary responsibility. A key concern will be about adequate integration of nutrition-improving activities into the PRSP and related Sector Development Plans at the national, regional and *woreda* levels. Because the extent of the effects of different variables on weight-for-height of children depended on the location of residence, decision-makers will need to think contextually to deal with factors influencing wasting, rather than employing a 'one-size-fits-all' approach. A single solution to the national problem of low WHZ may lead to a waste of resources, as it may be effective for a limited number of cases/areas only.

Tables

Table 1. Child wasting in Ethiopia in per cent (children aged 6-59 months)

Location		1995-96			1999-2000			Percentage change for all
		Male	Female	All	Male	Female	All	
Ethiopia	Wasted	8.9	9.4	9.2	10.2	9.0	9.6	4.3
	Severely wasted	3.3	3.6	3.4	1.9	1.6	1.8	-47.1
Rural	Wasted	9.3	9.8	9.5	10.5	9.3	9.9	4.2
	Severely wasted	3.4	3.8	3.6	1.9	1.7	1.8	-50.0
Urban	Wasted	6.5	7.2	6.8	6.5	5.6	6.1	-10.3
	Severely wasted	2.3	2.4	2.3	2.0	1.0	1.5	-34.8

Source: MoFED (2002a, 52)

Table 2. Distance to the nearest health centre (in km) (1999-2000)

	Percentiles of individuals					
	5	25	50	75	95	Mean
National	0	2.5	6	10	18	7.01
Rural	1	3	6	11	20	7.98
Urban	0	0	1	2	3.5	1.17

Source: MoFED (2002a, 76)

Table 3. Descriptive statistics of measures of WHZ (wasting) and their associates

Description of variable	Mean	Std. Dev.	Min	Max
Weight-for-height z-scores	-1.27	1.59	-7.89	5.82
Dummy for weight-for-height (1 if not wasted)	0.79	0.41	0.00	1.00
Male child	0.51	0.50	0.00	1.00
Age of child	8.00	0.09	7.72	8.60
Age of mother in years	34.76	7.82	21.00	60.00
No information on mother's age	0.00	0.07	0.00	1.00
Maximum years of schooling of a female member of household	4.32	3.74	0.00	15.00
Maximum years of schooling of a male member of household	5.03	4.23	0.00	16.00
Dummy for marital status (1 if permanent partner exists)	0.77	0.42	0.00	1.00
Mother's years of schooling	2.39	3.49	0	14

Description of variable	Mean	Std. Dev.	Min	Max
Father's years of schooling	3.88	3.46	0	15
Number of male adults (over 15 years old)	1.45	1.06	0.00	6.00
Number of boys (between 5 and 15 years old)	0.87	0.89	0.00	4.00
Number of female adults (over 15 years old)	1.50	0.81	0.00	6.00
Number of girls (between 5 and 15 years old)	0.96	0.93	0.00	4.00
Number of children under 5 years old	0.75	0.79	0.00	4.00
Wealth index	0.18	0.16	0.01	0.77
Land in hectares	0.64	0.88	0.00	7.25
Number of cattle owned	1.49	2.14	0.00	20.00
Owns a radio	0.43	0.50	0.00	1.00
Owns a television	0.06	0.24	0.00	1.00
Dummy for child work (1 if child works)	0.68	0.47	0.00	1.00
Hours per day spent by child on household chores	1.67	1.86	0.50	12.00
Food aid received (1 if yes)	0.23	0.42	0.00	1.00
School feeding programme (1 if yes)	0.06	0.23	0.00	1.00
Decrease in food availability (1 if yes)	0.50	0.50	0.00	1.00
Crops failed (1 if yes)	0.41	0.49	0.00	1.00
Child ill in last two weeks (1 if yes)	0.18	0.38	0.00	1.00
Child got enough food to eat (1 if yes)	0.76	0.43	0.00	1.00
Child's health compared with others (1 if worse)	0.14	0.35	0.00	1.00
Cognitive social capital	3.49	0.80	0.00	4.00
Membership of community association	0.17	0.38	0.00	1.00
Membership of women's group	0.28	0.45	0.00	1.00
Membership of religious group	0.40	0.49	0.00	1.00
Membership of funeral group	0.65	0.48	0.00	1.00
Social support	2.53	2.67	0.00	12.00
Source of drinking water (1 if safe)	0.56	0.50	0.00	1.00
Type of toilet facility (1 if flush toilet or pit latrine)	0.39	0.49	0.00	1.00
Average distance to public health clinic (1 if within 10km)	0.53	0.50	0	1
Location dummy (1 if urban)	0.43	0.49	0	1

Number of observations is 920.

