Human Capital Development in Ghana

June 26, 2019

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The team is grateful to Yoshimi Nishino (UNICEF) and Mayeso Zenengeya (UNICEF) for providing the team with summary tables of Ghana MICS 6 data as well as comments and suggestions on an earlier draft. Preliminary results of this report were presented at the Child Poverty Workshop organized by National Development Planning Commission (NDPC) and UNICEF in collaboration with Ghana Statistical Services (GSS). The team would like to thank the participants of the workshop from Ministry of Health, Ministry of Sanitation and Water Resources, Ghana Health Service, Ministry of Gender, Children and Social Protection, Ministry of Environment Science and Technology, Ministry of Education, Ministry of Finance, Ministry of Local Governments and Rural Development, ISSER, GSS, and NDPC for their valuable comments. The team is extremely grateful to Kathleen Beegle (Lead Economist, Global Themes Department- Gender) and Antonio Giuffrida (Program Leader, AFCW1) for their invaluable advice and suggestions. The team also benefited from discussions with Deborah Newitter Mikesell (Senior Education Specialist, Education GP), Eunice Yaa Brimfah Ackwerh (Senior Education Specialist, Education GP), Peter Darvas (Senior Economist, Education GP), Amer Hasan (Senior Economist, Education GP), Benoit Mathivet (Senior Economist, Health GP), Anthony Theophilus Seddoh (Senior Operations Officer, Health GP), Jenny Gold (Senior Health Specialist), Christabel Dadzie (Social Protection Specialist, Social Protection and Labor GP), Dhushyanth Raju (Lead Economist, Social Protection and Labor GP), Samik Adhikari (Young Professional, Social Protection and Labor GP), Radhika Lal (UNDP), Varun Kshirsagar (Poverty Action Lab), Hugo Salas Rodríguez (Poverty Action Lab), and Manuel Cardona (Poverty Action Lab).

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Executive Summary

Overview

1. To achieve inclusive economic growth, Ghana must continue to build its human capital and ensure children are healthy, developmentally on track, and acquiring skills to thrive in a fast-changing world. This report identifies critical challenges Ghana faces in pursuing further human capital development and inclusive growth: 1) Ghana's progress against child stunting (low height for age) has been significant, however, disparities across regions and between children in rich and poor households are substantial. 2) Cognitive development among Ghanaian children under 5 compares favorably to its peers. However, there exist large disparities across regions and income groups. 3) Even though Ghana's enrollment rates at primary and junior secondary school are relatively high compared with its peers, Ghanaian children's test scores are extremely low compared with not only other Lower-Middle Income Countries, but also other Sub-Saharan African countries. 4) Ghana's enrollment rates at senior secondary school and higher education remain low compared with peer countries of similar income levels.

To understand the underlying causes of these critical challenges, the study attempts to answer the following questions:

- 1) What are the determining factors of the gap in stunting across regions and wealth groups? Are policy interventions effective in reducing the gap?
- 2) Are children under age 5 getting ready to learn?
- 3) Are children acquiring real learning in the classroom? What determines reading and numeracy skill development? Are Ghanaian parents and teachers doing enough to help children learn?
- 4) What hinders teenagers from enrolling in senior secondary school? Are students prepared to enter the job market as skilled and productive adults? Are they gaining important skills, such as computer skills?
- 5) How do gender gaps in educational attainment and employment emerge? What are the constraints for girls to continue education and succeed in the job market?

2. This report considers the achievements and challenges in Ghana's human capital development in different life-cycle stages. The chart in Figure 0.1 summarizes the findings in the report. The following four factors are strongly correlated with children under age 5 growing up well-nourished and getting ready to learn: 1) household and parents' characteristics (number of siblings, mother's education), 2) adequate care and parents' involvement (parents' knowledge), 3) anthropometric characteristics of mothers (mother's height and weight), 4) access to services (health services and preschool). Ghanaian children's academic performance fall below the average of Sierra Leonean children after age 12. Human Capital Index (HCI) indicates Ghanaian school children's harmonized test scores are second lowest in the world after Niger. For children to acquire real learning in the classroom, it is important that teachers and parents communicate with each other; e.g., teachers reporting children's academic performance to parents and arranging meetings with parents to discuss academic performance of children. Parents' involvement is also critical in learning. Parents' help with homework, involvement in school activities, and availability of books and learning materials at home are all critical factors associated with cognitive development. Senior secondary school attendance and computer skill development are important to prepare youths to enter the job market and successfully gain wage employment, as completing senior secondary school and gaining computer skills significantly reduce the probability of being poor and gaining wage employment in the formal sector.

Figure 0.1: Summary of the findings

Following are the summary of findings in each chapter and policy recommendations.

Undernutrition

3. **Stunting affects children's development with long-lasting detrimental consequences.** During the first 1,000 days, a child's brain development is most rapid, and the effect of undernutrition is most detrimental to cognitive and physical development with severe consequences to health, education and productivity outcomes later in life. Ghana's progress against child stunting (low height for age) has been significant, however, disparities across regions and between children in rich and poor households are substantial. Understanding factors associated with stunting is critical for designing effective policies and setting policy priorities. The analytical results presented in this report demonstrate households and parents' characteristics (number of siblings, mother's education), anthropometric characteristics of mothers (height and weight), adequate care and access to health services are important factors associated with child stunting.
4. **The large gap in stunting rates across income groups emphasizes the potential role of social assistance programs in stunting reduction in Ghana.** Ghana's cash transfer program – Livelihood Empowerment Against Poverty (LEAP) -- targets households with children under five. Current program scale at 4.5 percent coverage of total poor households in the poorest districts may be too low for any significant impact on malnutrition reduction in poor areas; therefore, the government should increase coverage and spending of social assistance among poor households, targeting poor districts.
5. **Programs which are aimed at creating quality jobs and increasing opportunities for income generation are also critical.** The informal sector and agricultural self-employment continue to absorb a large share of the labor force, particularly in lower wealth quantiles. Social protection programs do not need to only offer consumption support. They can be designed to facilitate investment in household income

activities (Banerjee et al. 2015, Banerjee et al. 2018). Impact evaluations of the expanded programs which integrate in additional support such as training (for example, agricultural extension) or grants for businesses demonstrate they yield higher results to raising income of targeted households.

6. **Anthropometric characteristics of mothers are key factors associated with stunting, hence, programs focused on adolescent and women's nutrition should be a priority to tackle childhood undernutrition.** Results indicate strong inverse relationships between a mother's body weight and height and child stunting. Given that a mother's weight and height are affected by nutrition in childhood and adolescence, school health programs and community programs promoting adolescent and women's nutrition should be a priority to tackle childhood malnutrition.

7. **The high importance of the number of siblings indicates that family planning programs and policies play a key role in reducing undernutrition.** The government should prioritize family planning programs and policies. The current national policy emphasizes adolescent nutrition and family planning, but does not address specific birth planning and prevention means targeted towards adolescents such as contraceptive access and comprehensive sexuality education. An impact evaluation study on the use of mobile health programs (mHealth) to deliver health information suggests text-message interventions are effective in reaching out to a large population of young adults and increase their knowledge of sexual and reproductive health in Ghana (Rokicki et al. 2017, Rokicki and Fink 2017).

8. **Access to CHPS and clinics is strongly correlated with the utilization of health services among children, which in turn leads to reducing stunting.** To promote equity in under-five nutrition outcomes and remove physical barriers to access health and nutrition services, the government should prioritize expansion of CHPS to all communities in need. Access to CHPS or clinics increases the probability of children receiving medical treatments when they are sick. Moreover, impacts of living in a community with CHPS/clinics are greatest amongst children in the lowest wealth quantile. This implies access to CHPS is more effective among poor children and underscores the relative importance of removing physical barriers to ensure poor children can access health services.

Early Childhood Development (Learning under Age 5)

9. **Learning starts in infancy and continues throughout life. Early childhood education is extremely important, as it substantially impacts various outcomes in later life, such as academic achievement, skill development, health, and income. Ghana has shown substantial commitment to improving early childhood education.** The analytical results in this report show Ghanaian children under age 5 are more developmentally on track than children in Sierra Leone. Ghanaian children are more likely to be enrolled in preschool than children in Sierra Leone. Ghanaian parents are more engaged in activities with children and provide more books and toys to their children compared with parents in Sierra Leone. However, there are large differences across regions and income groups. In Greater Accra, 66 percent of children under age 5 are considered developmentally on track, while only 16.4 percent of children under age 5 are considered developmentally on track in Upper West region. 76.7 percent of children in the top 20 percent of households are developmentally on track, while only 15.7 percent of children in the bottom wealth quantiles are considered developmentally on track. Children in wealthy households have better learning environments than children in poor households.

10. **To fill the gap of cognitive development between poor and rich children as well as rich and poor regions, the government needs to design effective policy interventions, aiming at promoting preschool enrollment in poor regions, improving the quality of preschool, designing programs to encourage parents'**

involvement, and promoting availability of learning materials at home. A study conducted at preschools demonstrates the importance of parents' involvement and availability of books at home on school readiness (Wolf and McCoy 2019). Another impact evaluation study looked at the effectiveness of training teachers and mothers on cognitive development in Northern Ghana and proved such programs have positive impacts on children's cognitive skills (numeracy, literacy and motor skills) as well as children's school readiness (Amadu et al.). The study shows preschools and primary schools in poor districts are under resourced, parental involvement in school and learning activities are low, and parental educational levels are low. Not surprisingly, children's literacy and numeracy outcomes are especially poor in disadvantaged areas. Both teachers and parents need training and instruction on how to interact with children in ways that develop children's cognitive and socioemotional skills.

School Enrollment

11. **Ghana's completion rates of primary school and junior secondary school are considerably higher than its income and regional peers. However, its enrollment rate of senior secondary school is low compared with peers of similar income levels. In addition, the disparity in school enrollment between rich and poor has shifted from primary to senior secondary schooling.** The disparities in primary school enrollment rates between the bottom and top wealth quantiles narrowed for both boys and girls between 1991 and 2016. However, the gaps in senior secondary school enrollment rates between the bottom 20 and top 20 further widened. Between 1991 and 2016, the differences in enrollment at senior secondary school grew from 19 and 27 percentage points to 27 and 44 percentage points for girls and boys, respectively.

12. **Senior secondary school education is crucial to prepare Ghanaian youth to enter the job market as productive and skilled members of the workforce.** The analysis in this report shows that senior secondary school education is a major factor associated with gaining wage employment, and economic returns from senior secondary school is sufficiently high. However, the senior secondary school enrollment rates remain low, especially in poor areas and among children in poor households. This implies that scholarships targeted to poor households and poor districts can be an effective policy intervention in promoting senior secondary school enrollment in disadvantaged areas.

13. **The World Bank has been providing funding to the Ministry of Education to implement several initiatives intended to improve senior secondary school attendance and completion among students from disadvantaged backgrounds in selected districts.** The findings in this study suggest SEIP is associated with higher senior secondary school enrollment among children in the middle-income and poor households. The result suggests that poor and middle-income households have been the largest beneficiaries of SEIP.

Learning at School

14. **Basic knowledge and skills are key to prepare children to become skilled and productive workers. This report shows Ghanaian children's reading and numeracy skills fall below the average of children in Sierra Leone after age 12.** The quality of Ghanaian school is poorer in some dimensions than schools in Sierra Leone. Less schools in Ghana report children's academic performance to parents and communicate with parents. Ghanaian parents create more favorable learning environments for children than parents in Sierra Leone in general. For example, they provide more books to their children. However, fewer Ghanaian parents help with children's homework, especially if children are more than 10 years old. Children in poor households are particularly disadvantaged by poor learning environments. Children in poor households are more likely to be working and receiving fewer homework assignments from school compared with children

in rich households. In addition, parents and teachers are less likely to discuss children's academic performance. Furthermore, parents in poor households are less likely to get involved in school activities.

15. **Policy interventions which aim at improving school quality and encouraging parents' involvement are urgent.** Parents and teachers need to discuss children's performance. Parents need to learn how to engage in children's homework assignments and other learning activities, and schools should issue report cards and communicate children's academic performance with parents. In addition, children need to be freed from child labor and housework, so they can spend time working on homework.

16. **Targeted instruction to low performing children by community assistants is effective in improving learning outcomes of low performing children.** An impact evaluation of "Teaching Community Assistant" program was carried out to evaluate if targeted instruction in basic skills to small groups of low-performing students by teaching community assistants improve students' learning outcomes (Innovations for Poverty Action 2015). The results of the intervention show the provision of targeted lessons to low performing pupils by community assistants significantly improve learning outcomes.

17. **An impact evaluation of the government school feeding programs proves they are effective in increasing test scores, improving learning outcomes and cognitive development among girls, children from poor households and poor districts (Aurino et al. 2019).** The study explains that increases in school enrollment, higher educational attainment, and shifts in time spent at school are largely due to the school feeding program and emphasizes the positive impacts of the school feeding programs on learning outcomes.

18. **Parents cannot send children to school if they are financially constrained.** A study shows secondary schooling enrollment is significantly higher among children whose mothers are engaged in non-farm entrepreneurship and earning cash income, and the trend is stronger among poorer households (Janssens et al. 2019). This suggests creating cash income opportunity for parents, especially for mothers, can be effective in making sure children stay in school.

ICT Skills

19. **ICT skills are important in preparing youth to become productive labor workers and increase income.** Firms consider ICT skills as the most critical skills, and remark that many of their workers lack ICT skills. The analysis in this report demonstrates that ICT skills help the youth gain wage employment and escape from poverty. However, ICT skill development widely differ across educational levels, regions and income groups. The government needs to increase investment in ICT education and make sure that the youth in poor households and poor regions gain relevant ICT skills so that can become capable and productive members of the workforce and increase their income.

Gender Gap

20. **Boys suffer disproportionately from undernutrition compared to girls, and girls show better cognitive development.** The stunting rate for boys under age 5 is 3.5 percentage points higher than that of girls. Girls under age 5 do better than boys not only in physical development but also in cognitive development. 45.5 percent of girls under age 5 are developmentally on track, while 42.2 percent of boys are developmentally on track.
21. **Up to junior secondary school, girls' enrollment rates are higher than boys in most regions.** Girls' enrollment rates in primary school are higher than boys in most regions, except for Greater Accra, Ashanti, and Northern regions. Girls' enrollment rates at junior secondary school exceed that of boys in nine out of ten regions (except for Northern region).
22. **In most regions, boys' enrollment in senior secondary school is higher than girls.** This is in sharp contrast with the pattern of gender difference in enrollment rates in primary and junior secondary school where girls' enrollment rates generally exceed that of boys.
23. **Poverty and teenage pregnancy are the major factors affecting school enrollment among girls age 15 to 19.** Teenage pregnancy decreases the probability of girls' enrollment by 27 percent points after controlling for other factors. Providing scholarships to girls may be more effective in reducing the financial burden of schooling and will encourage them to stay in school and avoid pregnancy. A study shows the secondary school scholarships in 2008 led to increased completions of senior secondary school, more years of education, higher reading and math test scores, and higher earnings in 2016 (Duflo et al. 2017). The study confirms that the effects of scholarships are much stronger for girls than boys. Girls who received the scholarship also had fewer children, suggesting the scholarship also has positive impacts on family planning.
24. **There is substantial gender gap in ICT skill development and the probability of women gaining wage employment.** 39.4 percent of males between age 15 and 30 have ICT skills compared to 22.3 percent of females. As a result, about 63.2 percent of the ICT skills knowledgeable population are males with the remaining 32.8 percent being females. After controlling for ICT skills and other factors, women are 11.1 percentage points less likely to gain wage employment.

