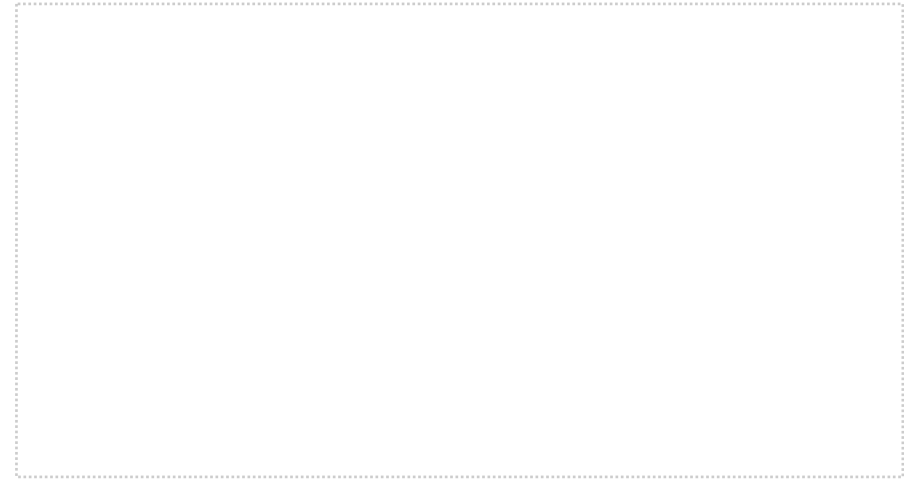




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Table 5. Regression Models Relating HAZ at 2y to Work Type (cont..)

Enrolled						
Crude						
Not working	1.5	1.55	.121	1.3	1.05	.292
HS grad	1.7	1.2	.232	1.2	.57	.566
/vocational						
At least college	1.7	1.94	.052	1.9	2.21	.027
Adjusted1						
Not working	1.3	1.02	.307	.85	-.60	.547
HS grad	1.6	.97	.334	.96	-.09	.932
/vocational						
At least college	1.8	1.8	.071	1.2	.56	.576
Adjusted2						
Not working	1.4	1.21	.225	.83	-.68	.498
HS grad	1.8	1.20	.231	.98	-.04	.967
/vocational						
At least college	1.8	1.83	.067	1.4	.81	.417
Not enrolled						
Crude						
Not working	1.	1.90	.057	1.1	.79	.428
HS grad	1.3	2.20	.028	1.3	1.98	.047
/vocational						
At least college	1.4	1.69	.092	2.0	3.36	.001
Adjusted1						
Not working	1.2	1.53	.127	.98	-.25	.804
HS grad	1.3	2.22	.027	1.2	1.47	.142
/vocational						
At least college	1.2	.94	.348	1.53	1.89	.058
Adjusted2						
Not working	1.2	1.47	.142	.94	-.72	.471

No. 10

Early Child Stunting and Gender Inequalities in Work Participation Among Young Filipino Adults

Paulita L. Duazo and Perla Hamoy

May 2008

Table 4 . Stratification of Work Outcome And HAZ by Gender

	Females	MAles	p-value ¹
	N(%)		
Work type			.00
Not working	402 (44.9)	398 (40.1)	
<high school	245 (27.3)	423 (42.6)	
HS grad/ vocational	161 (18.0)	109 (11.0)	
At least college	87 (9.7)	63 (6.3)	

¹ values of P based on Pearson's chi-square and t-test

Table 5. Regression Models Relating HAZ at 2y to Work Type

Work (referent=less HS	Females			Males		
	RRR	Z	P> z	RRR	Z	P> z
All						
Crude						
Not working	1.4	4.16	.000	1.2	2.85	.004
HS grad	1.2	2.11	.035	1.3	2.12	.034
/vocational						
At least college	2.0	5.08	.000	2.2	5.13	.000
Adjusted1						
Not working	1.3	2.66	.008	.99	-.09	.930
HS grad	1.3	2.26	.024	1.2	1.33	.184
/vocational						
At least college	1.8	3.73	.000	1.5	2.35	.019
Adjusted2						
Not working	1.22	2.13	.033	.91	-1.04	.299
HS grad	1.2	1.7	.089	1.0	.29	.774
/vocational						
At least college	1.4	1.84	.065	1.3	1.25	.210

