

Appendix A Data

A.1 Study Context

The research focuses on three developing countries - Ethiopia, India (in the states of Andhra Pradesh and Telangana), and Vietnam. According to the *Younglives* data team,¹ these countries were chosen to reflect a wide range of cultural, economic, geographical, political and social contexts. They face some of the common issues experienced by developing countries, such as high debt burden, post-conflict reconstruction, and adverse environmental conditions such as drought and flood. In the past decade, however, all of these countries have experienced consistent economic growth. Despite the considerable strides towards economic growth, there still remains unresolved challenges of poverty and high levels of social and economic inequality.

Ethiopia is a low income country but has reported economic growth averaging around 11 per cent annually since 2003, with the proportion of the population living in poverty falling to around 30 per cent from around 45 per cent ten years previously. Since 2005 Ethiopia has been implementing the Productive Safety Net Programme (PSNP), which helps chronically poor people to withstand shocks by addressing their short-term consumption needs and protecting their assets from further depletion. Ethiopia has a National Plan of Action for Children accompanied by a series of nutrition, health and education strategies. The country has made great strides in increasing primary enrollment through successive Education Sector Development Programmes, although secondary enrollment lags behind and there are significant challenges regarding the quality of education (Pells & Woodhead, 2014).

Andhra Pradesh is the fifth-largest state in India. An estimated one in three people in the state live below the poverty line and have been badly hit by inflation and rising food prices, following the global economic crisis. The Government has sought to address these challenges through a series of programmes aimed at improving children's development and tackling high levels of malnutrition has been introduced. The Right to Education Act was implemented in 2010 and provides free and compulsory education to all children aged six to 14. Its key objectives include monitoring and improving the quality of elementary education; and reducing gaps between social groups and by gender (Pells & Woodhead, 2014).

Vietnam has instigated a series of economic reforms, transitioning to a

market-orientated economy. Living conditions have steadily improved and the number of people living in poverty has fallen substantially. However, the country was badly affected by the global recession in 2009. Food prices increased and exports went down. There are widening gaps between rich and poor: while the number of people living below the official poverty line continues to decline from 16 per cent in 2006 to 11 per cent in 2010, almost half of the ethnic minority population are still poor. Over a quarter (28 per cent) of Viet Nam's 92 million population is below the age of 18. Enrollment rates at primary school are 97 per cent, although boys are more likely than girls to drop out of secondary school early (Pells & Woodhead, 2014).

A.2 Time Use Pattern

Figure 1 plots the average weekly time allocation by children. Some notable patterns are evident in figure 1. First, Indian and Vietnamese children at the age of five years spend almost the entire weekly hours on sleep, leisure and school while their Ethiopian counterparts engage in some domestic work activities. This is mainly due to the rather low enrollment in preschool education in Ethiopia. This gap diminishes starting at age eight when children are enrolled in primary education. Second, the time allocations across alternative activities remain largely unaltered for the older cohort between the ages of 12 and 15. In addition, a similar pattern of time use is witnessed by the younger cohort children at age 8. This is a clear indication that children in all the study countries start participating in domestic chores and work activities from as early as eight years of age and continue to do so through their adolescent years.