1. Introduction

1.1. Achievements

25. **Ghana achieved remarkable economic growth and poverty reduction.** Ghana's economic growth intensified after the return to democracy in 1992, and economic growth led to substantial poverty reduction. As shown in Figure 1.1, the national poverty rate declined to less than half between 1991 and 2012, and Ghana achieved the goal of reducing the poverty rate by half, in line with the first MDG target. The national poverty rate declined by a record 13.2 percentage points during 1991–1998, by 7.6 points during 1998–2005, then by 7.7 percentage points during 2005–2012. Poverty continued to fall, although at a slower pace, by 0.8 percentage points between 2012 and 2016.

Figure 1.1: Trends in GDP Per Capita and Poverty Rates

Source: World Bank, World Development Indicators (WDI), and Ghana Living Standards Survey (GLSS 3–7).

26. **Investment in education contributed to Ghana's economic growth and poverty reduction.** Ghana embarked on a major expansion in education investment in the 2000s, and Ghana's public spending on education constantly remained above the averages of not only SSA and LMIC, but also the average of upper middle-income countries (UMIC). The average public spending on education reached 37.5 percent of government spending in 2012, substantively above the averages of lower middle-income countries (LMIC) at 15.2 percent and Sub-Saharan Africa (SSA) at 16.4 percent in the same year (Figure 1.2). Schooling made significant contributions to economic growth, especially from the 1970s to 1990s (Figure 1.3). Higher educational attainment also led to increases in income. Each additional year of education was associated with a 6–10 percent increase in earnings (Molini and Paci 2015).

27. **As a result of substantial increases in education investment, the completion rates of primary school and junior secondary school dramatically increased.** In Ghana, basic education lasts 11 years from age 4 to 15. The curriculum is free and compulsory. In 1991, the completion rate of primary school was 65.6 percent, while the average completion rate of primary school were 71.4 percent and 54.2 percent in LMIC and SSA, respectively (Figure 1.4). By 2012, Ghana's completion rate of primary school rose to 95.1 percent, which was significantly higher than not only the average completion rate of primary school in SSA (68.1 Percent), but also the average completion rate of primary school in LMIC (90.3 percent). By 2014, Ghana's primary

school completion rate exceeded the average of UMIC. Moreover, Ghana has been successfully sustaining the completion of junior secondary school around the average of LMIC for the last twenty years.

Figure 1.2: Government Expenditure on Education (% of Government Expenditure) Figure 1.3: Ghana Growth Accounting, 1970–2016

Source: World Bank, World Development Indicators (WDI)

Sources: Geiger, Trenzcek, and Wacker (2018), based on Penn World Table (PWT) 9.0 and the WDI.

Figure 1.4: Primary School and Lower Secondary School Completion Rates

Source: World Bank, World Development Indicators (WDI)

28. Ghana has substantially improved child stunting (low height-for-age) rates in the last 30 years. Ghana's stunting rate under age 5 was 43 percent in 1988 (Figure 1.5). It was already lower than the average stunting rates of LMIC and SSA. By 2014, Ghana's stunting rate under age 5 was down to 19 percent, while the average stunting rates of LMIC and SSA declined to only 32 percent and 34 percent, respectively.

Figure 1.5: Stunting, Percentage

Source: World Bank, World Development Indicators (WDI)

29. **Ghana has also made significant progress in other areas of human capital development.** Ghana's preschool enrollment is significantly higher than its peer income countries (Figure 1.6). Its net enrollment rate of preschool was 73.2 percent in 2017, which is much higher than the net enrollment rates of preschool in other lower middle-income countries in SSA (62.1 percent in Cabo Verde, 27.7 percent in Cameroon, and 7.4 percent in Côte d'Ivoire). The country also made great progress in reducing its adolescent pregnancy rate (births per 1,000 women ages 15-19). In 1960, Ghana's adolescent pregnancy rate was 148 (Figure 1.7), which is close to the average in SSA (153). However, it declined dramatically in the last 50 years. In 2016, the adolescent pregnancy rate was only 68 while the average adolescent pregnancy rate in SSA was 102. Nevertheless, it is still higher than the average of LMIC (47).

Figure 1.6: Net Enrollment Rates of Pre-Primary School

Source: World Bank, World Development Indicators (WDI)

Figure 1.7: Adolescent Fertility Rates

Source: World Bank, World Development Indicators (WDI)

1.2. Challenges

30. **Child poverty declined by half between 1991 and 2012, however, there was little reduction between 2012 and 2016. It remains higher than the national poverty rates.** Child poverty rates for age 0 to 6, 6 to 12, and 12 to 18 all dropped by half between 1991 and 2012 (Figure 1.8). However, since 2012, there has been hardly any reduction in child poverty rates. The poverty rate of age 0 to 6 remained at 27.6 percent, and

the poverty rate among children age 6 to 12 declined by only 0.1 percent from 29.5 to 29.4 percent. Note, the child poverty rates for age 0 to 6, 6 to 12, and 12 to 18 were all higher than the national poverty rate of 23.4 percent in 2016. It is especially high among children age 6 to 12.

Figure 1.8: Child Poverty Rates

Source: GLSS 3, 4, 5, 6 and 7

31. **The regional disparity in poverty and inequality widened between 2012 and 2016. The regional disparity in child poverty also widened.** The three northern regions and Volta region became poorer, while other regions reduced poverty rates between 2012 and 2016 (Figure 1.9). Similarly, the regional disparity in child poverty widened. The poverty rates among children under 5, as well as age 5 to 18 increased in the poorest four regions (Volta, Upper East, Northern, and Upper West regions), while they declined in the wealthiest four regions (Greater Accra, Ashanti, Central, and Eastern regions). Poor regions also experienced increasing inequality. In Greater Accra, the poverty rate of children under 5 declined from 8 to 5 percent between 2012 and 2016, while the poverty rate of children under 5 remained high at 69 percent in Upper West. In Greater Accra, the poverty rate of children between age 5 to 18 declined from 7 to 3 percent, while the poverty rate among children age 5 to 18 increased from 76 to 78 percent in Upper West. In 2012, inequality was already higher in the poorest four regions (Volta, Upper East, Northern, and Upper West regions) than in the wealthiest four regions (Greater Accra, Ashanti, Eastern, Central, and Western regions) (Figure 1.9). Between 2012 and 2016, inequality increased in Upper East and Northern regions, while the wealthiest four regions all experienced declining inequality.

Figure 1.9: Widening the Gap in Poverty Rates and Inequality Across Regions

Source: GLSS 6 and 7

32. **Although Ghana's child stunting rate has significantly declined, there are still large differences across regions.** Ghana's stunting rate among children under age 3 declined from 26 percent to 17.6 percent between 1993 and 2014¹. However, the regional gap in stunting rates persists (Figure 1.10). In 1993, the stunting rate was lowest in Greater Accra (15.7 percent) and highest in Northern region (35.9 percent). In Greater Accra, the stunting rate dropped from 15.7 to 13.7 percent between 1993 and 2014. On the other hand, the stunting rate decreased from 35.9 percent to 23.9 percent in Northern region. Even though stunting decreased remarkably in Northern region, it's still the highest in the country.

Figure 1.10: Changes in Stunting Rates Under Age Three Across Regions

Source: 1993 and 2014 Ghana DHS

33. **There are also large differences in stunting by wealth quantile.** Figure 1.11 shows stunting rates of children under age five by wealth quantile in 2014. The stunting rate of children under age 5 was 24.8 percent among the bottom 20 percent, while the stunting rate was only 8.5 percent among the top 20 percent. This suggests stunting is still severe among children in poor households.

¹ 1993 DHS collected height data from children age under 3, not age under 5. Thus, the figure compares stunting rates under 3 between 1993 and 2014.

Figure 1.11: Stunting by Wealth Quantile in 2014

Source: 2014 DHS

34. **Ghana's HCI (Human Capital Index) is lower than the averages of lower middle-income countries due to low test scores (Table 1.1). Ghana's average harmonized test score is close to the minimum possible attainment, and the second lowest in the world after Niger.** Ghana compares favorably to its peers in 4 out of 5 components of Human Capital Index. For example, Ghana's expected years of school is 11.6, which is higher than not only the averages of SSA (8.1), but also LMIC (10.4). Ghana's under 5 non-stunting rate is also higher than the averages of SSA and LMIC. Ghana's probability of survival to age 5 and the survival rate from age 15 to 60 are also higher than the averages in SSA, although they are lower than the averages in LMIC. On the other hand, Ghana's harmonized test scores are extremely low compared with the averages of not only LMIC, but also SSA. 625 corresponds to advancement attainment, and 300 represents minimum attainment scores. The average harmonized test scores are 307 in Ghana, while the average harmonized test scores are 374 and 391 in SSA and LMIC, respectively. Because of the low harmonized test scores, Ghana's HIC is below the average of LMIC.

35. **Ghana's expected years of learning-adjusted school are also low due to low test scores.** HCI also estimates expected years of learning-adjusted schooling. Learning-adjusted years of school are calculated by multiplying expected years of school by the ratio of harmonized test scores to 625 (highest possible score). Ghana's expected years of learning-adjusted school are 5.7 years, while the mean expected years of learning-adjusted school are 4.9 and 6.6 in SSA and LMIC, respectively. Even though Ghanaian children are projected to go to school for 11.6 years on average, their effective years of schooling are only 5.7 years in terms of what children actually learn. Figure 1.12 shows how Ghana's harmonized test scores are exceptionally low considering its high expected years of schooling.

Table 1.1 : HCI (Human Capital Index)

	Ghana	Sub-Saharan Africa	Lower middle-income countries
Probability of Survival to Age 5	0.95	0.93	0.96
Expected Years of School	11.6	8.1	10.4
Harmonized Test Scores	307	374	391
Survival Rate from Age 15 to 60	0.76	0.73	0.81
Children Under 5 Not Stunted (%)	81%	68%	73%
Expected years of learning-adjusted school	5.7	4.9	6.6
Human Capital Index (HCI)	0.44	0.40	0.48

Source: Human Capital Index

Figure 1.12: Harmonized Test Scores vs. Expected Years of School

Source: Human Capital Index

36. **Ghanaian children's reading and numeracy skills over age 12 fall below the average child in Sierra Leone.** Figure 1.13 shows the percentage of children who demonstrate fundamental reading and numeracy skills. The tests were conducted in 2017 in Sierra Leone, and in 2017 to 2018 in Ghana. The percentage of children who demonstrated fundamental reading numeracy skills are not very different in Ghana and Sierra Leone until age 12. However, Ghanaian children's reading and numeracy performance becomes significantly inferior to children in Sierra Leone from age 13. The gap after age 12 widens, especially in numeracy skills. The percentage of children age 14 who demonstrate fundamental numeracy skills are 31.3 percent and 15.6 percent in Sierra Leone and Ghana, respectively. The percentage of children age 14 who demonstrate fundamental reading skills are 43.6 percent and 34 percent in Sierra Leone and Ghana, respectively.

Figure 1.13: Percentage of Children who Demonstrate Fundamental Reading and Numeracy Skills in Ghana and Sierra Leone by Age (Age 7 to 14)

Source: Ghana and Sierra Leone MICS 6

37. **Ghana's enrollment rates of senior secondary school and tertiary school are low compared with peers of similar income levels.** Even though Ghana's enrollment rates at pre-primary school, primary school, and junior secondary schools compare favorably to its regional and income-group peers, Ghana's

enrollment rates at senior secondary school and tertiary school are lower compared with its peers (*Figure 1.14*).

Figure 1.14: Gross Enrollment Rates of Senior Secondary and Tertiary Schools

Source: World Bank, World Development Indicators (WDI)

Source: World Bank, World Development Indicators (WDI)

38. Though Ghana's enrollment rates of preschool, primary school, and junior secondary school are higher than its peers of similar income levels, there are substantial differences across regions. Figure 1.15 shows adjusted net attendance rates at preschool, primary, junior secondary, and senior secondary schools in Ghana. Adjusted net attendance rates of preschool represents the percentage of children attending preschool who are of official preschool age. The adjusted net attendance rates of preschool are highest in Greater Accra (86.1 percent) and lowest in Northern region (46.2 percent). The primary school adjusted net attendance rate is the percentage of children attending primary school who are of official primary school age. It is again highest in Greater Accra (89.3 percent) and lowest in Northern region (67.1 percent). The regional gap of adjusted net attendance rates gets wider in junior secondary school. The adjusted net attendance rates of junior secondary are highest in Greater Accra (56.7 percent) and lowest in Upper West region (22.7 percent). The regional gap of adjusted net attendance rates gets even larger at senior secondary school. The adjusted net attendance rates of senior secondary are highest in Greater Accra (30 percent). In Upper West region, only 4.2 percent of children who are of official senior secondary school age attend senior secondary school.

Figure 1.15: Adjusted Net Attendance Rates at Preschool, Primary, Junior Secondary, and Senior Secondary Schools by Region in Ghana

Source: Ghana MICS 6

39. **There are also large gaps in enrollment rates across wealth quantile.** Gaps in enrollment rates are even larger across wealth quantile (Figure 1.16). The adjusted net attendance rates of preschool are highest among the top 20 percent of households (94 percent) and lowest among the bottom 20 percent of households (46 percent). At primary school, the adjusted net attendance rate is 94 percent among the top 20 percent of households, while it is only 67 percent among the bottom 20. The adjusted net attendance rates among the bottom 20 substantially decline from junior secondary school. The adjusted net attendance rate of junior secondary school is only 23 percent among the bottom 20 percent of households, while it is 69 percent among the top 20. The adjusted net attendance rates among the bottom 20 further decline at junior secondary school. The adjusted net attendance rate at senior secondary school is only 7 percent among the bottom 20 percent of households, while it is 44 percent among the top 20.

Figure 1.16: Adjusted Net Attendance Rates at Preschool, Primary, Junior Secondary, and Senior Secondary Schools by Wealth Quantile in Ghana

Source: Ghana MICS 6

40. **The disparity in school enrollment between rich and poor has shifted from primary to senior secondary schooling.** The disparities in primary school enrollment rates between the bottom and top wealth quantiles narrowed for both boys and girls between 1991 and 2016 (Figure 1.17). However, the gaps in senior secondary school enrollment rates between the bottom 20 and top 20 further widened. By 2016, the gaps in gross enrollment rates at junior secondary school between the two wealth groups rose to 29 and 38 percentage points for girls and boys, respectively, while the differences in enrollment at senior secondary school grew from 19 and 27 to 27 and 44 percentage points for girls and boys, respectively.

Figure 1.17: Gross School Enrollment Rates, Percentage

41. **There are many children who are not enrolled in schools of appropriate age levels, especially children in the bottom 20%.** Smaller percentages of children in poor households (bottom 20 percent of wealth quantile) are enrolled in school, compared with children in the top 20 percent in all ages except for age 18. Moreover, smaller percentages of children in the bottom 20 percent are enrolled in school of appropriate age levels, compared with children in the top 20. For example, 85.5 percent of children age 7 in the top 20 percent of households are enrolled in primary school, while only 51.2 percent of children age 7 in the bottom 20 percent of households are enrolled in primary school. 26 percent of children age 7 in the bottom 20 percent are still at preschool, and 22.6 are out of school. Similarly, 65.6 percent of children age 14 in the top 20 percent are enrolled in junior secondary school, while only 32.1 percent of children age 14 in the bottom 20 percent are enrolled in junior secondary school. 46.4 percent of children age 14 in the bottom 20 percent are still going to primary school, and 21 percent are out of school. On the other hand, only 6.3 percent of children age 14 in the top 20 percent are out of school.