Table 4. Defining a wealth index

Components of index and score	Contributing variables
H = Housing quality (/4)	Rooms/person, wall, roof, floor durability
CD = Consumer Durables (/11)	Radio, fridge, bicycle, TV, motorbike/scooter, motor vehicle, mobile phone, landline phone, modern bed, table or chair and sofa
S = Services (/4)	Electricity, water, sanitation, cooking fuel
Wealth Index = (H+CD+S)/3 Range = 0.0 – 1.0	

Table 5. Correlation between weight-for-height and its associates

Name of variable	Correlation coeff. (p-value)
Male child	-0.067
	(0.043)
Age of child	-0.0154
	(0.641)
Age of mother in years	0.039
	(0.233)
Maximum years of schooling of a female member of household	0.128
	(0.000)
Maximum years of schooling of a male member of household	0.066
	(0.045)
Mother's years of schooling	0.162
	(0.000)
Father's years of schooling	0.054
	(0.099)
Dummy for marital status (1 if permanent partner exists)	-0.060
	(0.068)
Number of male adults (over 15 years old)	-0.008
	(0.808)
Number of boys (between 5 and 15 years old)	-0.054
	(0.104)
Number of female adults (over 15 years old)	-0.040
	(0.228)
Number of girls (between 5 and 15 years old)	-0.075
	(0.023)

Name of variable	Correlation coeff. (p-value)
Number of children under 5 years old	-0.067
	(0.043)
Wealth index	0.166
	(0.000)
Land in hectares	-0.021
	(0.517)
Number of cattle owned	-0.094
	(0.004)
Owns a radio	0.063
	(0.057)
Owns a television	0.148
	(0.000)
Dummy for child work (1 if child works)	-0.049
	(0.141)
Hours per day spent by child on household chores	-0.028
	(0.401)
Food aid received (1 if yes)	0.021
	(0.534)
School feeding programme (1 if yes)	0.019
	(0.569)
Decrease in food availability (1 if yes)	0.010
	(0.765)
Crops failed (1 if yes)	0.062
	(0.059)
Child ill in last two weeks (1 if yes)	0.017
	(0.616)
Child got enough food to eat (1 if yes)	0.017
	(0.606)
Child's health compared with others (1 if worse)	-0.021
	(0.529)
Cognitive social capital	-0.075
	(0.023)

Name of variable	Correlation coeff. (p-value)
Membership of community association	0.053
	(0.109)
Membership of women's group	-0.010
	(0.774)
Membership of religious group	0.080
	(0.015)
Membership of funeral group	-0.042
	(0.203)
Social support	-0.010
	(0.764)
Source of drinking water (1 if safe)	0.010
	(0.768)
Type of toilet facility (1 if flush toilet or pit latrine)	0.076
	(0.022)
Average distance to public health clinic (1 if within 10km)	0.096
	(0.004)
Location dummy (1 if urban)	0.074
	(0.025)

Numbers just below correlation coefficients are p-values.

Table 6. Estimation results for WHZ for full sample

	(1)	(2)	Elasticity
	OLS1	OLS2	
Male child	-0.205	-0.206	-0.083
	(1.98)**	(2.01)**	
Age of child	96.811	101.993	-0.850
	(2.18)**	(2.23)**	
Age of child squared	-6.050	-6.383	
	(2.20)**	(2.25)**	
Age of mother in years	0.037	0.039	1.073
	(0.97)	(1.02)	
Age of mother squared	-0.000	-0.000	
	(0.81)	(0.84)	