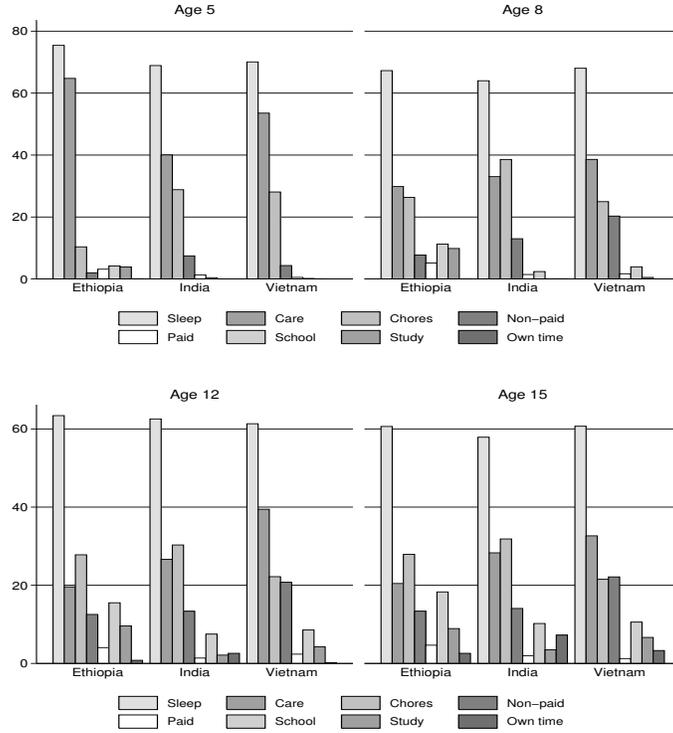


Figure 1: Weekly Time Allocation, By Age and Country

This pattern is in contrast to what is observed in time diary data from developed countries. Table A1 illustrates this difference by comparing the major activities reported in the *Young Lives* data with two other time diary surveys from the United States and Australia. Work related activities such as tending to younger siblings or ailing older members of the family, domestic chores, tasks on the family business (farm), and in some instances paid work outside of the house are features of a routine daily activity for a child in a developing country but none of them are reported as a category in the time diary data from both the United States (Child Development Supplement of the Panel Study of Income Dynamics) and Australia (Longitudinal Study of Australian Children).

There is also a clear socioeconomic heterogeneity in the time allocation pattern of both younger and older cohort children. As can be seen from figure 2 a large amount of heterogeneity is apparent in time allocated to work activities, in which children from poor families spend relatively more hours on work and less on leisure and studying. These differences appear

Table A1: Comparison of Children’s Time Allocation

Young Lives	Australia - LSAC ¹	USA - CDS ²
Sleep	Sleep	Reading
School	Day Care/School	Homework
Studying (outside of school)	Educational activities	Playing
Leisure	Other Educ. activities	Arts and craft
Caring for others	General Care (parents)	Sport
Domestic chores	General Care	Attending performances
Tasks on family farm	Media	Attending museums
Paid activities	Social activities	Religious activity

Notes: ¹Longitudinal Study of Australian Children, source ([Fiorini & Keane, 2014](#)); ²Child Development Supplement of the Panel Study of Income Dynamics, source ([Del Boca et al., 2017](#)).

across all the three countries and become more pronounced with age. Young children in Ethiopia spend more time either engaged in domestic chores or just on their own. This pattern is more pronounced for poorer households and rural dwellers. One possible reason for this is the short supply of preschool and daycare facilities available in the country ([Woldehanna et al., 2011](#)).