Figure 1.18: Types of Schools Enrolled Among Children in Top 20 and Bottom 20 by Age

Source: GLSS7

42. **Even though Ghana's adolescent pregnancy rate declined dramatically in the last 50 years, pregnancy is still a significant factor affecting school enrollment rates among girls.** Ghana's adolescent pregnancy rate is much lower than the average in SSA. However, teenage pregnancy remains a key factor lowering school enrollment rates among teenage girls. 64.9 percent of girls age 15 to 19 who have never been pregnant are enrolled in school, while only 17.2 percent of girls age 15 to 19 who have been pregnant are enrolled in school (Figure 1.19). In Chapter 7, this report shows that teenage pregnancy substantially reduces school enrollment rates of teenage girls after controlling for income, road access, and other conditions.

Figure 1.19: School Enrollment Rates Among Girls Age 15 to 19 who Have Ever/Never Been Pregnant

Source: GLSS7

43. **Ghana's investment in health and social protection is low by international standards.** Even though Ghana's spending on education compares favorably with its peers, investment in other key sectors in human capital development, such as health and social protection, remains low. Ghana's spending on health per capita is the 9th lowest globally, and the third lowest in SSA (The World Bank 2017). Public spending on social protection is also limited compared to international standards (The World Bank 2016). The next section examines whether policy interventions in health are effective in reducing undernutrition. Ghana spends only 0.5 percent of GDP on social assistance (including scholarships) compared to 2.1 percent of GDP spent by its Sub-Saharan African peers. Livelihood Empowerment Against Poverty program (LEAP), the

country's flagship cash transfer program for the poor and vulnerable, has conditionalities for households with orphaned and vulnerable children, such as school enrolment, birth registration of newborn babies and post-natal checks, vaccination of children under 5 years, and household commitment to avoid children undertaking labor activities. A study by the World Bank shows that the coverage of Livelihood Empowerment Against Poverty program (LEAP), is too low to generate significant impacts (The World Bank 2016).

44. **To achieve inclusive economic growth, Ghana must continue to build its human capital and ensure children are healthy and developmentally on track so that they will grow and become capable and productive members of the labor force. This above discussion identified critical challenges Ghana faces in enhancing human capital development and inclusive growth:** 1) the regional disparity in child poverty widened, and there remains a large disparity in stunting among children under age 5 across regions and income groups. 2) Ghanaian children are not developing cognitive skills they need to succeed in life. 3) Even though Ghana's enrollment rates at primary and junior secondary school are relatively high compared with its peers, the enrollment rates at senior secondary school and higher education remain low compared with peers of similar income levels. To understand the underlying causes of these critical problems, this report attempts to answer the following questions:

- 1) What are the determining factors of gaps in stunting across regions and wealth groups? Are policy interventions effective in reducing the gaps?
- 2) Are children under age 5 getting ready to learn?
- 3) Are children acquiring real learning in the classroom? What determines cognitive development? Are Ghanaian parents and teachers doing enough to help children learn?
- 4) What hinders teenagers from enrolling in senior secondary school? Are students prepared to enter the job market as skilled and productive adults? Are they gaining important skills, such as computer skills, before entering the job market?
- 5) How do gender gaps in educational attainment and employment emerge? What are the constraints for girls to continue education and succeed in the job market?

2. Child Nutrition

2.1. Introduction

45. **Ghana's progress against child stunting (low height for age) has been significant, however, disparities across regions and between children in rich and poor households widened over years.** As discussed in Chapter 1, Ghana has substantially improved child stunting in the last 30 years. Ghana's stunting rate under age 3 declined from 26 percent to 17.6 percent between 1993 and 2014. Yet, there are still large differences in the stunting rates across regions. In Greater Accra, the stunting rate dropped from 15.7 to 13.7 percent between 1993 and 2014. On the other hand, the stunting rate decreased from 35.9 percent to 23.9 percent in Northern region during the same period. Even though Northern region made significant progress in reducing stunting, its stunting rate is still quite high. There are also large differences in stunting rates by income groups. The stunting rates of children was 24.8 and 25.5 percent among children in the bottom 20 percent and in the second lowest wealth quantile of households in 2014, while the stunting rate among the top 20 percent of households was only 8.5 percent.

46. **Stunting affects children's development with long-lasting detrimental consequences.** Stunting is associated with premature death (Black et al. 2013), greater risk for illness (Goyal et al. 2019), decelerated brain development (Prado and Dewey 2014), poor cognitive development and academic performance (Mendez and Adair 1999, Glewwe et al. 2001, Grantham-McGregor et al. 2007, Kar et al. 2008, Victora et al. 2008), low IQ (Berkman et al. 2002, Grantham-McGregor 2002, Ampaabeng and Tan 2013), low levels of educational attainment (Glewwe and Jacoby 1995, Victora et al. 2008), lower income (Hanushek and Woessmann 2008, Hoddinott et al. 2013), and increased risks of chronic diseases such as coronary heart disease, stroke, type 2 diabetes, and metabolic syndrome later in life (Prentice and Moore 2005). A study in Ghana examined the long-term cognitive effects of the 1983 famine, and found differences in intelligence test scores among children measured in 1988 are largely explained by differences in children's experiences of the 1983 famine (Ampaabeng and Tan 2013). Stunting also likely leads to poor development of the next generation of children (Walker et al. 2015).

47. **Stunting reduces future income per capita of a country. Similarly, a country's per capita income today is lower in part because many of its workers were stunted in childhood.** The cost of stunting (reduction in per capita income from today's workforce being stunted in childhood) is estimated to be 9 percent of GDP per capita in Africa (Galasso et al. 2016). In other words, per capita income could have been 9 percent higher if none of the workforce had been stunted when they were children. As discussed earlier, poor regions are becoming poorer while wealthy regions are becoming wealthier. To close the regional economic gap, it is critical to invest in deprived children and eliminate stunting in poor regions. Elimination of stunting is expected to accelerate economic growth in lagging regions.

48. **Understanding key factors associated with stunting is critical for designing effective policies and setting policy priorities.** In 1990, UNICEF developed a conceptual framework on the causes of malnutrition (UNICEF 1990). In this framework, inadequate dietary intake and diseases are considered two "immediate" causes of malnutrition. Inadequate access to food, inadequate care, insufficient health services, and unhealthy environments are considered "underlying" causes of malnutrition. Systematic review on factors associated with stunting uncovers other key determining factors such as mother's low education and age,

child's age and sex, wealth, prolonged duration of breastfeeding, low birth weight, source of drinking water, WASH, mother's BMI, and father's education (Mbuya and Humphrey 2016, Akombi et al. 2017, Millward 2017). The World Bank (2018) examines food security, child care, WASH, and health services as underlying factors associated with undernutrition, and shows how simultaneous access to these underlying determinants are important in reducing stunting. This report classifies possible factors associated with stunting into four issues, namely, 1) household and parents' characteristics, 2) anthropometric characteristics of mothers, 3) adequate care, feeding practices, and WASH (Water Supply, Sanitation, and Hygiene), and 4) access to health services, and examines their relative importance as factors associated with stunting. The report also computes marginal relationship between stunting and each key factor. It will then show how access to health services is associated with the probability of receiving medical treatments for children in poor households when they get sick, and how access to health insurance improves the chance of receiving medical treatment for children. As utilization of health services are important factors associated with stunting, CHPS and health insurance are ultimately alleviating stunting.

Figure 2.1: Potential Factors associated with Stunting

2.2. Policy Interventions in health and social protection

49. **The Government of Ghana has made efforts to prioritize policies and programs promoting under-five nutrition.** The National Health Insurance Scheme (NHIS) and Community-based Health Planning and Services (CHPS) were established to promote universal health coverage and universal access. The Livelihood Empowerment Against Poverty (LEAP) and the school feeding programs were implemented to improve food security among the poor, and to ensure children are consuming sufficient food and getting enough nutrients

50. **In 2003, the Government made a commitment to universal health coverage (UHC) with the passage of the National Health Insurance Scheme (NHIS) Law.** The main policy objective of the NHIS is to provide equitable and universal access for the entire population of Ghana to an acceptable quality package of healthcare (Wang 2017). The benefit package of the NHIS is comprehensive, covering about 95 percent of health conditions affecting the population. The benefit package includes most necessary outpatient diagnostic and curative services, inpatient services, emergency care, maternity care, and oral health.

51. **For equity and redistribution purposes, certain categories of people are exempted from premium payments.** About 66 percent of all beneficiaries of the insurance scheme have been in the exempt category since its inception. The exempt population groups include SSNIT Contributors², people aged above 70, retirees who contributed to the social security (SSNIT) scheme, all children under 18 years of age³, pregnant women, people with mental disorders, and disabled people. However, the exempt population groups are required to enroll to enjoy the services provided through the NHIS. Available statistics indicates that despite opportunities offered by the NHIS to these exempt groups, many individuals within these groups remain uncovered by the NHIS and therefore do not benefit from the fully subsidized health care provided by NHIS service providers. Figure 2.2 presents NHIS coverage rates from 2013 to 2017. The coverage of NHIS has been stagnant over the last 7 years hovering between 35.3 percent and 40.0 percent of Ghana’s population.

Figure 2.2: NHIS coverage Rate from 2013 to 2017

Source: Ministry of Health (2018)

52. **Provision of adequate and quality health facilities is also necessary to improve access to health care. The Government increased the number of Community-Based Health Planning and Services (CHPS) to improve access to health.** The health system in Ghana is a collection of government, private, faith-based and non-governmental health facilities. The last decade has witnessed an expansion of health services in the country with government as a key provider of health care through the expansion of the Community-Based Health Planning and Services (CHPS). This represents a sharp shift from the non-governmental and private sectors led expansion witnessed in 1990s to 2000s (Aikins and Koram 2017).

53. **The Community-Based Health Planning and Services (CHPS) has become one of the critical programs that has helped expanding access to health care particularly in remote areas of the country.** The CHPS is a national strategy to deliver essential community-based health services involving health planning and service delivery with the communities. With the aim of minimizing geographic barriers and providing remote populations with primary health care, the project strategically focuses on deprived rural communities. The CHPS has been implemented since 2005 and remains one of the most important strategies for achieving universal access.

² Technically, SSNIT contributors are not exempt as they make mandatory premium payments every month.

³ Initially, Act 650 required both parents of children to be registered members of the NHIS for eligibility, but this requirement was removed under Review Act, 852.

54. **Livelihood Empowerment Against Poverty (LEAP)**, a flagship social protection program in Ghana, is an unconditional cash transfer program targeted to extremely poor and vulnerable households (The World Bank 2016). Rolled out in 2010, LEAP has targeted extremely poor households across all 10 regions with the following three vulnerabilities: elderly, orphan and vulnerable children, and the disabled. In 2015, LEAP 1000 was introduced to reduce poverty among children in poor households in the two poorest regions with highest malnutrition rates – Northern and Upper East. Vulnerability eligibility of households under LEAP 1000 was extended to include pregnant women and children less than 15-months-old. There are two components to the LEAP program design. The unconditional component targets households without children less than 15 years, while the conditional component targets households with children less than fifteen years old. Program benefits include bi-monthly cash transfers and free enrollment in the NHIS, with exemption from premium payments.

Table 2.1: Health Facilities by Type, 2016

Region	CHPS	Clinic	Health Center	Hospital	Midwife/ Maternity	Others	Total
Western	470 (62.1%)	145 (19.2%)	64 (8.5%)	38 (5.0%)	37 (4.9%)	3 (0.4%)	757 (100.0%)
Central	235 (54.8%)	67 (15.6%)	61 (14.2%)	28 (6.5%)	35 (8.2%)	3 (0.7%)	429 (100.0%)
Greater Accra	201 (29.0%)	283 (40.8%)	28 (4.0%)	82 (11.8%)	85 (12.2%)	15 (2.2%)	694 (100.0%)
Volta	350 (58.5%)	40 (6.7%)	161 (26.9%)	28 (4.7%)	16 (2.7%)	3 (0.5%)	598 (100.0%)
Eastern	611 (69.1%)	116 (13.1%)	99 (11.2%)	31 (3.5%)	25 (2.8%)	2 (0.2%)	884 (100.0%)
Ashanti	1041 (69.4%)	130 (8.7%)	135 (9.0%)	121 (8.1%)	73 (4.9%)	1 (0.1%)	1501 (100.0%)
Brong Ahafo	458 (63.2%)	102 (14.1%)	90 (12.4%)	30 (4.1%)	41 (5.7%)	4 (0.6%)	725 (100.0%)
Northern	386 (66.7%)	56 (9.7%)	96 (16.6%)	28 (4.8%)	9 (1.6%)	4 (0.7%)	579 (100.0%)
Upper East	225 (66.8%)	50 (14.8%)	53 (15.7%)	7 (2.1%)	2 (0.6%)	0 (0.0%)	337 (100.0%)
Upper West	208 (66.9%)	14 (4.5%)	68 (21.9%)	11 (3.5%)	5 (1.6%)	5 (1.6%)	311 (100.0%)
Ghana	4185 (61.4%)	1003 (14.7%)	855 (12.5%)	404 (5.9%)	328 (4.8%)	40 (0.6%)	6815 (100.0%)

Source: Ghana Health Service (2017)

55. **The design of the program makes LEAP both nutrition and human capital-sensitive.** In addition to livelihoods and productive purposes, the objectives of LEAP include: improving basic household consumption and nutrition among children, increasing access to health care services among children, increasing basic school enrollment, school attendance and retention of beneficiary children between five and fifteen years of age. Inclusion of conditions as part of the program design further strengthens the

nutrition and early childhood development (ECD)-related objectives of LEAP. The conditional component of LEAP promotes nutrition-specific and sensitive interventions such as quarterly growth monitoring for children under five years and vaccination. Education conditions on enrollment and school attendance for children are also included as conditions for receiving the conditional transfers.

56. **Automatic enrollment of LEAP beneficiaries into the NHIS and birth registration systems for children under five strengthens the sensitivity to nutrition and human capital outcomes.** Automatic enrollment into the NHIS will ease access and utilization of essential health services for children and women of benefitting households. In addition, birth registration for children under-five (not already registered) will strengthen Ghana's vital statistics and increase coverage of birth registration which is lowest amongst the poorest quantile.

57. **Results of impact evaluation of LEAP are mixed and stronger for consumption and healthcare utilization among children under-five compared to education and health outcomes for other age cohorts (The World Bank 2016).** LEAP showed positive impacts on total consumption, food consumption, and healthcare utilization among children under-five. However, LEAP had a weak impact on school enrollment at all levels even though education expenditures were reduced for beneficiaries' children five to seventeen years old.

58. **Low coverage of LEAP is a challenge and barrier to realizing nation-wide human capital benefits from this program.** Figure 2.3 shows the percentage of people who benefited from LEAP. The districts with the highest poverty rates have the highest coverage of LEAP as a percentage of the total population (Table 2.2). However, the districts with the lowest poverty rates have the highest coverage of LEAP as a percentage of the poor. For LEAP to play a significant role to reduce poverty and improve nutrition, the scale and efficiency of the project needs to be improved.

Figure 2.3: Percentages of Beneficiaries of LEAP

LEAP coverage as percentage of poor⁴ *LEAP coverage as percentage of population⁵*

Source: Ministry of Gender, Children, and Social Protection.

⁴ The darkest color indicates the other 20 percent of the poor who receive LEAP. The second, third, and fourth darkest colors imply those between 15 and 20 percent, 10 and 15, and 5 to 10 percent of poor who get LEAP, respectively. The lightest color denotes less than 5 percent of the poor who have access to LEAP.

⁵ The colors correspond to five quantiles of the percentage of the population covered by LEAP.

Table 2.2: Percentages of Beneficiaries of LEAP by Districts' Poverty Level

	As percentage of poor	As percentage of total population in the districts
Districts with high poverty rates (1/3)	4.5	2.6
Districts with low poverty rates (1/3)	5.9	0.6

Source: Ministry of Gender, Children, and Social Protection.