	(1)	(2)	Elasticity
	OLS1	OLS2	
No information on mother's age	-1.014	-0.857	0.000
	(2.52)**	(2.05)**	
Maximum years of schooling of a female member of household	0.085	0.071	0.242
	(3.40)***	(3.84)***	
Maximum years of schooling of a male member of household	-0.006	-0.005	-0.020
	(0.28)	(0.33)	
Dummy for marital status (1 if permanent partner exists)	-0.189	-0.179	-0.109
	(1.27)	(1.22)	
Number of male adults (over 15 years old)	0.011	0.012	0.014
	(0.16)	(0.18)	
Number of boys (between 5 and 15 years old)	-0.044	-0.059	-0.040
	(0.65)	(0.89)	
Number of female adults (over 15 years old)	-0.257	-0.256	-0.302
	(3.71)***	(3.68)***	
Number of girls (between 5 and 15 years old)	-0.166	-0.177	-0.134
	(2.65)***	(2.85)***	
Number of children under 5 years old	-0.061	-0.065	-0.038
	(0.86)	(0.92)	
Wealth index	2.290	2.283	0.324
	(2.80)***	(2.92)***	
Land in hectares	0.075	0.067	0.034
	(1.19)	(1.09)	
Number of cattle owned	-0.044	-0.049	-0.057
	(1.41)	(1.53)	
Wealth and decrease in food availability (Interaction)	1.031		
	(0.99)		
Wealth and crop failure (Interaction)	-2.485		
	(1.63)		
Female education and decrease in food availability (Interaction)	-0.031		
	(0.76)		
Male education and decrease in food availability (Interaction)	-0.003		
	(0.10)		
Female education and crop failure (Interaction)	-0.011		
	(0.25)		

	(1)	(2)	Elasticity
	OLS1	OLS2	
Male education and crop failure (Interaction)	-0.005		
	(0.15)		
Owns a radio	0.004	-0.022	-0.007
	(0.03)	(0.16)	
Owns a television	0.310	0.405	0.019
	(1.20)	(1.60)	
Dummy for child work (1 if child works)	-0.188	-0.163	-0.087
	(1.43)	(1.26)	
Hours per day spent by child on household chores	0.028	0.028	0.037
	(1.06)	(1.07)	
Food aid received (1 if yes)	-0.071	0.097	0.018
	(0.30)	(0.73)	
School feeding programme (1 if yes)	0.158	0.096	0.005
	(0.86)	(0.58)	
Decrease in food availability (1 if yes)	-0.073	0.014	0.006
	(0.27)	(0.11)	
Crops failed (1 if yes)	0.983	0.653	0.211
	(3.21)***	(4.39)***	
Food aid and decrease in food availability (Interaction)	0.243		
	(0.78)		
Food aid and crop failure (Interaction)	0.042		
	(0.14)		
Child ill in last two weeks (1 if yes)	-0.079	-0.066	-0.009
	(0.57)	(0.48)	
Child got enough food to eat (1 if yes)	-0.115	-0.113	-0.068
	(0.92)	(0.90)	
Child's health compared with others (1 if worse)	-0.131	-0.152	-0.017
	(0.84)	(0.97)	
Cognitive social capital	-0.059	-0.066	-0.181
	(0.93)	(1.05)	
Membership of community association	0.168	0.170	0.023
	(1.25)	(1.25)	
Membership of women's group	-0.111	-0.120	-0.026

	(1)	(2)	Elasticity
	OLS1	OLS2	
	(0.89)	(0.98)	
Membership of religious group	0.379	0.373	0.117
	(3.00)***	(2.95)***	
Membership of funeral group	-0.247	-0.228	-0.117
	(1.84)*	(1.71)*	
Social support	-0.034	-0.032	-0.064
	(1.59)	(1.46)	
Source of drinking water (1 if safe)	-0.138	-0.146	-0.064
	(1.24)	(1.31)	
Type of toilet facility (1 if flush toilet or pit latrine)	-0.030	-0.058	-0.018
	(0.20)	(0.41)	
Average distance to public health clinic (1 if within 10km)	0.275	0.260	0.109
	(2.38)**	(2.22)**	
Location dummy (1 if urban)	-0.116	-0.099	-0.034
	(0.54)	(0.47)	
Constant	-388.949	-409.079	
	(2.17)**	(2.22)**	
Observations	920	920	
R-squared	0.15	0.14	

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%. Weight-for-height z-score is the dependent variable.