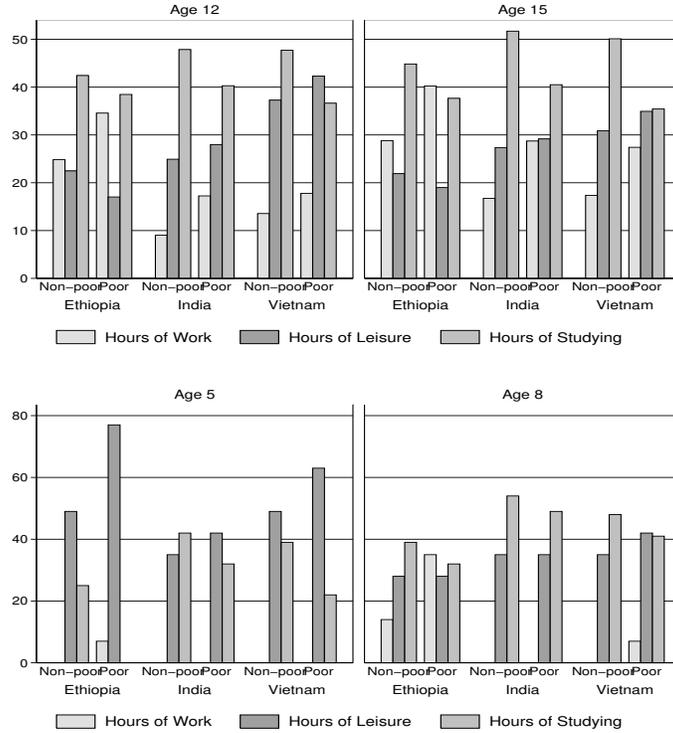


Figure 2: Weekly Time Allocation, by Wealth Index and Country

Table A2 reports the difference between average number of hours in each activity by gender and place of residence. The columns labeled ‘Male’ depict the difference in average weekly hours of time spent on the specific activity by gender where a positive magnitude indicates that boys spend more hours on that activity than girls. Similarly, the columns labeled ‘Rural’ show the differences between urban and rural children where a positive difference indicates more hours worked by rural dwellers. Girls spend more time than boys in activities performed at home such as caring for others and household chores (14.6 hours more in Ethiopia, 10.3 more in India, and 4 hours more in Vietnam). On the other hand, boys are busier performing tasks on the family farm (business), spending on average 9.8, 3.7, and 2.4 more hours than girls in Ethiopia, India, and Vietnam respectively. Children residing in urban areas enjoy more leisure, study and school hours than their rural counterparts in all three countries.

Table A2: Differences in Average Time by Gender and Place

	Ethiopia		India		Vietnam	
	Male	Rural	Male	Rural	Male	Rural
Sleep	-0.16	0.80	0.36	-0.05	3.23***	-1.28
Care	-2.97***	1.34**	-2.39***	0.77	-0.79**	-0.14
Chores	-11.62***	2.50***	-8.01***	3.74***	-2.28***	0.98
Farm/Buisness	12.17***	9.82***	0.25	3.66***	2.42*	7.56***
Paid	1.03	0.38	0.71	2.50	0.41	2.12
School	-2.00**	-5.54***	3.263**	-5.17***	-1.60*	-2.54**
Study	0.83	-3.51***	1.59*	-2.87***	-4.06***	-6.29***
Leisure	3.73***	-3.39***	2.90**	-0.57	3.62***	1.71
N	971		962		921	

Notes: Two sided t test for $H_0 : Difference = 0$; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; “Male” denotes the difference in average weekly hours of time spent on the specific activity by gender, “Rural” shows the difference between urban and rural children.

As one can observe from the numbers in figure 1, the children in the study sample spent several hours a week performing work activities. There is a general agreement that children should not be doing any work that is hazardous to their wellbeing. However, there is less agreement about work that is not deemed problematic. Should children not work at all, or does work in moderation help in developing skills, confidence, and good habits?

Table A3 provides descriptive evidence on the link between time spent on work activities and children’s cognitive and noncognitive outcomes. Though the degree to which children’s work interferes with their skill development is not easily readable, the preliminary evidence indicates that work activities are associated with reduced achievement test scores. The table depicts the differences between average test scores of children that spend higher than average time on work activities and those spending a lower than average time. The results show that children working more hours score less in all of the achievement tests.

Table A3: Differences in Average Test Scores by Time Inputs

	Ethiopia		India		Vietnam	
Older Cohorts						
PPVT	-0.670***	(-10.61)	-0.947***	(-13.86)	-0.616***	(-8.83)
MATH	-0.475***	(-7.35)	-0.978***	(-14.97)	-0.754***	(-11.25)
Self esteem	-0.327***	(-4.99)	-0.171*	(-2.37)	-0.380***	(-5.4)
Self efficacy	-0.283***	(-4.3)	-0.682***	(-9.86)	-0.463***	(-6.63)
Aspiration	-0.266***	(-4.02)	-1.117***	(-17.32)	-0.949***	(-14.6)
Observations	972		963		921	
Younger Cohorts						
PPVT	-0.789***	(-18.42)	-0.181***	(-3.81)	-0.146**	(-3.01)
MATH	-0.802***	(-18.56)	-0.161***	(-3.4)	-0.101*	(-2.16)
Observations	1875		1899		1824	

Notes: Two sided t test for $H_0 : Difference = 0$; t statistics in parentheses; * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; test scores are standardized to have mean 0 and standard deviation 1.

