# Childhood Stunting and Schooling Attainment of Filipino Young Adults

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Studies have shown that childhood stunting (length-for-age more than 2 SD below the median of the WHO reference) has adverse effects on school achievement. Severe stunting at two years old is significantly associated with later deficits in the child's cognitive ability (Mendez & Adair, 1999). Taller children were less likely to drop out during grade school (Daniels & Adair, 2004). A study by Chang, Walker, Grantham-McGregor, & Powell (2002) showed that specific arithmetic ability was poorer for stunted compared to non-stunted children. Lower nutritional status, measured in height-for-age, was found to affect school performance, a one standard deviation reduction in height for age would result in one-third of a year delay in child's schooling (Jamison, 1986).

The present study looks at the relationship of stunting at two years of age to school attainment in young adulthood, taking into consideration possible confounding factors such as sex, IQ, number of siblings, mother's age and education, household assets, and rural-urban classification. Because the relationships are expected to differ significantly by sex, the analysis is done separately for males and females.

The study uses data from the Cebu Longitudinal Health and Nutrition Survey (CLHNS) conducted in Metro Cebu, the second largest metropolitan area in the Philippines. A birth cohort of children born between May 1983 and April 1984 was followed from the time of their mother's pregnancy until 2005, when these children were 20-22 years old. Thus far, the CLHNS has had 19 interviews of these children.

Of the over 3,000 (3,080 single live born and some multiple live born) children identified in 1983-1984 during the baseline survey, 1,912 were followed up in the 2005 survey. The key reason for loss to follow up was migration out of the study area (75 %); refusals and deaths account for 25%. Those lost to follow up did not differ significantly from those interviewed in 2005 with respect to stunting at age two.

The young adults were 21 years of age on average at the time of 2005 survey, the age at which, in the Philippine educational system, a Filipino youth would have completed a four-year college course. Schooling attainment is measured in completed grades or levels of schooling (six years of primary, four years of secondary, and four to five years of college education). Those who did not complete a grade or had completed only Grade 1 or Grade 2 (53 cases) were excluded from the analysis because when the Intelligence Test was administered the children should already have finished Grade 2.

Table 1 shows the profile of the sample young adults, with p values indicating differences by sex. On the average, the males had one year less schooling than their female counterparts. Fewer males than females had completed high school as well as college.

We use length data at age two years to determine the stunting status of children, using the old WHO/National Center for Health Studies (NCHS) standard. More than half (61%) of the sample young adults were stunted when they were two years old, significantly more females were stunted (64%) than males (58%).

IQ was measured using a non-verbal test administered during the 1991-1992 survey when children were 8.5 years of age on average. The Philippines Non-Verbal Intelligence Test consists of 100 items; it is a cognitive test designed to assess analytic or reasoning skills (Guthrie et. al, 1977 as cited by Mendez & Adair, 1999). The mean IQ score of the children was 51.9, with females obtaining significantly higher IQ scores than males (52.5 vs. 51.4).

Linear regressions model is used to demonstrate the association of stunting and schooling attainment controlling for the other individual, maternal, household, and community characteristics (Table 2). Stunting at age two is associated with lower school attainment for both sexes. Effect of stunting on schooling is stronger in females (-0.65) than in males (-0.40). Further, results show a strong mediation by IQ (compare models 2 and 3). Although the effect of stunting on schooling is stronger in females than in males, accounting for IQ attenuates the association of stunting with schooling to a larger extent in females. IQ lessens the effect of stunting by 33% (a drop of coefficient to –0.43) for females, but only 15% for males (a drop to –0.34).

Logistic regression is used to determine whether stunting is associated with a) high school completion and b) college completion. Stunting at age two is not associated with high school completion but is associated with reduced likelihood of college completion among females. No such significant relationship is observed for males (data not shown).

The results of this study highlight the importance of early childhood nutrition. Stunting is shown to have adverse effects on later school attainment among Filipinos. Given that productivity in later life is largely a function of educational attainment, the evidence points to the urgent need for programs addressing childhood nutrition and development. This is particularly important for the Philippines where child malnutrition remains high even as the country aims for rapid economic and human development.