59. **The Ghana School feeding Program (GFSP) has been ongoing since 2005. First started as a pilot, the program has evolved to be a key government policy under the national social protection agenda.** The policy targets the improvement of nutrition and school retention for disadvantaged primary and pre-primary pupils, while simultaneously generating income generation opportunities for farmers and community members. Specific policy objectives include improving school enrollment, attendance and retention among primary and preschool pupils in the most deprived communities; promoting an increase in domestic food production and consumption; increasing the incomes of poor rural households; and improving the health and nutritional status of beneficiary pupils. As of 2015, the beneficiaries of GFSP are 1,693,698 pupils in 4,881 schools, receiving one nutritious meal per day. One impact evaluation study indicates GSFP may contribute to micronutrient adequacy, but has no significant effect on iron and nutritional status (Abizari et al. 2014). One meal under the program may not be sufficient as most disadvantaged children live far from school and walk a long distance to and from school (Aliyar et al. 2015). Unpublished results of the 2016 evaluation results show a statistically significant effect of school feeding on enrollment, lower likelihood of missing school, girls learning outcomes in math and literacy, reduced probability of stunting, and improved cognition (presentation by Institute of Statistical Social and Economic Research (ISSER) University of Ghana, Legon).

2.3. Data and Methodology

60. **The analysis was conducted using the 2014 Ghana Demographic and Health Survey, a nationally representative survey of 11,835 households. The dataset contains information about 5,819 children aged 0 – 59 months.** The questionnaire includes detailed questions on child health, height, weight, vaccination status, treatment practices, contact with health facilities, and multiple dimensions of household characteristics and parents' traits. Information was obtained for all live births that occurred in the five years prior to the survey. Height measurement was carried out with 3,118 children under age 5 who were present at the time of the survey. Children are considered stunted if their height-for-age is more than two standard deviations below the WHO Child Growth Standards median. Even though DHS does not collect data on complete consumption and expenditure, it creates the wealth index. The wealth index is constructed from household asset data and dwelling characteristics using principal components analysis. The assets consist of a television, bicycle, or car, and dwelling characteristics include type of flooring materials, a source of drinking water, and sanitation facilities. The analysis in this chapter uses the wealth index as one of the key independent variables and excludes the components of the wealth index (such as dwelling characteristics and asset ownership) from the list of determining factors of stunting.

61. **Magnitudes of relationship with potential determining factors are estimated by logit regressions.** This report conducts logit regressions and estimates marginal effects of the changes in potential determining factors on the probability of children being stunted. For example, the analytical results show

having additional sibling is associated with an increase in the probability of a child being stunted by 1.4 percent.

62. **Causal forests are used to analyze heterogeneous relationship between access to health services and policy interventions.** This study uses causal forests (machine learning algorithm) to estimate the heterogeneous relationship between the utilization of health services when are sick, the National Health Insurance Scheme (NHIS) membership and access to the Community-based Health Services and Planning (CHPS), clinics and hospitals. Causal forests allow us to evaluate heterogeneous effects of policy interventions across income groups (Wager and Athey 2018).⁶ Causal forest algorithm use regression trees to divide populations into subgroups to minimize mean square errors in treatment effects. Causal forests are conducted using GLSS 7 household survey data, as GLSS 7 collects information on the accessibility of various health facilities. The GLSS 7 data was collected from a nationally representative 14,009 households from October 2016 to October 2017. As too few households claimed themselves as LEAP and school feeding program beneficiaries, this study is not able to examine how these two social protection programs affect stunting.

2.4. Key factors associated with Stunting

63. **The key variables associated with stunting can be classified into four broad groups:** 1) household and parents' characteristics, 2) anthropometric characteristics of mothers, 3) adequate care and 4) access to health services.

Household and parents' characteristics

64. **Male-headed households, number of siblings, mother's years of education and child's gender and age are significantly correlated with the probability of children being stunted.** As shown in the logit model regression results in *Table A.1* in the Appendix, children born in male-headed households are 4.9 percent less likely to be stunted. The probability of stunting increases by 1.4 percent point for an additional sibling. The probability of stunting decreases by 0.7 percent point for an additional year of education mothers have received. Male children are 3.7 percentage more likely to be stunted after controlling for all other factors. Children age 2 to 3 are more likely to be stunted than children age 4, and children age 0 are less likely to be stunted than children age 4.

Anthropometric characteristics of mothers

65. **Anthropometric characteristics of mothers (mother's height and weight) are strongly correlated with stunting.** Mother's additional weight by 1 kg is associated with 0.4 percent lower rate of stunting. Similarly, Mother's additional height by 1 cm is associated with 0.7 percent lower rate of stunting. This result is consistent with findings in other studies which found mother's low BMI and low height to be significant key factors associated with stunting in Ghana (Nikoi and Anthamatten 2013, Aheto et al. 2015, Saaka and Galaa 2016, Ali et al. 2017).

⁶ Other studies use causal forests to estimate heterogeneous effects of electricity pricing (O'Neill and Weeks 2018), educational interventions (Dann 2017, Andor et al. 2018), cyber security policies (He et al. 2016), nutrition programs (Thomsen 2018), and youth employment programs (Davis and Heller 2017).

Adequate care and health services

66. **Parents' knowledge about iodized salt is strongly correlated with stunting.** The logit regression results suggest children are 5.5 percentage points less likely to be stunted if their parents have knowledge about iodized salt. Other studies find iodine is an essential micronutrient necessary for health growth and development of children (Farebrother et al. 2015, Krämer et al. 2016). Parents' knowledge about iodized salt may represent not only the knowledge about iodized salt but also general knowledge on adequate care for children.

67. **Rotavirus vaccination and utilization of medical treatments are also key factors associated with child stunting.** Logit regression results in *Table A.1* in the Appendix show children who received rotavirus vaccination are 2.2-point percent less likely to be stunted. It may be because these children are protected against rotavirus infections, the leading cause of severe diarrhea among young children. Children who received medical treatments when they had fever or coughed are 7.3 percentage points less likely to be stunted. These results suggest access to health services is a critical factor affecting stunting. Unfortunately, the 2014 DHS household survey did not collect information about the availability of health services and health facilities within communities. The next section investigates the relationship between access to health services and the utilization of medical treatments among children using GLSS 7 data.

2.5. Heterogeneous Relationship between Access to Health Services and the Utilization of Medical Treatments

68. **The analysis presented in the previous section validates the importance of access to health care on stunting.** However, the 2014 DHS data does not include information on the availability of health facilities within communities. This section uses GLSS 7 data and examines how access to health facilities such as CHPS, clinics and hospitals impact the utilization of medical treatments when children get sick, and how the relationship differ between children in poor and wealthy households. It also examines how NHIS (health insurance) membership stimulates the utilization of health facilities.

69. **Availability of CHPS and clinics increases the chance of children receiving medical treatments when they are sick, especially among children in the bottom 20 percent of households.** On average, accessibility to CHPS and clinics within communities increases the probability of children receiving medical treatments when they get sick by 2.3 percent points (ATE= average treatment effect). For children who do not currently have access to CHPS or clinics, their chance of receiving medical treatments will increase by 2.9 percent points if there were CHPS or clinics in their communities (ATU= average treatment effect on the untreated). For children who currently have access to CHPS or clinics, their chance of receiving medical treatments will not get affected due to the presence of CHPS and clinics (ATT= average treatment effect on the treated). This suggests the potential positive impacts of accessibility to CHPS and clinics arises from potential increases in the usage of medical treatments among children who currently do not have access to CHPS and clinics. If a child has NHIS membership, his/her chance of receiving medical treatments at CHPS or clinics will increase by 2.2 percent points. The impact is strongest among children in the lowest income group, as the availability of CHPS and clinics increases their chance of receiving medical treatments by 5 percent points. This indicates access to CHPS and clinics especially help poor children receive medical treatments when they get sick. There is no significant impact of access to hospitals. It may be because hospitals are usually located in district capitals, making it difficult for people in rural areas to access.

Figure 2.4: Heterogeneous Relationship between Access to Health Facilities and the Utilization of Medical Treatment (Causal Forests)

2.6. Summary

70. **Consequences of under-five malnutrition are serious with short and long negative effects on health, education, and productivity outcomes for both individuals and the society.** Previous studies found stunting is associated with premature death, greater risk for illness, brain development, poor cognitive development and academic performance, low IQ, lower income, and increased risks of chronic later in life.

71. **This study shows stunting is strongly correlated with 1) household and parents' characteristics, 2) anthropometric characteristics of mothers, 3) adequate care and 4) access to health services.** Gender of households, number of siblings, mother's years of education are associated with the probability of children being stunted. Children born in male-headed, having more siblings and less educated mother are more likely to be stunted. Mother's additional weight by 1 kg is associated with 0.4 percent lower rate of stunting. Similarly, Mother's additional height by 1 cm is associated with 0.7 percent lower rate of stunting. Parents' knowledge about iodized salt is strongly correlated with stunting. Parents' knowledge about iodized salt may represent not only the knowledge about iodized salt but also general knowledge on adequate care for children. Rotavirus vaccination and utilization of medical treatments are also key factors associated with child stunting. children who received rotavirus vaccination are 2.2-point percent less likely to be stunted. It may be because these children are protected against rotavirus infections, the leading cause of severe diarrhea among young children. Children who received medical treatments when they had fever or coughed are 7.3 percentage points less likely to be stunted.

72. **Availability of CHPS and clinics increases the chance of children receiving medical treatments when they are sick, especially among poor children.** Accessibility to CHPS and clinics within communities increases the probability of children receiving medical treatments when they get sick by 2.3 percent points. If a child has NHIS membership, his/her chance of receiving medical treatments increases by 2.2 percent points. The impact of access to CHPS and clinics is strongest among children in the lowest income group. This indicates access to CHPS and clinics disproportionately help poor children.

3. Early Childhood Education (Learning Under Age 5)

3.1. Introduction

73. **Learning starts in infancy and continues throughout life. Early childhood education is extremely important, as it substantially impacts various outcomes in later life, such as skill development, academic achievement, health, and income.** Early intervention programs which targeted disadvantaged children, such as the Perry Preschool Project and the Abecedarian Project, had significant impacts on outcomes in educational attainment, employment, earnings, and health in the United States (Campbell et al. 2014, Elango et al. 2015, Conti et al. 2016). The Perry Preschool Project enhanced academic motivation, especially for girls (Heckman et al. 2013). The full-day child care for the first 5 years of life under the Abecedarian Project produced better metabolic and cardiovascular health measures among project participants in their 30s (Campbell et al. 2014). Meta-analysis also found early childhood development interventions are effective in improving cognitive development of children in developing countries (Rao et al. 2017).

74. **Investment in early childhood education has significantly higher rates of return than later-life investments. Early childhood interventions targeting disadvantaged populations are particularly effective as measured by the rates of return and benefit-cost analysis.** Schooling after the second grade has only minor impacts on learning outcomes (Heckman 2011). Well-accepted measures of educational inputs such as class size and teacher salaries are found to have smaller effects than investment in early childhood education (Heckman 2011). Early childhood interventions targeted toward disadvantaged children are found to generate significantly higher economic returns than later interventions such as lowered pupil-teacher ratios, job training, and tuition subsidies (Heckman 2006).

75. **Ghana has shown substantial commitment to improving early childhood education. Ghana is one of a few countries that developed a national early childhood development policy in Africa (Wolf et al. 2017).** Under the policy promulgated in 2004 (2004 National ECCD Policy), the Ministry of Education developed implementation strategies for early childhood development, including the National Early Childhood Care and Development Policy. It stressed that access to quality preschool is central to improving early childhood development. In 2007, Ghana became the first Sub-Saharan African country to expand Free Universal and Compulsory Basic Education (FCUBE) to preschool, under which all children are to receive two years compulsory early childhood education at the ages of 4 and 5 before entering primary school.

76. **As discussed in Chapter 1, Ghana made significant progress in raising preschool enrollment. However, there are considerable disparities by region and wealth quantile.** Ghana's net enrollment rate for preschool is much higher than other lower middle-income countries in SSA. However, there are large differences in the preschool enrollment rates across regions and wealth quantiles within the country. In Greater Accra, 86.1 percent of children age 36 to 59 months were enrolled in preschool, while only 46.2 percent of children were enrolled in preschool in Northern region in 2017 and 2018. Among the richest 20 percent of households, 94.4 percent of children went to preschool, while only 45.6 percent of children in the bottom 20 percent of households went to preschool.

Figure 3.1: Percentages of Children Age 36-59 Months who are Attending Preschool (2017-18)

Source: Ghana MICS 6

77. **Inequality among families in early childhood environments is a major cause of disparity. Complementing early childhood education with improved family environments is an efficient and cost-effective way to improve learning among poor children, as well as their academic achievement and economic success later in life.** A study conducted at preschools in Ghana demonstrates the importance of parents' involvement and availability of books at home on school readiness (Wolf and McCoy 2019). Results of impact evaluations in other countries suggest policy interventions which enhance family environments significantly improve cognitive and noncognitive development of children, as well as adult outcomes. For example, an intervention that gave 2 years of psychosocial stimulation to growth-stunted toddlers in poor households increased their earnings by 25 percent 20 years later in Jamaica (Gertler et al. 2014). The intervention consisted of weekly visits from community health workers who taught parenting skills and encouraged mothers and children to interact in ways that develop cognitive and socioemotional skills. The intervention had large impacts on schooling attainment; By age 22, the children who received the intervention had 0.6 more years of educational attainment than the children who did not receive the intervention. The Jamaican intervention had substantially larger effects on earnings than any of the U.S. programs, suggesting early childhood interventions may potentially be more effective for disadvantaged children in developing countries. The results also suggest disadvantage among poor children is not necessarily associated with financial poverty, but rather with parenting practices and lack of positive cognitive and noncognitive stimulation.

78. **In order to develop effective policies for early childhood education, it is important to understand family environments, and examine whether preschool education is helping children under age 5 develop cognitive skills.** This chapter uses MICS 6 data collected in Ghana and Sierra Leone from 2017 to 2018, compares family environments and preschool education between the two countries, and studies how they affect cognitive skills of children age under five. Sierra Leone is the first country which made the MICS 6 survey data at the micro level available in the world. The MICS 6 survey data from Ghana is not publicly available at the individual level at the time of writing this report. Thus, the report uses only aggregated data for Ghana for now and conducts detailed analysis for Sierra Leone. Once the Ghana MICS 6 data at the micro level becomes available, the report will include the analysis of micro level data analysis for Ghana.

79. **This study focuses on literacy and numeracy skills as the core cognitive skills among children under age 5.** The ability to read is one of the most fundamental cognitive skills. A strong foundation in numeracy skills is important for academic success once children start primary school and start to learn mathematics. Children under age 5 should build strong foundations of literacy and numeracy skills even before they start primary school. Children are considered developmentally on track in literacy and numeracy based on

whether they can identify at least ten letters of the alphabet, whether they can read at least four simple, popular words, and whether they recognize all numbers from 1 to 10. If at least two of these are true, then the child is considered developmentally on track.

80. This chapter considers factors associated with literacy and numeracy skills among children under age 5 classified into five broad groups: 1) household and parents’ characteristics, 2) preschool enrollment, 3) stunting, 4) parents’ involvement, and 5) availability of learning materials, as shown in Figure 3.2.

Figure 3.2: Potential Factors associated with Learning Under Age 5

3.2. Comparison with Sierra Leone

81. More children under age 5 go to preschool in Ghana, compared with Sierra Leone. Figure 3.3 shows adjusted net school attendance rates at preschool, primary school, junior secondary school, and senior secondary school in Ghana and Sierra Leone in 2017/18. The adjusted net preschool attendance rates are estimated as percentages of children of the official preschool age group who attend preschool during the reference academic year. 70.9 percent of children of the official preschool age attend preschool in Ghana, while only 11.5 percent of children in Sierra Leone do. Even though there is a large gap in preschool enrollment between rich and poor in Ghana, almost half of the children in the bottom 20 percent still go to preschool, while very few poor children in Sierra Leone go to preschool. Among the children in the top 20 percent of wealth quantile, 94.4 percent of Ghanaian children go to preschool while only 40.6 percent of children do in Sierra Leone. Beyond preschool, adjusted net school attendance rates are not very different between Ghana and Sierra Leone. In fact, the adjusted net school attendance rates at senior secondary are higher in Sierra Leone than Ghana, especially among the children in the richest income quantile.