Appendix B Heterogeneity Checks

Table A4: Cognitive Production Function: Older Cohort, Ethiopia

	Gender		Urbanicity		Wealth	
	Female	Male	Urban	Rural	Poor	Non-poor
Sleep	-0.0435 (0.0524)	-0.0184 (0.0510)	-0.107* (0.0437)	0.0289 (0.0543)	0.0286 (0.0575)	-0.0960* (0.0422)
Care	-0.128* (0.0552)	-0.0230 (0.0587)	-0.0801 (0.0430)	-0.0749 (0.0587)	-0.0442 (0.0586)	-0.124* (0.0483)
Chores	-0.0674 (0.0496)	0.0871 (0.0624)	-0.0385 (0.0483)	0.0258 (0.0625)	0.00280 (0.0601)	-0.0240 (0.0499)
Non-paid work	-0.0702 (0.0839)	-0.165** (0.0564)	-0.398*** (0.114)	-0.0423 (0.0586)	-0.0803 (0.0625)	-0.250*** (0.0669)
Paid work	-0.121 (0.0647)	-0.115 (0.0602)	-0.158 (0.0925)	-0.0826 (0.0505)	-0.0745 (0.0533)	-0.219* (0.107)
Study	0.0879 (0.0558)	0.0836 (0.0551)	-0.0223 (0.0415)	0.213** (0.0687)	0.183** (0.0687)	-0.00392 (0.0424)
Own time	-0.0146 (0.0617)	-0.0898 (0.0493)	-0.116* (0.0466)	-0.0376 (0.0561)	-0.0111 (0.0597)	-0.130** (0.0473)
<i>N</i>	390	422	340	472	406	406

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; robust standard errors in parentheses. Coefficients are standardized to have mean 0 and standard deviation 1. Controls include: gender of child, grandparent present at home, number of siblings, urban dummy, wealth index, height-for-age z-score, lagged test scores, and parental education in years.

Table A5: Cognitive Production Function: Younger Cohort, Ethiopia

	Gender		Urbanicity		Wealth	
	Female	Male	Urban	Rural	Poor	Non-poor
Sleep	-0.0434 (0.0308)	-0.0497 (0.0292)	-0.115** (0.0410)	0.0185 (0.0211)	0.0132 (0.0252)	-0.0976** (0.0335)
Care	-0.0924*** (0.0263)	-0.105** (0.0322)	-0.0783 (0.0458)	-0.0649** (0.0203)	-0.0652** (0.0220)	-0.132** (0.0408)
Chores	-0.0602* (0.0290)	-0.0659* (0.0315)	-0.131** (0.0500)	-0.00262 (0.0214)	-0.00128 (0.0239)	-0.131*** (0.0370)
Non-paid work	-0.113* (0.0508)	-0.141*** (0.0318)	-0.365*** (0.0929)	-0.0615* (0.0264)	-0.0806** (0.0300)	-0.251*** (0.0511)
Paid work	0 (.)	-0.0159 (0.0133)	-0.0399 (0.0260)	-0.00420 (0.0135)	-0.0144 (0.0123)	0 (.)
Study	0.0784 (0.0490)	0.0755* (0.0368)	0.0283 (0.0496)	0.150*** (0.0336)	0.0951* (0.0375)	0.0776 (0.0442)
Own time	-0.157*** (0.0355)	-0.184*** (0.0321)	-0.261*** (0.0524)	-0.105*** (0.0235)	-0.117*** (0.0279)	-0.237*** (0.0399)
<i>N</i>	773	867	658	982	851	789

Notes: Same as Table A4 above

Table A6: Cognitive Production Function: Older Cohort, India

	Gender		Urbanicity		Wealth	
	Female	Male	Urban	Rural	Poor	Non-poor
Sleep	-0.229*** (0.0429)	-0.196*** (0.0494)	-0.110 (0.0726)	-0.203*** (0.0361)	-0.138** (0.0471)	-0.245*** (0.0429)
Care	-0.0496 (0.0293)	-0.184 (0.121)	-0.00613 (0.126)	-0.0590* (0.0300)	-0.00953 (0.0327)	-0.125** (0.0478)
Chores	-0.0132 (0.0415)	-0.137* (0.0575)	-0.118 (0.0886)	-0.0439 (0.0374)	-0.0273 (0.0449)	-0.0767 (0.0549)
Non-paid work	-0.115** (0.0444)	-0.218*** (0.0435)	-0.152*** (0.0440)	-0.172*** (0.0347)	-0.157*** (0.0460)	-0.174*** (0.0402)
Paid work	-0.204*** (0.0527)	-0.163** (0.0511)	-0.131 (0.0772)	-0.201*** (0.0396)	-0.160*** (0.0461)	-0.164** (0.0626)
Study	0.0570 (0.0670)	-0.0478 (0.0699)	-0.0940 (0.0979)	0.0333 (0.0548)	0.136 (0.0736)	-0.0823 (0.0587)
Own time	-0.0201 (0.0496)	-0.238*** (0.0507)	-0.199* (0.0823)	-0.0776 (0.0398)	-0.0421 (0.0495)	-0.170*** (0.0479)
<i>N</i>	429	417	159	683	441	405