Table 1. Profile of Sample Young Adults by Sex

| | Males *n*=969 | Females *n*=890 | P value |
|---|---|---|---|
| Age (mean years) | 20.9 | 20.9 | 0.354 |
| Years of schooling (mean) | 9.4 | 10.4 | 0.000 |
| Completed high school (%) | 63.9 | 78.8 | 0.000 |
| Completed 4 yrs of college (%) | 7.4 | 17.6 | 0.000 |
| Stunted at age 2 (%) | 57.6 | 64.3 | 0.003 |
| IQ at age ~8 (mean score) | 51.4 | 52.5 | 0.043 |
| Number of siblings (mean) | 2.4 | 2.2 | 0.164 |
| Mother's education (mean years) | 7.6 | 7.5 | 0.465 |
| Age of mother at baseline (mean years) | 26.1 | 26.1 | 0.888 |
| Household assets at baseline (mean score) | 1.1 | 1.0 | 0.110 |
| Urban residence (%) | 74.4 | 73.6 | 0.581 |

Table 2. Linear Regression Models

| | Males | | | | | Females | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Coef. | SE | P>\| t \| | 95 % CI | | Coef. | SE | P>\| t \| | 95 % CI | |
| Model 1 | | | | | | | | | | |
| Stunted at 2 years | -1.08 | 0.170 | 0.000 | -1.42 | -0.75 | -1.23 | 0.167 | 0.000 | -1.56 | -0.90 |
| Model 2 | | | | | | | | | | |
| Stunted at 2 years | -0.40 | 0.164 | 0.014 | -0.72 | -0.08 | -0.65 | 0.155 | 0.000 | -0.95 | -0.35 |
| Number of siblings | 0.08 | 0.039 | 0.037 | 0.00 | 0.15 | 0.11 | 0.034 | 0.001 | 0.04 | 0.18 |
| Asset score | 0.30 | 0.079 | 0.000 | 0.15 | 0.45 | 0.33 | 0.078 | 0.000 | 0.17 | 0.48 |
| Years of mother's education | 0.23 | 0.023 | 0.000 | 0.19 | 0.28 | 0.23 | 0.021 | 0.000 | 0.19 | 0.28 |
| Mother's age | 0.01 | 0.013 | 0.646 | -0.02 | 0.03 | 0.03 | 0.012 | 0.006 | 0.01 | 0.06 |
| Urban | 0.27 | 0.184 | 0.148 | -0.09 | 0.63 | 0.11 | 0.170 | 0.499 | -0.22 | 0.45 |
| Model 3 | | | | | | | | | | |
| Stunted at 2 years | -0.34 | 0.157 | 0.033 | -0.64 | -0.03 | -0.43 | 0.149 | 0.004 | -0.73 | -0.14 |
| IQ at 1991 survey | 0.06 | 0.006 | 0.000 | 0.05 | 0.07 | 0.06 | 0.006 | 0.000 | 0.05 | 0.07 |
| Number of siblings | 0.09 | 0.037 | 0.017 | 0.02 | 0.16 | 0.12 | 0.032 | 0.000 | 0.06 | 0.19 |
| Asset score | 0.27 | 0.076 | 0.000 | 0.12 | 0.42 | 0.28 | 0.074 | 0.000 | 0.14 | 0.43 |
| Years of mother's education | 0.18 | 0.023 | 0.000 | 0.13 | 0.22 | 0.19 | 0.021 | 0.000 | 0.14 | 0.23 |
| Mother's age | 0.01 | 0.012 | 0.326 | -0.01 | 0.04 | 0.04 | 0.012 | 0.002 | 0.02 | 0.06 |
| Urban | 0.17 | 0.177 | 0.332 | -0.18 | 0.52 | -0.02 | 0.163 | 0.899 | -0.34 | 0.30 |

References:

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