Figure 3.3: Comparison of Adjusted Net School Attendance Rates in Ghana and Sierra Leone

Source: Ghana and Sierra Leone MICS 6

82. **More Ghanaian children under age 5 are developmentally on track than children in Sierra Leone.** 36 percent of children in Ghana age 3 are considered developmentally on track, while only 10.1 percent of age 3 children in Sierra Leone are (Figure 3.4). Similarly, 52.4 percent of children in Ghana age 4 are considered developmentally on track, while only 20.5 percent of age 4 children in Sierra Leone are. This suggests that Ghana has achieved higher early childhood education outcomes compared with Sierra Leone. Ghana's higher enrollment rates of preschool compared with Sierra Leone may be a key factor of Ghana's great achievement. As shown in Section 3.4, micro level data analysis suggests preschool enrollment is a key determining factor of early childhood education outcomes in Sierra Leone.

Figure 3.4: Percentage of Children who Are Developmentally on Track in Literacy-Numeracy in Ghana and Sierra Leone

Source: Ghana and Sierra Leone MICS 6

83. **Ghanaian parents are more engaged in activities with children and provide more books and toys to their children compared with parents in Sierra Leone.** Children's early experiences with responsive caregiving and availability of learning materials are important as they boost neurological function and cognitive development. 30.2 percent of parents are regularly engaged in some activities with children age 2, while few parents are in Sierra Leone (Figure 3.5). Ghanaian children are given more books to read and more toys to play with compared with children in Sierra Leone in all age groups. Ghana's greater achievement in early childhood education may be largely due to better learning environments at home.

The report will incorporate micro level data analysis to examine it once the micro level data becomes available to analyze the factors associated with learning outcomes in Ghana.

Figure 3.5: Comparison of Learning Environments Between Ghana and Sierra Leone

Source: Ghana and Sierra Leone MICS 6

3.3. Gaps in Learning Outcomes by Region and Wealth Quantile in Ghana

84. **More Ghanaian children under age 5 are enrolled in preschool and developmentally on track than children in Sierra Leone. However, there are large differences across regions.** As discussed in Section 1.2, the adjusted net enrollment rate of preschool in Greater Accra is 86.1 percent while the adjusted net enrollment rate of preschool in Northern region is only 46.2 percent. The adjusted net enrollment rates of preschool are 94.4 percent and 45.6 percent among children in the top 20 percent and bottom 20 percent of wealth quantile. In Greater Accra, 66 percent of children under age 5 are considered developmentally on track in literacy and numeracy, while only 16.4 percent of children under age 5 are considered developmentally on track in Upper West region (Figure 3.6). The analytical results from Sierra Leone in the next section demonstrates preschool enrollment is a significant factor affecting cognitive development among children under age 5. It is possible that the gap in preschool enrollment also impacts cognitive development in Ghana.

Figure 3.6: Percentages of Children who are Developmentally on Track by Region

Source: Ghana MICS 6

85. **There are also substantial differences in early childhood education outcomes by mother's education level and wealth quantile.** Cognitive development is likely to be determined by mother's educational

attainment and wealth status of households. 71.2 percent of children whose mothers completed higher education are developmentally on track, while only 27 percent of children whose mothers have not completed primary school are considered developmentally on track (Figure 3.7). Furthermore, wealth is strongly correlated with cognitive development. 76.7 percent and 15.7 percent of children in the top and bottom wealth quantiles are considered developmentally on track, respectively.

Figure 3.7: Percentages of Children who are Developmentally on Track by Mother's Education and Wealth Quantile

Source: Ghana MICS 6

86. **Children in wealthy households have better learning environments than children in poor households.** Figure 3.8 shows a large disparity in learning environments between poor and rich children under age 5. While only 19 percent of children in the top wealth quantile were left home alone in the past week, over 30 percent of children in the bottom wealth quantile were left alone. 26 percent of children under age 5 have more than 3 books to read in the richest wealth income group, while children in the bottom 20 percent have no books to read at home on average. 65 percent of children in the top wealth quantile have more than two toys to play with at home, while only 40 percent of children in the poorest income group have more than two toys at home.

Figure 3.8: Comparison of Learning Environments by Wealth Quantile

Source: Ghana MICS 6

3.4. Determining Factors of Learning

87. **This section presents analytical results of determining factors of cognitive development using MICS 4 data collected in 2011. The top factors associated with cognitive development can be classified into five broad groups:** 1) households and parents' characteristics, 2) preschool enrollment, 3) stunting, 4) parents' involvement, and 5) availability of learning materials. Logit regressions are used to examine the magnitudes of correlations of these factors with cognitive skill development (literacy and numeracy).

88. **Wealth and parents' education are important determining factor of cognitive development among children under 5** (Table A.2 in the Appendix). Log regression results shown in Table A.2 indicate belonging to household wealth is strongly correlated with the probabilities of developing sufficient cognitive development among children under age 5. Children whose mothers attended primary school are 8.1 percent points more likely to develop adequate cognitive skills. Being adopted or fostered children is associated with 28.8 percent points lower probabilities of developing adequate cognitive skills.

89. **Preschool enrollment is an important factor associated with cognitive development among children under age 5.** Logit regression results suggest children attending preschool are 15 percent and 44.2 percentage points more likely to adequate cognitive skills compared with children who do not attend preschool in Sierra Leone (Table A.2).

90. **Stunting is also among the leading factors associated with numeracy skill development.** Logit regression results in Table A.2 suggest stunting lowers the probability of children developing cognitive skills, after controlling for all other factors. Children who are stunted are 10.2 percentage points less likely to develop sufficient cognitive skills.

91. **Parents' involvement is positively related with cognitive skill development** (Table A.2). Children who regularly play with their parents are 15.5 percentage points more likely to develop cognitive skills (Table A.2). The number of children's books available at home is strongly associated with cognitive skill development. Having an additional book at home increases the chance of children attaining cognitive development by 8.8 percent points (Table A.2).

3.5. Summary

92. **Learning starts in infancy and continues throughout life. Early childhood education is extremely important, as it substantially impacts various outcomes in later life, such as skill development, academic achievement, health, and income. Ghana has shown substantial commitment to improving early childhood education.** The analytical results in this report show Ghanaian children under age 5 are more developmentally on track than children in Sierra Leone. Ghanaian children are more likely enrolled at preschool, and Ghanaian parents are more engaged in activities with children and provide more books and toys to their children compared with parents in Sierra Leone.

93. **However, there are large differences across regions and income groups.** In Greater Accra, 66 percent of children under age 5 are considered developmentally on track, while only 16.4 percent of children under age 5 are considered developmentally on track in Upper West region. 76.7 percent of children in the top 20 percent of households are developmentally on track, while only 15.7 percent of children in the bottom wealth quantiles are considered developmentally on track. Children in wealthy households have better learning environments than children in poor households.

94. **The analytical results demonstrate there are five major factors associated with cognitive development:** 1) households and parents' characteristics, 2) preschool enrollment, 3) stunting, 4) parents' involvement, and 5) availability of learning materials at home. Household wealth is strongly correlated with the probability of developing cognitive skills. Children whose mothers attended primary school are 8.8 percentage points more likely to develop adequate cognitive skills. Being adopted or fostered children is associated with 28.8 percent points lower probabilities of developing adequate cognitive skills.

95. **Preschool enrollment facilitates literacy and numeracy skill development.** Children attending preschool are 44.2 percentage points more likely to gain adequate cognitive skills compared with children who do not attend preschool.

96. **Stunting is among the leading factors associated with numeracy skill development. Parents' engagement and the availability of learning materials are also important factors associated with literacy and numeracy skill development.** Stunting lowers the probability of children developing cognitive skills. Children who regularly play with their parents are 15.5 percentage points more likely to attain adequate cognitive skills. The number of children's books available at home is also strongly associated with cognitive skill development. Having an additional book at home increases the chance of children attaining sufficient cognitive skills by 8.8 percent points.

4. School Enrollment

4.1. Introduction

97. **As discussed in Chapter One, Ghana's completion rates of primary school and junior secondary school are considerably higher than its income and regional peers. However, its enrollment rates of senior secondary school are low compared with peers of similar income levels. The disparity in school enrollment between rich and poor has shifted from primary to senior secondary schooling.** The disparities in primary school enrollment rates between the bottom and top wealth quantiles narrowed for both boys and girls between 1991 and 2016. However, the gaps in senior secondary school enrollment rates between the bottom 20 and top 20 further widened. Between 1991 and 2016, the differences in enrollment at senior secondary school grew from 19 and 27 to 27 and 44 percentage points for girls and boys, respectively.

98. **Wealth, parents' education, road density, are among the important factors associated with school enrollment rates between age 7 and 15.** Logit regression results in Table A.3 in the Appendix suggest children in wealth is still a significant factor determining school enrollments for children between age 7 and 15, after controlling for all other variables. Mother's education is positively related with school enrollment rates among children age 7 to 12, but negatively associated with school enrollment rates among children age 13 to 15. Father's education is also positively related with school enrollment rates among children age 7 to 12. Road density is positively correlated with school enrollment rates among both children age 7 to 12 and 13 to 15, suggesting accessibility is an important factor determining school enrollment.

99. **As discussed in Chapter One, there are many children who are not enrolled in schools of appropriate age levels, especially children in the bottom 20%.** Smaller percentages of children in poor households are enrolled in school, compared with children in the top 20 percent in all ages except for age 18. Moreover,

smaller percentages of children in the bottom 20 percent are enrolled in school of appropriate age levels, compared with children in the top 20. *Table A.4* in the Appendix shows wealth, number of siblings, household heads' age, both parents' years of education, road density, having books at home are positively associated with the probability of children enrolling in schools of appropriate age levels. Children who are not related to household heads are significantly less likely to enroll in age-appropriate grade levels.

100. **Among children who are in school, parents' involvement is an important factor associated in children staying in age-appropriate grades.** *Table A.4* in the Appendix shows children who get parents' help in finishing homework and have parents who read books for them and tell their expectations are more likely to stay in age-appropriate grades. On the other hand, children under 12 who commute on foot are less likely to stay in age-appropriate grades, suggesting lack of means of transportation could be a determining factor of staying in age-appropriate grades. This is consistent with the result that road density is positively correlated with school enrollment for children between age 13 and 15.

101. **Senior secondary school (SSS) education is crucial to prepare Ghanaian youth to enter the job market as productive and skilled members of the workforce.** Access to senior secondary school education is increasingly becoming an important factor for spurring economic growth in Ghana. Senior secondary school education plays a very important role in human capital accumulation and serves as a major factor associated with household welfare and income earning potential. Educational attainment is also expected to lower birth rates and child mortality, improve nutrition and health, increase productivity and social mobility, and empower people to build a competitive economy (Hanushek and Wößmann 2007).

102. **The Free SSS program, one of its flagship programs and initiatives of the new government, was launched by President Nana Akufo-Addo on September 12, 2017.** The government of Ghana recognizes that it is through education that knowledge, values and cognitive and noncognitive skills are acquired to build the human capital necessary for economic development. Successive governments in Ghana have prioritized education policies in their plans for accelerating economic development. The new government, which came to power in 2017, has also prioritized education as an important area to achieve sustained development. The government has identified school fees as a significant barrier to access senior secondary school and launched the Free SSS program.

103. **The level of investment in education is largely influenced by the expected returns** (Admassie 2003). If there is no economic return to senior secondary school education, parents will not have an incentive to send their children to senior secondary school. For example, in Bangladesh, the rapid development of garment factories created strong demand for girls with senior secondary school education. Parents became willing to send their daughters to senior secondary school, since high paying jobs at garment factories were often available for girls (Heath and Mobarak 2015).

104. **This chapter first discusses senior secondary school policy in Ghana.** It then demonstrates there is a strong economic return to senior secondary school education. Children cannot enter senior secondary school unless they pass the Basic Education Certificate Examination (BECE). This chapter examines key factors associated with passing BECE. Finally, it will investigate determining factors and bottlenecks that prevent Ghanaian youth from enrolling in senior secondary school.

105. *Figure 4.1* illustrates potential determining factors on senior secondary school enrollment.

Figure 4.1: Potential Factors associated with Senior Secondary School Enrollment

4.2. Free Senior Secondary School Policy

106. The government of Ghana recognizes that it is through education that knowledge, skills, attitudes, values and character are acquired to build the human capital necessary for socio-economic development. It is therefore not surprising that, like many developing countries, successive governments have prioritized education policies in their plans for accelerated economic development. The new NPP government, which came to power in 2017, has also prioritized education as an important area to achieve sustained development. The government identified school fees as a significant barrier to access and therefore the policy to reduce or eliminate burden relating to costs of secondary education of borne by parents.

107. The free SSS policy was a campaign promise during the 2016 presidential and parliamentary elections. The policy seeks to redefine basic education to include senior secondary education, making secondary education the terminal point of basic education in the country. During the first year (2017/2018) of the free SSS policy implementation, except the Parent-Teacher Association (PTA) dues, the free SSS paid all fees including admission fees, maintenance fees, fees for cumulative records and medical fees through what is fondly called “one-time” fees. The total of the “one-time” fees for the first-year students of the 2017/2018 academic year, however, stood at GH¢435.00 and GH¢438.00 for day students and for boarding students respectively. Recurrent fees of GH¢101.47 and GH¢105.47 are for utilities, examinations, library, practical, entertainment, science development, and teacher motivation for day students and boarding students, respectively. The policy also provided other services, including two sets of school uniforms, two sets of house dresses, school cloths, P.E kits, nine exercise books, four notebooks, one supplementary reader, three core English Literature books, and books for core subjects.

108. In 2017, the percentage of youth who did not enroll at senior secondary school after junior secondary school completion declined dramatically. Figure 4.2 presents statistics on senior secondary school placements for those who could not enroll in SSS. These statistics indicate that prior to the implementation of the free SSS policy, an average of 27.3 percent of placed students were unable to enroll. This high percentage of the unrolled has been attributed to parents’ inability to provide financial resources. It is believed that a high proportion of children from poor backgrounds were unable to enroll at SSS level.

Figure 4.2: SSS Placements and Enrollment in Ghana (2013-17)

Source: Ministry of Education

4.3. SEIP program

109. **The World Bank has been providing funding to Ghana’s Ministry of Education to implement several initiatives intended to improve senior secondary school attendance and completion among students from disadvantaged backgrounds in selected districts.** The main purpose of the World Bank sponsored program (SEIP) is to increase access to secondary education by targeting underserved districts and to improve the quality of secondary education in low performing senior secondary schools. The SEIP commenced in the 2014/15 academic year providing support in the form of infrastructural improvement in about 148 secondary schools in the country, scholarships to the needy, and quality improvements (strengthened school management, leadership and accountability, improvements in quality of math and science instruction, and introduction of School Performance Partnerships). The project built 14 new schools in 14 districts. In addition, 9 new schools were built in the 9 poorest districts with high effective and potential demand for secondary education. In total, SEIP built 23 new schools in 23 districts (SEIP 23).