Notes: Same as Table A4 above

Table A7: Cognitive Production Function: Younger Cohort, India

	Gender		Urbanicity		Wealth	
	Female	Male	Urban	Rural	Poor	Non-poor
Sleep	-0.0445 (0.0354)	-0.126** (0.0404)	-0.174** (0.0609)	-0.0681* (0.0304)	-0.0713* (0.0310)	-0.110* (0.0477)
Care	-0.0369 (0.0209)	-0.00789 (0.0364)	-0.0516 (0.0618)	-0.0145 (0.0192)	-0.00617 (0.0181)	-0.0473 (0.0456)
Chores	0.000356 (0.0294)	-0.115** (0.0352)	-0.0613 (0.0537)	-0.0555* (0.0247)	-0.0193 (0.0259)	-0.0836* (0.0396)
Non-paid work	-0.00371 (0.00587)	-0.0391*** (0.0117)	0 (.)	-0.0256** (0.00914)	-0.0216** (0.00800)	-0.0428 (0.0356)
Paid work	-0.0713*** (0.0134)	-0.0000358 (0.0687)	0.00627 (0.0271)	-0.0413 (0.0481)	-0.0922*** (0.0211)	0.134 (0.0817)
Study	0.104* (0.0434)	0.0178 (0.0455)	-0.0366 (0.0697)	0.0745* (0.0372)	0.127** (0.0392)	-0.0115 (0.0524)
Own time	0.00327 (0.0423)	-0.0505 (0.0450)	0.0580 (0.0741)	-0.0677* (0.0343)	-0.0238 (0.0293)	-0.0354 (0.0666)
<i>N</i>	875	995	471	1386	942	928

Notes: Same as Table A4 above

Table A8: Cognitive Production Function: Older Cohort, Vietnam

	Gender		Urbanicity		Wealth	
	Female	Male	Urban	Rural	Poor	Non-poor
Sleep	-0.0487 (0.0551)	-0.0664 (0.0514)	0.0885 (0.0643)	-0.0934* (0.0435)	-0.112 (0.0577)	-0.0342 (0.0445)
Care	-0.0229 (0.0336)	0.0405 (0.0605)	0.0604 (0.0597)	-0.0115 (0.0329)	-0.00875 (0.0518)	-0.0198 (0.0361)
Chores	0.0199 (0.0441)	0.0812 (0.0616)	0.0819 (0.0683)	0.0484 (0.0412)	-0.00182 (0.0567)	0.0739 (0.0476)
Non-paid work	-0.227** (0.0833)	-0.155* (0.0739)	0.404*** (0.112)	-0.206*** (0.0597)	-0.215** (0.0731)	-0.00243 (0.0635)
Paid work	-0.132 (0.0814)	-0.0748 (0.0708)	-0.226** (0.0789)	-0.112 (0.0573)	-0.0757 (0.0695)	-0.122 (0.0823)
Study	-0.0606 (0.0809)	-0.0266 (0.101)	0.252** (0.0913)	-0.0850 (0.0759)	-0.150 (0.120)	0.0939 (0.0685)
Own time	-0.184** (0.0661)	-0.0339 (0.0680)	0.0305 (0.0992)	-0.107* (0.0532)	-0.143 (0.0733)	0.00451 (0.0545)
<i>N</i>	409	387	154	642	349	447