Table 2. Profile of Young Adults

Characteristics	Both sexes		Female		Male		P-value
	(n=1,888)		(n=895)		(n=993)		
Birth weight, g	3008.3	420	2983.9	413	3030.3	425	.02
Birth length, cm	49.1	2.0	48.9	2	49.4	2	.00
Height-for-age z-score	-2.1		-2.1		-2.1		.60
Highest education, yr	10.5	3.2	11.2	2.8	9.8	3.4	.00
Maternal height, cm	150.6	5.0	150.5	5	150.6	5	.53
Maternal education, yr	7.0	3.3	7.0	3.2	7.1	3.4	.50
Paternal education, yr	7.1	3.4	7.0	3.3	7.2	3.6	.26
Work and enrollment status,%							.00
working							
not enrolled	57.6		55.1		60.0		
enrolled	49.1		44.4		53.4		
not working	8.5		10.7		6.6		
not enrolled	42.4		44.9		40.1		
enrolled	26.8		28.4		25.3		
	15.6		16.5		14.8		
Major occupational group,%							.00
Professional	2.3		2.6		2.0		
Administrative	0.6		0.8		0.4		
Clerical	5.4		8.3		2.8		
Sales	11.6		13.7		9.6		
Farmers, etc.	1.6		0.2		2.8		
Miners, etc.	0.2		0.0		0.3		
Transport	4.4		0.7		7.8		
Production	24.3		22.7		25.7		
Service, etc.	7.4		6.2		8.6		
Not working	42.4		44.9		40.1		

Table 3. Characteristics of Young Adults Classified by Work Type

Variables	Work type				p-value
	Not working	Less high school	High school graduate/vocational	At least college	
Child's HAZ	-2.0	-2.3	-2.1	-1.7	.00
Child's Highest education (y)	11.0	9.0	11.2	14	.00
Enrollment status (%)					0.000
Enrolled	63.136.9	92.27.8	92.27.8	41.358.7	
Not enrolled					
Mother's height (cm)	151.2	150.3	150.3	151.1	.01
Mother's Education (y)	8.4	6.1	6.7	9.1	.00
Urbanicity index	32.9	28.1	27.5	33.6	.00
Assets index	1.4	.83	.89	1.4	.00
Hygiene index	6.0	5.3	5.4	6.2	.00

Early Child Stunting and Gender Inequalities in Work Participation Among Young Filipino Adults

Paulita L. Duazo and Perla Hamoy

Abstract

Accumulated evidences have shown the relationship between early child health and later labor productivity through school achievement. The present study aims to show a similar relationship for working young adults who still consider jobs as 'learning experience' or a 'stepping stone' to a better job. Specifically, this study investigates the effect of early child height-for-age z-score (HAZ) to work among young adults. We define work outcome as jobs requiring higher educational attainment. A cohort of 1,888 young adults (20-22 years old) from the Cebu Longitudinal Health and Nutrition Survey (CLHNS) of which 46.3% females comprise the analytic sample. Findings show a positive association between the height-for-age z- scores and labor productivity, and the association is attenuated by education. No clear gender disparities in the associations were detected. Results of the study point to the importance of investing in early child health programs to ameliorate later productivity.

Introduction

Common in the Philippines as in other developing countries is protein-energy malnutrition (UNICEF 1998). Although trends in the proportions of malnutrition among 0 to 5 year old Filipino children had been decreasing over the years, the figures are still alarming and malnutrition still pose as problem if unabated. In the 2003 National Nutrition Survey conducted by the Food and Nutrition Research Institute (FNRI) and on the basis of growth faltering, about three in every ten 0 to 5 year old were malnourished (FNRI 2003). One of the consequences of early stunting is poor school performance in the form of delayed school entrance, poor cognitive achievement tests and high absenteeism in mid childhood (Daniels and Adair (2004); Alderman, Behrman, Lavy and Menon (2001); Ghuman, Behrman and Gultiano (2006); Perez and Cinco (2007)). Early child nutrition is strongly associated with cognition and schooling outcome and later productivity. Investment in early childhood health and nutrition is widely recognized as a cost effective intervention to fight the vicious cycle of poverty- thru improved schooling outcome and thus improved adult productivities (Berhman (1993)).

Early studies accumulating over the past years have shown that early child nutrition affects schooling outcome and affects income thru later labor productivity. Glewwe, Jacoby and King (2000) using a sample of sibling pairs in the CLHNS, studied associations between schooling and child nutrition using height-for-age z-score (HAZ). Using the sibling difference of achievement test score and HAZ nearest to the school enrollment of the older sibling and the recent HAZ for the younger sibling, the group found out that there was a 'direct effect of nutrition on the learning productivity per year of school'. Poorly nourished children perform more poorly in school even after controlling for some unobserved heterogeneity both intra- and inter- households.