110. **In addition, 50 existing senior secondary schools in 50 different districts (SEIP 50) benefited from facilities improvement aimed to increase access.** The project also provided support to improve 125 existing schools – the 50 schools that benefited from the facility improvement and other 75 existing schools in 75 districts (SEIP 75). To address the problem of low senior secondary school enrolment in poor communities, the SEIP provided scholarship, explicitly prioritizing girls’ enrolment. In all, an estimated amount of \$15.0 million was provided to support about 10,025 students. The first batch of beneficiaries of SEIP received their support in the 2014/2015 academic year and would have completed secondary school in the same academic year. With additional financing, project duration was extended by two years, closing in 2020/21. The last batch of beneficiaries who will complete the three-year cycle of secondary education in the 2020/21 academic year have been enrolled in secondary school since 2018/19.

111. **Statistically, there was no significant difference in senior secondary school enrollment rates between the districts where SEIP was introduced and the districts which were not selected for the SEIP program in 2012.** Table 4.1 shows the senior secondary school enrollment rates in project districts (treatment districts) and non-project districts (control districts) for SEIP 23, SEIP 50 and SEIP 75 projects. In any of the SEIP projects, there was no statistically significant difference in enrollment rates. This allows us to evaluate the impacts of SEIP on senior secondary school enrollments in this report.

Table 4.1: Comparison of Senior Secondary Enrollment Between SEIP Districts and Non-SEIP Districts In 2012

Variable	Control districts	Treatment districts	P-value
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SEIP 23	Enrollment	0.187	0.200	0.279
SEIP 50	Enrollment	0.183	0.209	0.123
SEIP 75	Enrollment	0.178	0.212	0.748
SEIP ALL	Enrollment	0.186	0.190	0.054

Source: GLSS 6

4.4. Return to Education

112. **People will not go to senior secondary school unless there are economic returns to senior secondary school enrollment.** This section presents the evidence that there are great economic returns to senior secondary school education.

113. Figure 4.3 shows poverty rates by the educational attainment of household heads. 47.2 percent of households with heads having no education are living under the national poverty line. If household heads attained primary school and junior secondary school education, the poverty rates decline to 28 percentage points and 15.5 percent points, respectively. If household heads received senior secondary school education, then the poverty rate further drop to 7.3 percent points, which is much lower than the national poverty rate of 23.4 percent. *Table A.5* in the Appendix shows the probit model regression results on poverty status. After controlling for all other variables, completing senior secondary school education decreases the probability of being poor by 10.9 percentage points compared with people who did not complete primary school education.

Figure 4.3: Poverty Rate by Educational Attainment of Household Heads in 2016/17

Source: Calculations based on GLSS 7.

114. **The sector of employment of the individual is a good predictor of poverty status.** Figure 4.4 presents the distribution of employment by sector by wealth quantile in 2016/17. Among the bottom 20 percent of households, agriculture was the dominant economic activity, accounting for about 85 percent of employment. By contrast, agriculture accounted for only 17 percent of employment among the adults in the top 20 percent of households. 46 percent of the individuals in the top 20 percent are wage employees. Another 38 percent of the top 20 earned their living from non-agricultural self-employment. Thus, most of the poor people make their living from agricultural employment, while a large percentage of the rich people, on the other hand, work as wage employees or in non-agricultural self-employment. The probit regression

results in *Table A.5* show wage workers in the private and public sectors are 8.7 percentage points and 14.6 percentage points less likely to be poor compared with people who are not working.

Figure 4.4: Distribution of Employment Sector by Consumption Quintile in 2016/17

Source: Calculations based on GLSS 7.

115. **Educational attainment is strongly correlated with the sector of employment.** 86 percent of people who received only primary school education are working in agricultural self-employment. On the other hand, only 48 percent of people who attained senior secondary school education are in agricultural self-employment, while more than half of the people with senior secondary education are in non-agricultural sectors. The percentage of people engaged in agriculture further decline with higher educational attainment. Only 30 percent of people who attained higher education are engaged in agriculture, while more than 61 percent of them have wage employment in the formal sector (either in private or public sectors). The probit regression results in *Table A.6* in the Appendix show after controlling for all other factors, completing senior secondary school education increases the probability of gaining wage employment (either public or private) by 17.3 percentage points compared with people who did not complete primary school education.

Figure 4.5: Distribution of Employment Sector by Educational Attainment in 2016/17

Source: Calculations based on GLSS 7.

4.5. Basic Education Certificate Examination

To enroll in senior secondary school, pupils first need to successfully complete basic education and pass the Basic Education Certificate Examination (BECE). This section examines factors associated with basic education completion among youth between 15 and 19 years of age.

116. **Late completion of junior secondary school is a common problem.** As shown in Figure 4.6, a large percentage of pupils from both rich and poor households do not complete basic education at the expected age of 15-16: only 11.7 per cent and 56.3 per cent of children from poor households and rich households complete junior secondary school education by age 16, respectively. Thus, while the expected age for completion of basic education is age 15, there are a preponderance of students who complete junior secondary school at a much later age.

117. **Key factors associated with basic education completion are ages of the individuals, household income, mother and father's age at birth, mother's education, household size, and birth interval.** Error! Reference source not found. shows the results of random forest. As expected, older individuals are likely to have completed basic education (completed BECE) compared to younger ones. Mother's and father's age at birth is very important for completion of basic education. Children born by relatively older women are more likely to complete basic education. Similarly, a father's age at birth of the child determines basic education completion. The Probit regression results in *Table A.7* show individuals in the bottom 20 percent of households are 7.6 percentage points less likely to complete BECE. The regression results also suggest mother's education and the number of siblings are also critical determining factors of BECE completion. Individuals with more siblings are less likely to complete BECE. A big family size may reduce the chances of a child for educational enrollment, probably because the available resources must be divided among more children.

118. **Bio-diversity—measured by Net Primary Productivity (NPP)⁷—also influences completion of basic education.** Since, especially in villages, children help their parents in farm activities, good soil fertility implies land will be cultivated, thereby stopping children completing basic education. This would be particularly important for households that expect children to be involved in child labor to support household income. Other significant factors associated with basic education completion include road density, Normalized Difference Vegetation index (NDVI)⁸, night time light, and precipitation. These factors probably affect households' vulnerability, which in turn affects basic education completion.

⁷ NPP is the total amount of carbon dioxide taken in by plants. The change in NPP over time is often used as a measure of land degradation. The losses of NPP can be caused by human-induced dryland degradation (Zika and Erb 2009). NPP is a better measure of biomass productivity (Xu et al. 2012).

⁸ Normalized Difference Vegetation Index (NDVI) is a satellite imagery-derived measure of “greenness”, or the relative density and health of vegetation, of the earth's surface. It specifies where and how much green vegetation is growing at a certain time.

Figure 4.6: BECE Completion Rate by Age

Source: GLSS 7

4.6. Factors associated with Senior Secondary School Enrollment

This section discusses factors associated with senior secondary school (SSS) enrollment among BECE graduates. The sample includes all individuals who have completed basic education with BECE qualification.

119. **Household resources (proxied by non-food and food consumption expenditure) are top factors associated with enrollment in senior secondary school.** A larger number of children in the household diminishes the probability that individuals will enroll in senior secondary school. Logit regression results indicate children in the bottom 20 percent of households are 10 percentage points less likely to enroll in senior secondary school even if they have completed BECE (). Access to electricity increases the probability of both completing BECE and enrollment of senior secondary school after BECE completion.

120. **Mother and father's ages at birth, number of senior secondary schools (availability of SSS), and number of children are major demographic factors affecting SSS enrollment.** Mother and father's ages at birth are very important for senior secondary enrollment. Children born by relatively older women and men are likely to enroll in senior secondary school. A larger number of children in the household diminishes the probability that individuals will enroll in senior secondary school. Logit regression results indicate children in the bottom 20 percent of households are 10 percentage points less likely to enroll in senior secondary school even if they have completed BECE (*Table A.7*). Access to electricity increases the probability of both completing BECE and enrollment of senior secondary school after BECE completion.

4.7. Heterogeneous Relationship between SEIP and Senior Secondary School Enrollment

121. **SEIP is associated with higher senior secondary school enrollment among children in the low and middle-income households as well as female students.** SEIP was implemented from the 2014/15 academic year. Causal forests are used to examine the heterogeneous relationship of SEIP and senior secondary school enrollment (*Table 4.2*). SEIP increased the senior secondary school enrollment rates by 2.3 percentage points on average. Low and middle-income households were the largest beneficiaries of SEIP—enrollment rates for bottom 20 and middle-income households improved by 2.7 and 2.8 percentage points, respectively. The project also benefited female students, as the enrollment rate among female students increased by 3.5 percentage points.

Table 4.2: Heterogeneous Effect of Secondary Education Improvement Project (SEIP)

	Average Treatment Effect	Standard error
Overall effect	0.023	0.006
Treatment group	0.024	0.010
Control group	0.023	0.011
Male	0.012	0.009
Female	0.035	0.010
Bottom 20	0.027	0.009
Middle	0.028	0.009
Top 20	0.004	0.020
Observations	6622	

4.8. Summary

122. **Ghana's completion rates of primary school and junior secondary school are considerably higher than its income and regional peers. However, its enrollment rates of senior secondary school are low compared with peers of similar income levels.** The disparity in school enrollment between rich and poor has shifted from primary to senior secondary schooling. The disparities in primary school enrollment rates between the bottom and top wealth quantiles narrowed between 1991 and 2016. However, the differences in enrollment at senior secondary school grew from 19 and 27 to 27 and 44 percentage points for girls and boys, respectively.

123. **Senior secondary school education is crucial to prepare Ghanaian youth to enter the job market as productive and skilled members of the workforce.** The analysis shows that senior secondary school education is a major factor associated with gaining wage employment, and economic returns to senior secondary school is sufficiently high. However, senior secondary school enrollment rates remain low, especially among teenagers in poor regions and poor households.

124. **Late completion of junior secondary school is a common problem among poor and wealthy children and hinders senior secondary school enrollment.** A large percentage of pupils from both rich and poor households do not complete basic education at the expected age of 15-16: only 11.7 per cent and 56.3 per cent of children from poor households and rich households complete junior secondary school education by age 16, respectively.

125. **Key factors associated with junior secondary school completion are ages of the children, household income, mother and father's age at birth, mother's education, household size, and birth interval.** Individuals in the bottom 20 percent of households are 7.6 percentage points less likely to complete BECE. Children born by relatively older women are more likely to complete basic education. Similarly, a father's age at birth of the child determines basic education completion. Mother's education and the number of siblings are also critical determining factors of BECE completion. Individuals with more siblings are less likely to complete BECE. A big family size may reduce the chances of a child for educational enrollment, probably because the available resources must be divided among more children.

126. **Household wealth is the top factors associated with enrollment in senior secondary school after successfully completing junior secondary school.** children in the bottom 20 percent of households are 10 percentage points less likely to enroll in senior secondary school even if they have completed BECE. This suggests scholarship is an effective policy intervention in promoting senior secondary school enrollment. Among girls age 15 to 19, poverty and teenage pregnancy are the major factors affecting school enrollment. Thus, scholarship may be more effective if it is targeted to girls.

127. **The World Bank has been providing funding to Ghana's Ministry of Education to implement several initiatives intended to improve senior secondary school attendance and completion among students from disadvantaged backgrounds in selected districts.** The main purpose of the World Bank sponsored program (SEIP) is to increase access to secondary education by targeting underserved districts and to improve the quality of secondary education in low performing senior secondary schools. The SEIP commenced in the 2014/15 academic year providing support in the form of infrastructural improvement in about 148 secondary schools in the country, scholarships to the needy, and quality improvements. The result suggests that low and middle-income households were the largest beneficiaries of SEIP—enrollment rate for low and middle-income households improved by 2.7 and 2.8 2.3 percentage points, respectively.

5. Learning at School

5.1. Introduction

128. **Basic knowledge and skills are key to prepare children to become skilled and productive workers.** However, a substantial fraction of children who complete primary and junior secondary school in developing countries fail to acquire basic skills and knowledge that are valued in the labor market (Filmer and Schady 2014). There is an urgent need to improve the quality of education in developing countries, including Ghana. Understanding factors that influence the quality of education and learning outcomes is critical for the Government of Ghana, so it can design effective school programs.

129. **This study focuses on reading and numeracy skills as the core cognitive skills, as they are critical skills to succeed in life.** The ability to read and understand texts is one of the most fundamental cognitive skills. Yet in many countries, children are unable to read and understand simple texts even if they are enrolled in school. A strong foundation in numeracy skills is important for academic success especially in mathematics, which is a skill in high demand when youth enter the job market. Children need to build a strong mathematics foundation while they are at primary and junior secondary schools, so they can succeed in senior secondary school and become competent members of the labor force.

130. **Investment in school could potentially improve academic outcomes in Ghana.** Balwanz and Darvas (2013) provide a list of factors that are positively and negatively associated with learning outcomes in Ghana. Among the school related factors with positive effects on test scores are the proportion of trained teachers, availability of textbooks, and the proportion of female teachers. The presence of high repetition dropout, multi-grade classrooms, and a high percentage of orphans are the factors that are negatively associated with test scores.

131. **There are strong and positive correlations between learning outcomes and parental involvement.** Studies from other countries suggest the role of parents and family involvement has strong impacts on learning outcomes (Ma et al. 2016). Behavioral involvement (such as visiting school and participating in educational affairs), home supervision (such as monitoring homework, limiting television and game time, and structuring time use), and home-school connection (establishing a channel of communication to contact schools for children's academic performance) are key to determining performance that explain learning outcomes.

132. **Based on the findings in previous studies, this chapter examines potential factors associated with learning outcomes (reading and numeracy skills) among children between age 7 and 14:** 1) household and parents' characteristics, 2) enrollment in the age-appropriate grade, 3) parents' involvement and learning environment at home, and 4) quality of school as shown in Figure 5.1.

Figure 5.1: Potential Factors associated with Learning (Age 7 to 14)

133. This chapter uses MICS 6 data collected in Ghana and Sierra Leone from 2017 to 2018, compares potential factors associated with reading and numeracy skills in the two countries, and examines how they are affecting the development of reading and numeracy skills. Sierra Leone is the first country which made the MICS 6 survey data at the micro level available in the world. The MICS 6 survey data from Ghana is not publicly available at the individual level at the time of writing this report. Thus, the report uses only aggregated data for Ghana for now and conducts detailed analysis for Sierra Leone. Once the Ghana MICS 6 data at the micro level becomes available, the report will include the analysis of micro level data analysis for Ghana.

5.2. Comparison with Sierra Leone

134. This section compares reading and numeracy skills among children age 7 to 14 in Ghana and Sierra Leone, using reading and numeracy test scores in MICS 6. Error! Reference source not found. contains all questions in reading and numeracy tests given to children age 7 to 14. Children who successfully completed all the three reading tasks are considered that they have reading skills. Children who successfully completed all four of the foundational number tasks are considered to have numeracy skills.

135. Ghanaian children's reading and numeracy skills fall below the average of children in Sierra Leone after age 12. The percentage of Ghanaian children who have reading and numeracy skills are not very different from the average in Sierra Leone until age 12. However, Ghanaian children's reading and numeracy skills become considerably lower than the average test scores of children in Sierra Leone from age 13. The gap after age 12 widens especially for numeracy skills.

Figure 5.2: Comparison of Reading and Numeracy Skill Development in Ghana and Sierra Leone

Source: Sierra Leone and Ghana MICS 6

136. **The quality of Ghanaian school is poorer in some dimensions compared with schools in Sierra Leone.** More schools in Sierra Leone make the information of children's school performance available to parents, compared with schools in Ghana. Figure 5.3 shows a higher proportion of parents in Sierra Leone receive report cards of their children's performance from school in all child ages, compared with Ghanaian parents. In particular, Ghanaian parents of children above 11 years old are significantly less likely to receive report cards from school. As shown in Section 4.5, whether parents receive report cards from school is one of the leading factors associated with reading skills for children between 12 and 14 in Sierra Leone. In addition, fewer Ghanaian parents discuss children's academic progress with teachers, compared with parents in Sierra Leone. Ghanaian parents of children above 11 years old are substantially less likely to discuss children's progress with teachers. Analytical results in Section 4.5 indicate whether parents and teachers discuss children's academic performance is an important determining factor of reading skill development among children age 12 and 14, as well as numeracy skills among children 7 to 11 years old. On the other hand, teacher absence is more severe in Sierra Leone than in Ghana. In addition, Ghanaian schools are more likely to give homework to children. As shown in Section 4.5, homework is a critical factor associated with cognitive development.