Notes: Same as Table A4 above

Table A9: Cognitive Production Function: Younger Cohort, Vietnam

	Gender		Urbanicity		Wealth	
	Female	Male	Urban	Rural	Poor	Non-poor
Sleep	-0.0616 (0.0393)	-0.0386 (0.0328)	-0.00303 (0.0549)	-0.0740** (0.0286)	-0.0306 (0.0338)	-0.0720* (0.0355)
Care	-0.00759 (0.0281)	0.0267 (0.0428)	-0.172 (0.0919)	0.00962 (0.0242)	-0.0160 (0.0241)	0.0260 (0.0497)
Chores	0.00946 (0.0328)	0.0296 (0.0355)	0.152 (0.0933)	0.00298 (0.0255)	-0.0132 (0.0282)	0.0694 (0.0406)
Non-paid work	-0.0207 (0.0458)	-0.0517* (0.0242)	0 (.)	-0.0498* (0.0222)	-0.0528** (0.0200)	0.0617 (0.139)
Paid work	0.0239*** (0.00413)	0.0251* (0.0126)	0 (.)	0.0236** (0.00826)	0.0281*** (0.00459)	-0.0227*** (0.00671)
Study	0.134** (0.0459)	0.217*** (0.0435)	0.265*** (0.0692)	0.134*** (0.0351)	0.113** (0.0412)	0.207*** (0.0421)
Own time	0.0220 (0.0452)	0.0573 (0.0444)	-0.00328 (0.0558)	0.0226 (0.0367)	-0.00595 (0.0358)	0.0853 (0.0474)
<i>N</i>	777	821	316	1282	727	871

Notes: Same as Table A4 above

B.1 Non-Linearity Check

Table A10: Cognitive Production Function: Non-linear model

	Ethiopia		India		Vietnam	
	PPVT	MATH	PPVT	MATH	PPVT	MATH
Sleep	-0.00287 (0.0388)	-0.0173 (0.0398)	-0.116*** (0.0336)	-0.0884** (0.0313)	-0.0110 (0.0345)	-0.0664 (0.0403)
Care	-0.00142 (0.0408)	0.00307 (0.0411)	-0.0397 (0.0339)	-0.0155 (0.0292)	0.00699 (0.0265)	-0.110** (0.0374)
Chores	0.0709 (0.0426)	-0.00636 (0.0483)	0.0205 (0.0343)	-0.0188 (0.0315)	0.0716* (0.0359)	-0.0572 (0.0336)
Non-paid	-0.0416 (0.0456)	0.0648 (0.0506)	-0.0986* (0.0386)	-0.111** (0.0411)	-0.115 (0.0704)	-0.104* (0.0520)
Paid	-0.0521 (0.0426)	0.0256 (0.0470)	-0.0531 (0.0396)	-0.151** (0.0474)	-0.0498 (0.0537)	-0.163** (0.0512)
Study	0.0750* (0.0362)	0.137** (0.0443)	0.00117 (0.0488)	0.0312 (0.0422)	-0.000962 (0.0622)	-0.102 (0.0664)
Leisure	-0.0224 (0.0381)	-0.0438 (0.0386)	-0.0722* (0.0362)	-0.0863* (0.0349)	-0.0405 (0.0502)	-0.193*** (0.0522)
<i>N</i>	784	651	817	833	790	788

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$; robust standard errors in parentheses. Coefficients are standardized to have mean 0 and standard deviation 1. Controls include: gender of child, grandparent present at home, number of siblings, urban dummy, wealth index, height-for-age z-score, and parental education in years.
Dependent variable is natural logarithm of test scores

Notes

¹<http://www.younglives.org.uk>

References

- Del Boca, D., Monfardini, C. & Nicoletti, C. (2017). Parental and child time investments and the cognitive development of adolescents. *Journal of Labor Economics*, 35(2), 565–608.
- Fiorini, M. & Keane, M. P. (2014). How the allocation of children’s time affects cognitive and noncognitive development. *Journal of Labor Economics*, 32(4), 787-836.
- Pells, K. & Woodhead, M. (2014). *Changing children’s lives: Risks and opportunities*. Young Lives, Department for International Development, University of Oxford.
- Woldehanna, T., Gudisa, R., Tafere, Y., Pankhurst, A. & Lives, Y. (2011). *Understanding changes in the lives of poor children: Initial findings from ethiopia: Round 3 survey report*. Young Lives, Department of International Development, University of Oxford.