Table 7. Estimation results for WHZ for full sample (with mother's and father's education)

	OLS1
Male child	-0.209
	(2.04)**
Age of child	88.987
	(2.03)**
Age of child squared	-5.562
	(2.05)**
Age of mother in years	0.041
	(1.05)
Age of mother squared	-0.000

	OLS1
	(0.82)
No information on mother's age	-1.148
	(2.85)***
Mother's years of schooling	0.070
	(2.84)***
Father's years of schooling	-0.024
	(0.94)
Dummy for marital status (1 if permanent partner exists)	-0.200
	(1.32)
Number of male adults (over 15 years old)	0.002
	(0.04)
Number of boys (between 5 and 15 years old)	-0.038
	(0.58)
Number of female adults (over 15 years old)	-0.157
	(2.47)**
Number of girls (between 5 and 15 years old)	-0.128
	(2.10)**
Number of children under 5 years old	-0.061
	(0.87)
Wealth index	2.373
	(2.89)***
Land in hectares	0.069
	(1.13)
Number of cattle owned	-0.047
	(1.52)
Wealth and decrease in food availability (Interaction)	1.242
	(1.29)
Wealth and crop failure (Interaction)	-2.989
	(2.10)**
Mother's education and decrease in food availability (Interaction)	-0.033
	(0.81)
Father's education and decrease in food availability (Interaction)	-0.051
	(1.10)
Mother's education and crop failure (Interaction)	0.051

	OLS1
	(1.23)
Father's education and crop failure (Interaction)	0.028
	(0.65)
Owns a radio	0.067
	(0.48)
Owns a television	0.274
	(1.04)
Dummy for child work (1 if child works)	-0.203
	(1.55)
Hours per day spent by child on household chores	0.025
	(0.99)
Food aid received (1 if yes)	-0.109
	(0.45)
School feeding programme (1 if yes)	0.217
	(1.17)
Decrease in food availability (1 if yes)	0.015
	(0.05)
Crops failed (1 if yes)	0.789
	(2.58)***
Food aid and decrease in food availability (Interaction)	0.201
	(0.61)
Food aid and crop failure (Interaction)	0.168
	(0.54)
Child ill in last two weeks (1 if yes)	-0.094
	(0.67)
Child got enough food to eat (1 if yes)	-0.095
	(0.77)
Child's health compared with others (1 if worse)	-0.085
	(0.54)
Cognitive social capital	-0.065
	(1.01)
Membership of community association	0.141
	(1.06)
Membership of women's group	-0.101

	OLS1
	(0.81)
Membership of religious group	0.389
	(3.09)***
Membership of funeral group	-0.216
	(1.62)
Social support	-0.030
	(1.42)
Source of drinking water (1 if safe)	-0.147
	(1.31)
Type of toilet facility (1 if flush toilet or pit latrine)	0.000
	(0.00)
Average distance to public health clinic (1 if within 10km)	0.242
	(2.11)**
Location dummy (1 if urban)	-0.062
	(0.29)
Constant	-357.728
	(2.02)**
Observations	920
R-squared	0.15

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%. Weight-for-height z-score is the dependent variable.

Table 8. Estimation results for WHZ by location

	(1)	(2)	(3)	(4)
	Rural OLS1	Rural OLS2	Urban OLS1	Urban OLS2
Male child	-0.134	-0.144	-0.166	-0.111
	(1.16)	(1.26)	(0.99)	(0.66)
Age of child	42.833	56.480	-237.546	-199.616
	(1.14)	(1.59)	(0.77)	(0.66)
Age of child squared	-2.696	-3.548	14.932	12.558
	(1.16)	(1.61)	(0.77)	(0.67)
Age of mother in years	-0.081	-0.083	0.085	0.091
	(1.86)*	(1.88)*	(1.46)	(1.59)
Age of mother squared	0.001	0.001	-0.001	-0.001