137. **Ghanaian parents create more favorable learning environments for children than parents in Sierra Leone. However, fewer parents help with homework, especially if children are more than 10 years old.** Ghanaian parents are more likely to provide books to children and help children with homework up to 10 years old. However, beyond age 10, parents in Sierra Leone are more involved in supporting children with homework than parents in Ghana. As homework is one of the most critical factors affecting cognitive skill development, it may be affecting low reading and numeracy performance of Ghanaian children after age 12.

Figure 5.3: Comparison of Learning Environments in Ghana and Sierra Leone

Source: Sierra Leone and Ghana MICS 6

5.3. Gaps in Learning Outcomes and Learning Environments by Region and Wealth in Ghana

138. **Children in poor regions and poor households have considerably lower reading and numeracy skills.** In Greater Accra, 48.3 percent and 19.4 percent of children age 7 to 14 have reading and numeracy skills, respectively. On the other hand, only 6.2 percent and 4.5 percent of children in Northern region have attained reading and numeracy skills, respectively. There are also wide disparities in reading and numeracy skills between children in poor households and rich households. 48.8 percent and 21 percent of children in the richest 20 percent of households have reading and numeracy skills, while only 4.9 percent and 3.5 percent of children in the poorest 20 percent of households have attained reading and numeracy skills.

Figure 5.4: Percentages of Children with Reading and Numeracy Skills by Region and Wealth Quantile

Source: Ghana MICS 6

139. **Children in poor households are disadvantaged by poor learning environments.** Children in poor households are more likely to be working and receiving fewer homework assignments compared with children in rich households. In addition, parents and teachers are less likely to discuss their performance. Furthermore, parents in poor households are less likely to help with children's homework, get involved in school activities, and receive report cards of children's academic performance from school.

Figure 5.5: Comparison of Learning Environments across Wealth Quantile in Ghana

Source: Ghana MICS 6

5.4. Determining Factors of Learning: Case of Sierra Leone

This section presents analytical results of determining factors of reading and numeracy skill development in Sierra Leone. The sample for the analysis is all children age 7 to 14, regardless of their school enrollment status. Thus, some children are enrolled in primary school, junior secondary school or not attending school. As soon as Ghana MICS 6's micro-level data becomes available, the analytical results from Ghana will be incorporated in this section.

140. **Like Ghana, children in poor households are disadvantaged by poor learning environments.** Children in poor households are more likely to be working (both as child laborers and helping with housework), have limited access to books, and their teachers are more likely to be absent from school. They receive less homework compared with children in richer households. In addition, parents and teachers of poor children are less likely to discuss children's academic performance. Furthermore, parents in poor households are less likely to help with children's homework, get involved in PTA activities, and receive report cards on children's academic performance from school.

Figure 5.6: Comparison of Learning Environments by Income Groups in Sierra Leone

Source: Sierra Leone MICS 6

141. Based on the findings in previous studies, this section examines correlation between reading and numeracy skills with following factors: 1) household and parents' characteristics, 2) enrollment in the age-appropriate grades, 3) parents' involvement and learning environments at home, and 4) quality of school.

Household and parents' characteristics

142. **Wealth, child labor, relationship with household heads are leading factors associated with reading and numeracy skill development.** Wealth is an important factor associated with both reading and numeracy skills. Wealth perhaps represents opportunities -- better learning environments children enjoy in wealthy households. Child labor hinders numeracy skill development among children age between 7 and 11, as they take time away from children going to school, doing homework and engaging in other learning activities. Living in urban areas is also very important for gaining reading and numeracy skills. It may represent better access to school. Children who are not biological children of the household heads are less likely to attain reading skills. For children age 7 to 11, living with mothers is a critical factor associated with both reading and numeracy skill development.

Parents' involvement and learning environment at home

143. **Parents' help with homework, number of books, and parents' involvement in school events are all leading factors associated with reading and numeracy skill development.** When parents help children between age 7 to 11 with homework, it increases the probability of the child attaining reading skills and numeracy skills by 2.7 percentage points and 3.3 percent points, respectively. If parents attend school events regularly, it increases the probability of gaining numeracy skills by 3.2 percentage points and 5.1 percentage points for children age 7 to 11 and age 12 to 14, respectively. If parents participate in PTA activities, it likely to increase the probability that children develop adequate reading skills. Parents' involvement in school events may be sending children positive signals that they need to take learning and school work seriously. A number of books available for children is strongly correlated with reading skills.

Enrollment in the age-appropriate grade

144. **For children between age 12 and 14, whether they are attending junior secondary school or not is an important factor in achieving both reading and numeracy skill development.** Children between age 12 and 14 are officially junior secondary school age, however, many children age 12 to 14 are still enrolled in primary school. *Table A.8* and *Table A.9* in the Appendix show that the probability of attaining reading and numeracy skills among children age 12 to 14 is higher if they are enrolled in junior secondary school by 20.4 and 10.4 percentage points, respectively. The analysis does not tell us causality; whether children have higher reading and numeracy skills because they are enrolled in junior secondary school, or children are enrolled in junior secondary school because they have high reading and numeracy skills.

Quality of school

145. **Schools issuing report cards of children's academic performance for parents, having meetings with parents to discuss children's performance, and providing homework to children are all crucial factors affecting reading and numeracy skill development.** Children age 7 to 11 and 12 to 14 who receive homework from school are more likely to attain reading skills by 8.4 percent points and 13.2 percentage points, respectively. Similarly, children age 7 to 11 and 12 to 14 who receive homework from school are more likely to develop adequate numeracy skills by 5.1 percent points and 7.4 percentage points, respectively. Children age 7 to 11 and 12 to 14 whose parents receive report cards of children's academic performance are more likely to attain reading skills by 3.1 and 11.1 percent points, respectively. Issuance of report cards is also positively associated with the development of numeracy skills among children age 7 to 11. Discussion of children's performance between teachers and parents significantly increase the probability that children develop sufficient reading skills.

146. **Quality of school has heterogenous impacts on skill development among children in poor and rich households.** Homework assignments are effective in development reading and numeracy skills among children both in rich and poor households. Report cards of children's academic performance issued to parents are particularly more effective in improving numeracy skills among children in rich households. Teacher absence does not have significant effects on average; however, it has significant impacts only on children in wealthy households, as it discourages reading and numeracy skill development among children in wealthy households. Teacher absence may not have significant impacts on cognitive development among children in poor and medium income households because there are many other issues that affect their learning.

Figure 5.7: Heterogeneous Impacts of Homework, Report Card and Teacher Absence (Causal Forests)⁹

5.5. Summary

147. **Basic knowledge and skills are key to prepare children to become skilled and productive workers.** This report shows Ghanaian children's reading and numeracy skills fall below the average of children in Sierra Leone after age 12. The percentage of Ghanaian children who have reading and numeracy skills are not very different from the average in Sierra Leone until age 12. However, Ghanaian children's reading and numeracy skills become considerably lower than the average test scores of children in Sierra Leone from age 13. The gap after age 12 widens especially for numeracy skills.

148. **The quality of Ghanaian school is poorer in some dimensions compared with schools in Sierra Leone.** Schools in Sierra Leone better communicate with parents compared with schools in Ghana. More schools in Sierra Leone make the information of children's school performance available to parents by issuing report cards, compared with schools in Ghana. As shown in analysis for Sierra Leone, whether parents receive report cards from school is one of the leading factors associated with reading skills for children between 12 and 14 in Sierra Leone. In addition, fewer Ghanaian parents discuss children's academic progress with teachers, compared with parents in Sierra Leone. Analytical results from Sierra Leone indicate whether parents and teachers discuss children's academic performance is an important determining factor of reading and numeracy skill development. On the other hand, teacher absence is more severe in Sierra Leone than in Ghana. In addition, Ghanaian schools are more likely to give homework to children.

149. **Ghanaian parents create more favorable learning environments for children than parents in Sierra Leone. However, fewer parents help with homework, especially if children are more than 10 years old.** Children in poor households are particularly disadvantaged by poor learning environments in Ghana. Children in poor households are more likely to be working and receiving fewer homework assignments compared with children in rich households. In addition, parents and teachers are less likely to discuss

⁹ This analysis is conducted using only children who attend schools.

children’s academic performance. Furthermore, parents in poor households are less likely to help with children’s homework, get involved in school activities, and receive report cards of children’s academic performance from school. Research findings from both Ghana and Sierra Leone indicate parents’ involvement and learning environments are key factors associated with learning outcomes.

6. ICT skills

6.1. Introduction

150. **ICT skills are also important in preparing youth to become productive labor workers and increase income. This chapter examines computer skill development among youth.** According to the Employers Association’s Skills Gap Survey (Darvas et al. 2017), the largest share of employers (47 %) in the formal private sector reported computer and information technology (ICT) skills as lacking among existing employees, followed by teamwork skills (43 %). This suggest ICT skills are one of the most important skills for youth to acquire so they can become competitive labor force. This chapter demonstrates the importance of ICT skills in gaining wage employment in the formal sector and shows that ICT skill development widely differ across educational levels, regions and income groups.

Figure 6.1: Private Sector’s Demand for Skills

Source: Darvas et al. (2017)

6.2. Return to ICT skills

151. **33.8 percent of Ghanaian youth adults age 15 to 30 can use computers for various activities. People with ICT skills are less likely to be poor, and more likely to gain wage employment than people without ICT skills.** This section presents the evidence that there are great economic returns to ICT skills.

152. Figure 6.2 shows there is strong correlation between ICT skills and wealth. 59.4 percent of people age 15 to 30 have ICT skills while only 8.3 percent of people age 15 to 30 have ICT skills. There are regional differences on the use of computers. In Greater Accra, 55.1 percent of young adults can use computers, compared to 9.1 percent in the Northern Region. ICT skills also differ across people of varying educational

attainment. 83.9 percent of youth with tertiary or post-secondary education have ICT skills compared with 11.5 percent of youth with only primary education.

Figure 6.2: ICT Skills by Wealth, Educational Level and Region among People between Age 15 and 30

Source: GLSS 7

153. **ICT skills are good predictor of poverty.** As shown in *Table A.5* in the Appendix, people with ICT skills are 9.7 percentage points less likely to be poor, after controlling for all other factors. People who frequently used Microsoft office (word and excel), regularly send emails, create electronic presentations, and install devices are 9.8 percent, 9.6 percent, 12.5 percent and 9.1 percentage points less likely to be poor compared with people who do not have these computer skills. It implies these are the essential computer skills for youth to gain for escaping poverty.

154. **ICT skills help youth gain wage employment.** The majority of young adults with ICT skills work in wage employment—55.8 per cent of people with ICT skills work as wage employees. On the contrary, only 3.4 percent of people with ICT skills are in the agricultural sector. In private wage employment, only 2.2 percent of individuals with no ICT work there, compared with 17.8 percent of individuals with ICT skills. As shown in *Table A.6* in the appendix, people with ICT skills are 11.1 percentage points more likely to gain wage employment.

Figure 6.3: Sectors of Employment by ICT Skills

Source: GLSS 7

155. **Multiple ICT skills are strongly associated with wage employment.** People who frequently use these essential computers and perform many activities are more likely to work in wage employment (*Table A.6*

in the Appendix). Workers who use computers to perform nine different activities were 27.3 percentage points more likely to work as wage employees than identical workers who did not use computers. However, workers who use computers to perform only one single task were only 7.1 percentage points more likely to be wage employees than workers who do not use computers. People who engage in programming activities are 12.5 percentage points more likely to get wage employment than those who do not engage in programming activities.

6.3. Summary

156. **ICT skills are important in preparing youth to become productive labor workers and increase income.** ICT skills are the most wanted skills by employers in the formal private sector. The analysis in this chapter demonstrates ICT skills help youth gain wage employment and escape from poverty. However, there are regional differences on the use of computers. In Greater Accra, 55.1 percent of young adults can use computers, compared to 9.1 percent in Northern Region. Moreover, a higher proportion of youth in the top 20 of the wealth quantiles have ICT skills (59.4 percent) compared with 8.3 percent in the bottom 20 percent. ICT skills also differ across people of varying educational attainment. 83.9 percent of youth with tertiary or post-secondary education have ICT skills compared with 11.5 percent of youth with only primary education.

7. Gender Gap

7.1. Early Childhood Development (Children Under Age 5)

157. **Boys suffer disproportionately from undernutrition compared to girls.** The stunting rate for boys under age 5 is 3.5 percentage points higher than that of girls (Figure 7.1), as the stunting rates for boys and girls are 20.7 percent and 17.2 percent, respectively. A meta-analysis from 84 countries reports that stunting is usually more prevalent among boys than girls under age 5 (Khara et al. 2018).

Figure 7.1: Stunting Rates by Gender

Source: 2014 DHS

158. **Girls do better in cognitive development.** 45.5 percent of girls under age 5 are developmentally on track in the domain of literacy and numeracy, while 42.2 percent of boys are developmentally on track. It suggests girls under age 5 do better than boys not only in physical development but also in cognitive development.

Figure 7.2: Percentage of Children Who are Developmentally on Track by Gender

Source: Ghana MICS 6

7.2. School Enrollment

159. **Gender equality is important not only for providing equal opportunities to girls but also for economic growth.** A meta-analysis study (Minasyan et al. 2019) and cross-sectional data from 96 countries (Goodwin et al. 2017) show educational gender equality is significantly correlated with economic growth.

160. **Girls' enrollment rates in primary school and junior secondary school are higher than boys in most regions.** Girls' enrollment rates in primary school are higher than boys in most regions, except for Greater Accra, Ashanti, and Northern regions. In Western and Volta regions, girls' enrollment rates at primary school are 10 percentage points and 8 percentage points higher than the enrollment rates of boys. Girls' enrollment rates at junior secondary school exceed that of boys in nine out of ten regions (except for Northern region). In Greater Accra, Eastern and Upper East regions, the enrollment rates of girls are 13 percent, 15 percent and 13 percentage points higher than the enrollment rates of boys.

161. **Except for Western, Volta, Upper East and Northern regions, boys' enrollment in senior secondary school is higher than girls.** This is in sharp contrast with the pattern of gender difference in enrollment rates in primary and junior secondary school where girls' enrollment rates generally exceed that of boys. Note more girls attend senior secondary school than boys in three out of four poorest regions (Volta, Upper East and Northern).

Figure 7.3: School Enrollment Rates by Gender and by Region

Source: GLSS 7

162. **Among girls age 15 to 19, poverty and teenage pregnancy are the major factors affecting school enrollment.** Probit model regressions are conducted to examine the relationship between teenage pregnancy and other factors and girls' school enrollment (*Table A.10*). The regression results suggest teenage pregnancy decreases the probability of girls' school enrollment by 27 percent points. Girls in the bottom 20 percent of households are 7.7 percentage points less likely to enroll in school. As discussed in Section 4.7, The World Bank's SEIP, which provides scholarship to disadvantaged students, was effective in increasing the enrollment rate of senior secondary school by 3.5 percentage points.

7.3. Learning (Age 7 to 14)

163. **Girls perform better than boys in reading for most age groups, however, girls underachieve in numeracy tests.** Average reading scores for both boys and girls positively associated with age. There is a substantial decline of boys' reading scores around age 13. In contrast, average reading scores of girls witness a constant increase between age 12 to 14. In contrast to reading skills, boys perform better than girls in numeracy skills in almost all the age groups. The percentage of girls with numeracy skills stagnate after age 12.