The timing and severity of growth faltering in early childhood has a strong association with cognitive performance. Height-for-age at two years has a larger negative impact on the cognitive development and later adult productivity (Glewwe and King (2001), Adair (1999)). Especially during the first 2 years of life, children with poor nutritional status have poor cognitive performance (Glewwe, king 2000). In a study done by Mendez and Adair, results revealed that stunting at 2 years old, particularly when severe had a strong association with cognitive performance at 8 and 11 years old.

In this paper we posit that early stunting leads to low work output and that individuals stunted at 2 y will be more likely to be in a job requiring low education. This in effect find relationships between job demands and the capacities of the workers. The findings of this study adds to the research on the long term effects of early malnutrition by using a shorter period wherein the working young adults still consider jobs as 'learning experience' or a 'stepping stone' to a better job.

Subjects and Methods

The Cebu Longitudinal Health and Nutrition Survey (CLHNS) was a community-based, prospective study of a 1-y birth cohort in a fast growing city located in the central part of the Philippines. It employed a stratified, single-stage sampling design to select 17 urban and 16 rural barangays (smallest administrative unit) in Metro Cebu, Philippines. Households were surveyed and information was collected on all births occurring between May 1, 1983 and April 30, 1984. Since baseline, a total of 1,192 children have been dropped from the original sample of 3,080 single and 24 multiple births. Reasons for attrition include out-migration from the study area, about 75%, and the remaining due to refusals and deaths (Perez, 2003).

A total of 1,888 young adults comprise the analytic sample. Characteristics of these were similar to the children included in the original sample i.e., there were no differences in the household income and assets (Mendez and Adair, 1999), hygiene, maternal education and parity. However, the young adults were more likely to be healthy at birth and were in households who own their dwelling units compared to their counterparts in the original sample. (Refer to Table 1).

Work type. During the 2005 survey subjects were asked of the educational requirement of the job they were currently in. Work type was defined in terms of job educational requirement (categorized as job requiring less high school (comparison group), high school graduate and or with vocational training, and at least college). Those who were not working at the time of the 2005 survey were included as one category.

Height-for age. The main exposure was recumbent length or height-for-age z-scores (HAZ) of the young adults measured at two years was computed based on the World Health Organization standards (WHO Anthro2005).

Data analysis. Bivariate analysis was performed to assess pairwise associations between HAZ and work outcomes. Tools such as Chi-square, ANOVA and t-test statistics were used to evaluate such associations.

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Table 1. Odds of sample children remaining in the 2005 survey

Characteristics (baseline)	In the analytic sample (N=1,888)		
	Odds ratio	95% CI	P-value
Bithweight, gms	1.0	1.0	.001
Mother's education, y	1.0	.97-1.0	.78
Mother's parity	.97	.94-1.0	.13
Urban residence	.84	.70-1.0	.11
Housing ownership	2.3	2.0-2.7	.000
Hygiene index	1.0	.96-1.0	.99
Wealth	.97	.82-1.2	.74

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Several potential confounders of HAZ at two years and that of work type were considered in the model to account for some biases that may affect the HAZ-work association. Variables captured at birth were mother's height, environmental cleanliness index, urbanicity index, household assets, and mother's education. Urbanicity index measures the proximity of the child to health, education and other social services. Household asset is an index variable measured by summing the presence of air-conditioner, vehicle, television set, ownership of housing lot and strong housing materials. Environmental cleanliness is a variable created by summing the assessment scores for the food area "very clean" (vs. "not clean" or "filthy"), garbage disposal, type of toilet (flushed/water-sealed vs. latrine or no toilet), and the interviewer's general assessment of the surroundings as "very clean" (vs. "not clean" or "filthy") (Daniels and Adair (1999)). Taken from the 2005 survey were child's age and highest educational attainment.

Multivariate logistic regression analysis was performed to estimate the likelihood of a young adult with higher HAZ to be in a job requiring higher education. Three models were arrived at: first, the crude associations of HAZ and type of work constitute the unadjusted model; the second model comprise in addition to the crude, potential confounders of HAZ at two years (such as mother's height and hygiene index, urbanicity index, household assets, and mother's education). Additional models were run to assess the effect of education on the HAZ-work outcome relationship. The analysis was stratified by sex and by enrollment status (currently enrolled or not).

Used the WHO Anthro 2005 software and Intercooled Stata 8.0 for data processing.

Results

Socio-demographic characteristics

Table 2 shows that males were heavier and longer at birth than females. There was no apparent significant difference in the mean HAZ of the male and female young adults taken at 2 years. On the average, the young adults were high school graduates or have reached 10 years of schooling. While males have about 1.4 less years of schooling than females, more were not enrolled and were currently working. Among those who were currently enrolled, one-fourth were not working.