	(1)	(2)	(3)	(4)
	Rural OLS1	Rural OLS2	Urban OLS1	Urban OLS2
	(1.84)*	(1.90)*	(1.15)	(1.24)
No information on mother's age	-1.478	-1.383	0.000	0.000
	(3.10)***	(3.04)***	(.)	(.)
Maximum years of schooling of a female member of household	0.102	0.041	0.077	0.059
	(2.37)**	(1.64)	(2.46)**	(2.26)**
Maximum years of schooling of a male member of household	0.038	-0.001	-0.048	-0.041
	(1.02)	(0.08)	(1.75)*	(1.71)*
Dummy for marital status (1 if permanent partner exists)	0.112	0.079	-0.212	-0.263
	(0.53)	(0.37)	(0.99)	(1.32)
Number of male adults (over 15 years old)	0.091	0.075	0.040	0.066
	(1.09)	(0.92)	(0.40)	(0.66)
Number of boys (between 5 and 15 years old)	0.097	0.102	-0.076	-0.099
	(1.34)	(1.40)	(0.72)	(0.93)
Number of female adults (over 15 years old)	-0.209	-0.207	-0.282	-0.298
	(2.36)**	(2.27)**	(2.88)***	(3.09)***
Number of girls (between 5 and 15 years old)	-0.035	-0.013	-0.251	-0.278
	(0.49)	(0.19)	(2.79)***	(3.13)***
Number of children under 5 years old	-0.011	-0.008	-0.171	-0.162
	(0.14)	(0.10)	(1.57)	(1.51)
Wealth index	0.356	0.877	2.433	1.665
	(0.20)	(0.69)	(2.34)**	(1.76)*
Land in hectares	0.004	0.002	0.385	0.365
	(0.07)	(0.03)	(1.84)*	(1.80)*
Number of cattle owned	-0.037	-0.040	-0.161	-0.176
	(1.22)	(1.33)	(2.27)**	(2.44)**
Wealth and decrease in food availability (Interaction)	0.915		-1.350	
	(0.48)		(0.73)	
Wealth and crop failure (Interaction)	-0.019		-5.967	
	(0.01)		(2.37)**	
Female education and decrease in food availability (Interaction)	0.035		-0.096	

	(1)	(2)	(3)	(4)
	Rural OLS1	Rural OLS2	Urban OLS1	Urban OLS2
	(0.59)		(1.92)*	
Male education and decrease in food availability (Interaction)	-0.031		0.048	
	(0.75)		(0.95)	
Female education and crop failure (Interaction)	-0.112		0.191	
	(1.88)*		(2.31)**	
Male education and crop failure (Interaction)	-0.034		-0.144	
	(0.78)		(1.90)*	
Owns a radio	-0.041	-0.023	0.217	0.231
	(0.24)	(0.14)	(0.95)	(1.04)
Owns a television	-1.341	-0.306	0.399	0.482
	(2.28)**	(0.62)	(1.33)	(1.65)*
Dummy for child work (1 if child works)	-0.143	-0.152	-0.025	-0.074
	(0.88)	(0.93)	(0.12)	(0.35)
Hours per day spent by child on household chores	-0.010	-0.009	0.109	0.115
	(0.32)	(0.30)	(1.86)*	(1.94)*
Food aid received (1 if yes)	0.241	0.311	0.083	-0.295
	(0.97)	(2.42)**	(0.19)	(0.76)
School feeding programme (1 if yes)	0.058	0.079	0.158	0.110
	(0.22)	(0.31)	(0.51)	(0.39)
Decrease in food availability (1 if yes)	-0.191	0.005	0.796	-0.001
	(0.61)	(0.03)	(1.52)	(0.01)
Crops failed (1 if yes)	1.172	0.690	1.543	0.449
	(3.70)***	(4.30)***	(2.04)**	(1.36)
Food aid and decrease in food availability (Interaction)	0.546		-0.778	
	(1.86)*		(0.94)	
Food aid and crop failure (Interaction)	-0.394		-0.314	
	(1.39)		(0.38)	
Child ill in last two weeks (1 if yes)	0.044	0.056	-0.241	-0.110
	(0.30)	(0.38)	(0.93)	(0.45)
Child got enough food to eat (1 if yes)	-0.419	-0.389	0.152	0.210
	(3.20)***	(2.98)***	(0.71)	(0.97)
Child's health compared with others (1 if worse)	0.142	0.171	-0.356	-0.380

	(1)	(2)	(3)	(4)
	Rural OLS1	Rural OLS2	Urban OLS1	Urban OLS2
	(0.82)	(1.01)	(1.26)	(1.34)
Cognitive social capital	-0.152	-0.186	-0.034	-0.024
	(1.87)*	(2.30)**	(0.34)	(0.24)
Membership of community association	0.220	0.197	0.304	0.284
	(1.47)	(1.31)	(1.00)	(0.95)
Membership of women's group	0.113	0.150	-0.638	-0.657
	(0.81)	(1.11)	(2.66)***	(2.79)***
Membership of religious group	0.739	0.736	-0.279	-0.254
	(5.58)***	(5.67)***	(1.15)	(1.02)
Membership of funeral group	-0.216	-0.196	0.110	0.131
	(1.52)	(1.38)	(0.44)	(0.54)
Social support	-0.034	-0.034	0.065	0.064
	(1.47)	(1.48)	(1.35)	(1.33)
Source of drinking water (1 if safe)	0.263	0.250	-0.538	-0.482
	(2.01)**	(1.92)*	(2.47)**	(2.26)**
Type of toilet facility (1 if flush toilet or pit latrine)	-0.425	-0.450	0.199	0.169
	(2.16)**	(2.32)**	(0.89)	(0.76)
Average distance to public health clinic (1 if within 10km)	1.108	1.123	-0.708	-0.777
	(8.06)***	(8.09)***	(3.14)***	(3.47)***
Constant	-170.407	-224.764	942.278	790.982
	(1.12)	(1.56)	(0.76)	(0.66)
Observations	529	529	391	391
R-squared	0.33	0.31	0.28	0.25

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%. Weight-for-height z-score is the dependent variable.

Table 9. Estimation results for WHZ by location (with mother's and father's education)

	(1)	(2)
	Rural OLS1	Urban OLS1
Male child	-0.125	-0.145
	(1.10)	(0.87)
Age of child	43.335	-340.759
	(1.12)	(1.10)

	(1)	(2)
	Rural OLS1	Urban OLS1
Age of child squared	-2.736	21.410
	(1.15)	(1.11)
Age of mother in years	-0.076	0.084
	(1.69)*	(1.48)
Age of mother squared	0.001	-0.001
	(1.71)*	(1.19)
No information on mother's age	-1.403	0.000
	(2.96)***	(.)
Mother's years of schooling	0.171	0.053
	(2.33)**	(1.96)*
Father's years of schooling	0.013	-0.078
	(0.27)	(2.31)**
Dummy for marital status (1 if permanent partner exists)	0.090	-0.210
	(0.40)	(1.00)
Number of male adults (over 15 years old)	0.077	-0.013
	(1.02)	(0.13)
Number of boys (between 5 and 15 years old)	0.101	-0.079
	(1.44)	(0.75)
Number of female adults (over 15 years old)	-0.119	-0.227
	(1.42)	(2.57)**
Number of girls (between 5 and 15 years old)	-0.003	-0.247
	(0.05)	(2.80)***
Number of children under 5 years old	-0.012	-0.130
	(0.15)	(1.15)
Wealth index	0.060	2.538
	(0.03)	(2.48)**
Land in hectares	0.022	0.315
	(0.34)	(1.46)
Number of cattle owned	-0.042	-0.168
	(1.39)	(2.29)**
Wealth and decrease in food availability (Interaction)	0.834	-1.206
	(0.44)	(0.70)
Wealth and crop failure (Interaction)	0.379	-4.128

	(1)	(2)
	Rural OLS1	Urban OLS1
	(0.20)	(2.03)**
Mother's education and decrease in food availability (Interaction)	-0.027	-0.050
	(0.44)	(0.99)
Father's education and decrease in food availability (Interaction)	-0.056	-0.001
	(1.15)	(0.01)
Mother's education and crop failure (Interaction)	-0.109	0.093
	(1.33)	(1.02)
Father's education and crop failure (Interaction)	0.009	-0.178
	(0.16)	(1.66)*
Owns a radio	-0.030	0.352
	(0.17)	(1.69)*
Owns a television	-1.753	0.389
	(2.41)**	(1.26)
Dummy for child work (1 if child works)	-0.190	-0.060
	(1.15)	(0.28)
Hours per day spent by child on household chores	-0.009	0.091
	(0.29)	(1.61)
Food aid received (1 if yes)	0.185	-0.028
	(0.74)	(0.06)
School feeding programme (1 if yes)	0.183	0.183
	(0.67)	(0.59)
Decrease in food availability (1 if yes)	-0.049	0.629
	(0.16)	(1.18)
Crops failed (1 if yes)	0.838	1.722
	(2.67)***	(2.44)**
Food aid and decrease in food availability (Interaction)	0.562	-0.688
	(1.71)*	(0.82)
Food aid and crop failure (Interaction)	-0.340	0.833
	(1.14)	(0.99)
Child ill in last two weeks (1 if yes)	0.037	-0.187
	(0.26)	(0.73)
Child got enough food to eat (1 if yes)	-0.398	0.173
	(3.06)***	(0.82)