Majority was employed as production workers, with more males being in the group than females. On the other hand, more females than males were employed in desk and sales jobs. Parental characteristics (mother's height and parental education) were similar across sexes. (Refer to Table 2).

Bivariate analysis

In bivariate analysis, young adults stunted at 2 y tended to land in a job requiring lower education. Basing from the WHO reference data and a cut-off score of $-2sd$, those who were currently in jobs requiring at least college education were normal. Not much difference was seen between those not currently working and those in jobs requiring at high school or vocational trainings.

No gender differences was observed with respect to HAZ at two years. About 16% of the subjects were not currently working and were enrolled full time. While about 5% were working in jobs requiring at least college education and were also enrolled. Those in the 'at least college' work type and not currently working have higher mother's education, assets, hygiene score and urbanicity index. (Refer to Table 3).

With respect to work type, more females than males are in jobs requiring higher education.

Multivariate analysis

In this section, we examined the relationship of early health to work outcome in early adulthood controlling for household and community characteristics thought to affect the association. In the crude model and unstratified by enrollment status, there were trends apparent between work types and HAZ. Young adults who have higher HAZ at 2 y were more likely to be in jobs requiring at least college education than otherwise. This was true for both sexes; those who have higher HAZ at 2 y were twice more likely to be in jobs requiring higher education. The likelihood and significance diminished when separate runs for enrollment status was performed. After adjusting for the socio-economic status (SES), maternal height and other covariates the HAZ -work type association diminished. Further adjustment for educational attainment further reduced the association and the significance. Adjusting for 2005 educational attainment decreased the likelihood of being in a job requiring at least college education by 30% for females and 41% for males. Education appears to mediate the HAZ-work association especially among males

Additional models disaggregated by enrolment status were also run to assess the relationship of HAZ and work. Similar trends were observed and were consistent with the above findings. In the 'not currently enrolled', the likelihood of being in a job requiring higher education was diminished when 2005 educational attainment was added to the crude model. Those in the 'enrolled' group, an increased likelihood of taller children to be in a job requiring at least college education than to be in jobs requiring at least high school, especially among the females; adjusting for 2005 educational attainment increased the likelihood of being in a job requiring at least college education by approximately 6% for females, but not significantly. Among the males, an increased likelihood to be in a job requiring at least college was 26%, but significance decreased considerably.

Discussion

What happens early in life has an effect in later life (Martorell (1995), Behrman (1993). This study shows how early malnutrition imperils adulthood abilities thru labor productivity. It compromises optimum opportunity of being in a 'better' job (described in terms of jobs requiring higher education) and which can be translated to higher paying jobs. Early childhood health as represented by height-for-age at two years was significantly associated with the type of work of young Filipino adults. Results also show that productivity is partly compromised through minimal educational attainment. The result seems to show that early child health may affect labor productivity through improved cognitive skills through schooling achievements. Taller children select into jobs that have higher cognitive skill requirements.

It was almost often the case that jobs requiring higher educations. This result parallels with other studies in that, young adults who were well nourished at early age were those who have higher productivity in terms of school achievement and later-on higher labor productivity. There seems to be no considerable gender disparity on the association of early nutrition and type of work.

The apparent association of early nutrition and early adulthood productivity was stronger when highest education was not included in the model. Education was clearly correlated with economic productivity. It suggests that good school performance or higher school achievement leads to higher earning capacity. This finding indicates that part of the effect of early nutrition was transient. Our findings add to this research by suggesting that early environments could have positive effect on labor productivity.

The study emphasizes the long-term effect of early childhood nutrition on young adult labor participation specifically working in jobs that require high education and low physical activity. It stresses the importance of preventing malnutrition in early childhood to improve later life productivity. Productivity later in life was partly compromised through limited educational achievement (Hill and Sanford (1995). Improving early child health provides long-term benefits and was more effective in combating the intergenerational effects of poverty. Benefits range from child survival to school readiness and schooling achievement to later years labor productivity and health (Maluccio, et.al.). The results of the study reinforce the knowledge as basis for policy formulation that might improve the well-being and productivity of many of the needy in developing countries. Poor children were mostly the victims of malnutrition due to less access to food and health services. To emancipate the poor from the vicious cycle of poverty, various health interventions were to be directed as early as childhood. The economic benefits derived from early interventions always extend to adulthood when earning potential was at its most, as contrasted from those who have not been given childhood health interventions.

The study have its limitations. First, index children who have been present throughout the study periods were nutritionally "better-off" than those who have been excluded. Secondly, findings maybe limited only to those who were in the cohort

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