	(1)	(2)
	Rural OLS1	Urban OLS1
Child's health compared with others (1 if worse)	0.197	-0.331
	(1.15)	(1.14)
Cognitive social capital	-0.151	-0.030
	(1.77)*	(0.30)
Membership of community association	0.219	0.181
	(1.47)	(0.60)
Membership of women's group	0.162	-0.627
	(1.17)	(2.66)***
Membership of religious group	0.743	-0.292
	(5.56)***	(1.19)
Membership of funeral group	-0.199	0.174
	(1.38)	(0.72)
Social support	-0.025	0.063
	(1.10)	(1.24)
Source of drinking water (1 if safe)	0.260	-0.512
	(1.99)**	(2.37)**
Type of toilet facility (1 if flush toilet or pit latrine)	-0.392	0.170
	(1.99)**	(0.75)
Average distance to public health clinic (1 if within 10km)	1.076	-0.817
	(7.85)***	(3.83)***
Constant	-172.037	1,353.663
	(1.10)	(1.10)
Observations	529	391
R-squared	0.33	0.28

Robust t statistics in parentheses
* significant at 10%; ** significant at 5%; *** significant at 1%. Weight-for-height z-score is the dependent variable.

Appendix: Definition of wasting

A child is wasted if his/her weight-height ratio is less than two standard deviations below the mean weight-height ratio of the reference population.

Wasting = (Weight/Height)I < Mean (Weight/Height) - 2 Standard Deviation (Weight/Height)

Similarly, **severe wasting** is defined as follows:

Severe Wasting = (Weight/Height)I < Mean (Weight/Height) - 3 Standard Deviation (Weight/Height)

Height-for-age (stunting) and weight-for-height (wasting) are the most frequently used measures of nutritional status. Stunting is a long term (cumulative) indicator of slow growth (past nutrition) due to repeated illness and/or insufficient diet, while wasting is short term and can be reversed given favourable conditions. Given that stunting is frequently the result of nutrition challenges during infancy, it was not considered a suitable indicator for the current determinants of under-nutrition in eight-year-olds. Underweight, which is not considered in this paper, could be caused by stunting, wasting or both and hence does not distinguish between cumulative (long term) and current (short term) malnutrition (see SC UK Ethiopia, 2002; MoFED, 2002a).

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Young Lives is an international longitudinal study of childhood poverty, taking place in Ethiopia, India, Peru and Vietnam, and funded by DFID. The project aims to improve our understanding of the causes and consequences of childhood poverty in the developing world by following the lives of a group of 8,000 children and their families over a 15-year period. Through the involvement of academic, government and NGO partners in the aforementioned countries, South Africa and the UK, the Young Lives project will highlight ways in which policy can be improved to more effectively tackle child poverty.

As one of the poorest countries in the world, Ethiopia's rate of child malnutrition is one of the highest, even within sub-Sahara Africa. The causes and relative importance of various determinants of malnutrition in Ethiopia are not well understood. This paper specifically explores some of the less obvious factors affecting children's nutritional status in Ethiopia. It is based on information collected in 2002 from 1001 households with eight-year-old children mainly from food insecure communities in Tigray, Amhara, Oromia, SNNP and Addis Ababa Regional States. As part of the Young Lives Project, this study is particularly important because the determinants of the nutritional status of eight-year-old children is much less researched than that of younger children, not only in Ethiopia but in other developing countries.

The results from simple correlation analysis indicated that a number of variables were significantly related to weight-for-height z-score (WHZ) (as an indicator of wasting). In addition to analysing WHZ for the whole sample, we have also separately analysed WHZ for urban and rural households, and found that the determinants differed.

The results show that weight-for-height z-scores depend on the sex of the child and suggest that short-term malnutrition is higher for male children than for female children. We conclude that variables such as physical and natural capital (wealth index, ownership of radio, television and land), human capital (education of members of the household), social capital (strength of a caregivers' ties to social organizations and networks), age-sex composition of households (the number of girls, the number of female adults) and location of residence (rural or urban) are important in influencing WHZ in eight-year-olds.

We conclude that addressing child malnutrition, especially WHZ, requires a multi-dimensional approach that takes into account food security, public health and gendered intra-household dynamics if it is to be effective. Moreover, a cross-sectoral nutrition policy is needed to improve policy synergies.

Published by

Young Lives
Save the Children UK
1 St John's Lane
London EC1M 4AR

Tel: 44 (0) 20 7012 6796
Fax: 44 (0) 20 7012 6963
Web: www.younglives.org.uk

ISBN 1-904427-27-8 First Published: 2005

Designed and typeset by Copyprint UK Limited