Figure 7.4: Percentages of Children 7 To 14 with Reading and Numeracy Skills by Gender

Source: Ghana MICS 6

164. **In most regions, girls outperform boys in reading, and boys outperform girls in numeracy skills.** However, girls outperform boys in both reading and numeracy skills in Upper East and Upper West regions. This implies that girls in these poorest two regions have great potential to succeed academically if financial constraints are released.

Figure 7.5: Percentages of Children 7 To 14 with Reading and Numeracy Skills by Gender and Region

Source: Ghana MICS 6

7.4. ICT skills and job market

165. There are substantial gender differences in Information and Communication Technology (ICT) skills and the probability of women gaining wage employment. 39.4 percent of males between age 15 and 30 have acquired ICT skills compared to 22.3 percent of females (Figure 7.6). As a result, about 63.2 percent of the ICT skills knowledgeable population are males with the remaining 32.8 percent being females. After controlling for ICT skills and other factors, women are 11.1 percentage points less likely to gain wage employment (*Table A.6* in the Appendix).

Figure 7.6: ICT Skills by Gender

Source: GLSS 7

7.5. Summary

166. Girls do better both in physical and cognitive development under age 5, and they are more likely to be enrolled in primary and junior secondary school. 45.5 percent of girls under age 5 are developmentally

on track in the domain of literacy and numeracy, while 42.2 percent of boys are developmentally on track. Girls' enrollment rates in primary school are higher than boys in most regions, except for Greater Accra, Ashanti, and Northern regions. In Western and Volta regions, girls' enrollment rates at primary school are 10 percentage points and 8 percentage points higher than the enrollment rates of boys. However, girls are less likely to enroll in senior secondary school than boys.

167. **However, teenage girls between age 15 and 19 are less likely to enroll in school than boys.** Among girls age 15 to 19, poverty and teenage pregnancy are the major factors affecting school enrollment. Girls in the bottom 20 % and experience of pregnancy decrease the probability of girls staying in school by 7.7 percentage points and 27 percentage points, respectively.

168. **There are substantial gender gaps in ICT skill development and the probability of women gaining wage employment.** 39.4 percent of males between age 15 and 30 have acquired ICT skills compared to 22.3 percent of females. As a result, about 63.2 percent of the ICT skills knowledgeable population are males with the remaining 32.8 percent being females. After controlling for ICT skills and other factors, women are 11.1 percentage points less likely to gain wage employment.

8. Conclusion

169. **This report examined human capital development throughout a life cycle in Ghana.** To understand the underlying causes of critical challenges of human capital development, the study attempted to answer the following questions:

- 1) What are the determining factors of the gap in stunting across regions and wealth groups? Are policy interventions effective in reducing the gap?
- 2) Are children under age 5 getting ready to learn?
- 3) Are children acquiring real learning in the classroom? What determines reading and numeracy skill development? Are Ghanaian parents and teachers doing enough to help children learn?
- 4) What hinders teenagers from enrolling in senior secondary school? Are students prepared to enter the job market as skilled and productive adults? Are they gaining important skills, such as computer skills?
- 5) How do gender gaps in educational attainment and employment emerge? What are the constraints for girls to continue education and succeed in the job market?

170. **The following four factors are strongly correlated with children under age 5 growing up well-nourished:** 1) household and parents' characteristics, 2) anthropometric characteristics of mothers, 3) adequate care, and 4) access to health services. Accessibility to CHPS and clinics within communities increases the probability of children receiving medical treatments when they get sick. The impact of access to CHPS and clinics is strongest among children in the lowest income group. This indicates access to CHPS and clinics disproportionately help poor children. If a child has NHIS membership, his/her chance of receiving medical treatments further increases by 2.2 percent points.

171. **Early childhood education is extremely important, as it substantially impacts various outcomes in later life, such as skill development, academic achievement, health, and income.** Ghana has shown substantial commitment to improving early childhood education. Ghanaian children under age 5 are more

developmentally on track than children in Sierra Leone. Ghanaian children are more likely to be enrolled in preschool than children in Sierra Leone. Ghanaian parents are more engaged in activities with children and provide more books and toys to their children compared with parents in Sierra Leone. However, there are large differences across regions and income groups, and children in wealthy households have better learning environments than children in poor households.

172. **Ghana's completion rates of primary school and junior secondary school are considerably higher than its income and regional peers. However, its enrollment rates of senior secondary school (SSS) are low compared with peers of similar income levels.** The analysis in this report shows that SSS factor associated with gaining wage employment, and economic returns from senior secondary school is sufficiently high. However, the senior secondary school enrollment rates remain low, especially in poor areas and among children in poor households. Children in the bottom 20 percent of households are 10 percentage points less likely to enroll in SSS even if they have completed BECE. Mother and father's ages at birth, number of senior secondary schools (availability of SSS), and number of children are major demographic factors affecting SSS enrollment.

173. **Ghanaian children's reading and numeracy skills fall below the average of children in Sierra Leone after age 12.** Ghanaian parents create more favorable learning environments for children than parents in Sierra Leone in general. However, fewer Ghanaian parents help with children's homework, especially if children are more than 10 years old. Children in poor households are particularly disadvantaged by poor learning environments. Children in poor households are more likely to be working and receiving fewer homework assignments compared with children in rich households. In addition, parents and teachers are less likely to discuss children's academic performance. Furthermore, parents in poor households are less likely to get involved in school activities and receive report cards of children's academic performance from school or discuss children's performance with teachers.

174. **33.8 percent of Ghanaian youth adults between age 15 to 30 can use computers. People with ICT skills are less likely to be poor, and more likely to gain wage employment than people without ICT skills.** There is strong correlation between ICT skills and wealth. 59.4 percent of people age 15 to 30 have ICT skills while only 8.3 percent of people age 15 to 30 have ICT skills. There are also regional differences on the use of computers. In Greater Accra, more than half of young adults can use computers, compared to less than 10 percent in the Northern Region. ICT skills also differ across people of varying educational attainment. These results imply the disparity in ICT skill development between youth in rich and poor households as well as rich and poor regions can further widen economic opportunities and income across regions and income groups.

175. **Girls do better both in physical and cognitive development under age 5, and they are more likely to be enrolled in primary and junior secondary school. However, teenage girls between age 15 and 19 are less likely to enroll in school than boys.** Among girls age 15 to 19, poverty and teenage pregnancy are the major factors affecting school enrollment. Girls in the bottom 20 % and experience of pregnancy decrease the probability of girls staying in school by 7.7 percentage points and 27 percentage points, respectively.

176. **There are substantial gender gaps in ICT skill development and the probability of women gaining wage employment.** 63.2 percent of the ICT skills knowledgeable population are males with the remaining 32.8 percent being females. After controlling for ICT skills and other factors, women are 11.1 percentage points less likely to gain wage employment.

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Appendix

Table A.1: Factors Associated with Stunting (Logit Model Regression)

	Stunting: Logit		
	Marginal effect	Standard error	P-value
Wealth index	-0.009	0.017	0.576
NHIS	-0.007	0.016	0.664
Ever breastfed	-0.009	0.020	0.647
Number of antenatal visits during pregnancy	-0.005	0.003	0.115
Baby postnatal check within 2 months	0.010	0.019	0.615
program_help_pregnant	-0.018	0.019	0.335
Receive vitamin A recently	-0.023	0.015	0.133
Child age	0.000	0.000	0.595
Urban	0.002	0.021	0.916
Household size	0.005	0.003	0.160
Number of children	-0.004	0.010	0.675
Time to fetch water	0.000	0.000	0.978
Time to fetch water-unknown	0.006	0.032	0.846
Head-male	-0.049	0.021	0.020
Head's age	-0.001	0.001	0.468
Birth interval	0.000	0.004	0.985
Number of siblings	0.014	0.006	0.019
Mother's weight	-0.004	0.001	0.000
Mother's height	-0.007	0.001	0.000
Mother's years of education	-0.007	0.002	0.003
Father-alive	0.041	0.045	0.362
Father's years of education	0.001	0.002	0.725
Never vaccinated	-0.063	0.057	0.267
Vaccination-BCG	0.016	0.039	0.676
Vaccination-DPT	-0.003	0.014	0.816
Vaccination-Measles	-0.010	0.015	0.494
Vaccination-Polio	0.011	0.012	0.380
Vaccination-ROTA	-0.022	0.010	0.034
Vaccination-Yellow fever	-0.040	0.027	0.134
Access to market	0.000	0.000	0.919
Drought	0.007	0.005	0.116
Flood	0.001	0.003	0.801
NDVI	-0.004	0.117	0.972
Precipitation	0.000	0.003	0.899
Road density	0.001	0.002	0.487
Soil erosion	-0.002	0.002	0.282
Had diarrhea during the last 2 weeks	-0.049	0.084	0.562
Had no treatment in diarrhea	0.030	0.088	0.737
Had medical treatment in diarrhea	0.019	0.085	0.823
Had ORS in diarrhea	0.040	0.037	0.275
Had no treatment in fever or cough	-0.004	0.038	0.917
Had medical treatment in fever or cough	-0.073	0.036	0.041
Had fever or cough during the last 2weeks	0.021	0.028	0.464

Knowledge about iodized salt	-0.055	0.019	0.003
Enough iodine in salt	0.003	0.020	0.887
Have food including vitamin A	0.010	0.006	0.100
Male	0.037	0.014	0.009
Relationship: adopted or fostered	0.091	0.051	0.073
Relationship: grandchild	0.028	0.030	0.349
relationship: other relative	-0.045	0.044	0.312
Age in years dummy: 0	-0.166	0.093	0.072
Age in years dummy: 1	0.027	0.070	0.699
Age in years dummy: 2	0.113	0.050	0.024
Age in years dummy: 3	0.064	0.033	0.048
Ethnicity: gadangme	-0.042	0.045	0.355
Ethnicity: ewe	-0.038	0.033	0.250
Ethnicity: guan	-0.056	0.047	0.233
Ethnicity: moledagbani	-0.099	0.032	0.002
Ethnicity: grusi	-0.101	0.047	0.032
Ethnicity: gurma	-0.111	0.036	0.002
Ethnicity: mande	0.085	0.073	0.244
Ethnicity: other	-0.033	0.070	0.640
Religion: anglican	-0.106	0.100	0.289
Religion: methodist	-0.038	0.040	0.339
Religion: presbyterian	0.017	0.043	0.702
Religion: pentecostal charismatic	0.038	0.023	0.100
Religion: other christian	0.033	0.030	0.282
Religion: islam	0.015	0.031	0.632
Religion: traditional spiritualist	-0.015	0.036	0.688
Religion: no religion	0.057	0.036	0.112
Survey month: 10	-0.023	0.020	0.240
Survey month: 11	0.036	0.022	0.091
Survey month: 12	-0.012	0.029	0.693
Central	0.050	0.045	0.261
Greater Accra	0.073	0.067	0.277
Volta	0.033	0.064	0.610
Eastern	0.023	0.045	0.603
Ashanti	-0.006	0.041	0.884
Brong Ahafo	0.015	0.052	0.781
Northern	0.168	0.080	0.035
Upper East	0.044	0.081	0.588
Upper West	0.142	0.089	0.112
Observations	3,262		
Pseudo R2	0.192		

Table A.2: Factors Associated with Learning Age Under 5 in Ghana, MICS4 (Logit Model Regression)

	Marginal effect	Standard error	P-value
Household size	-0.001	0.005	0.855
Urban	0.025	0.029	0.385
Head-male	0.013	0.033	0.699
Head's age	-0.000	0.001	0.994
Wealth index	0.077	0.024	0.001
Electricity	0.010	0.032	0.765
Age	0.000	0.000	0.000
Stunting	-0.102	0.030	0.001
Parent's involvement	0.155	0.096	0.108
Attend preschool	0.442	0.099	0.000
Have books	0.088	0.029	0.002
Toy	-0.113	0.046	0.013
Mother has attended school	0.081	0.028	0.004
Mother alive	-0.098	0.083	0.234
Father alive	0.175	0.087	0.044
Region: western	-0.003	0.053	0.961
Region: central	0.048	0.048	0.314
Region: volta	-0.004	0.065	0.950
Region: eastern	-0.082	0.054	0.126
Region: ashante	-0.065	0.052	0.213
Region: brong ahafo	-0.020	0.054	0.711
Region: northern	0.139	0.059	0.019
Region: upper east	0.125	0.063	0.047
region_upper_west	0.118	0.064	0.066
ethnicity: gadangme	-0.008	0.053	0.880
ethnicity: ewe	-0.005	0.046	0.905
ethnicity: guan	-0.001	0.059	0.993
ethnicity: gruma	-0.001	0.056	0.984
ethnicity: mole dagbani	-0.037	0.050	0.459
ethnicity: grusi	-0.105	0.064	0.099
ethnicity: mande	0.025	0.095	0.792
ethnicity: nonghanaian	-0.037	0.093	0.688
ethnicity: others	-0.202	0.097	0.037
religion: catholic	-0.092	0.066	0.168
religion: deeper_life	-0.060	0.148	0.685
religion: jehovah witness	0.010	0.104	0.926
religion: muslim	-0.117	0.069	0.092
religion: other religion	-0.157	0.074	0.034
religion: penticostalcharismati	-0.094	0.061	0.123
religion: protestant	-0.067	0.065	0.304
religion: sda	0.019	0.081	0.817
religion: spritualist	0.007	0.085	0.936
religion: traditional	-0.282	0.074	0.000
Male	-0.027	0.022	0.236
Relationship: adopted / foster	-0.288	0.158	0.068
Relationship: other not related	0.191	0.116	0.100
Relationship: grandchild	0.026	0.039	0.511
Interaction: parent's involvement & preschool	-0.209	0.105	0.046
Observations	2,552		
Pseudo R2	0.308		

Table A.3: Factors Associated with School Enrollment (Logit Model Regression)

	School enrollment					
	Age 07-12			Age 13-15		
	Marginal effect	Standard error	P-value	Marginal effect	Standard error	P-value
Child age	-0.001	0.003	0.668	-0.041	0.008	0.000
Urban	-0.012	0.011	0.291	-0.031	0.018	0.083
Wealth Index	0.002	0.001	0.005	0.003	0.001	0.005
Household size	-0.002	0.002	0.314	-0.004	0.003	0.135
Number of children	-0.005	0.005	0.328	-0.013	0.008	0.116
Head-male	-0.021	0.015	0.152	0.035	0.019	0.072
Head's age	-0.001	0.000	0.220	-0.001	0.001	0.055
Birth interval	0.001	0.002	0.633	0.004	0.003	0.113
Number of siblings	-0.006	0.004	0.096	-0.004	0.005	0.411
Mother's years of education	0.004	0.001	0.013	-0.006	0.002	0.007
Father's years of education	0.007	0.002	0.000	0.001	0.002	0.596
Access to market	0.001	0.000	0.000	0.001	0.000	0.000
Drought	0.009	0.003	0.008	-0.004	0.004	0.355
Flood	-0.008	0.002	0.000	-0.013	0.003	0.000
NDVI	0.156	0.076	0.041	0.089	0.116	0.443
NPP	-0.688	0.103	0.000	-0.172	0.146	0.241
Precipitation	0.019	0.002	0.000	0.016	0.003	0.000
Road density	0.007	0.001	0.000	0.008	0.002	0.000
Soil erosion	0.003	0.001	0.016	-0.006	0.002	0.000
Male	-0.001	0.009	0.873	0.036	0.013	0.007
Relationship: adopted or foster	0.013	0.032	0.681	-0.014	0.036	0.694
Relationship: brother / sister	0.007	0.040	0.866	-0.099	0.050	0.048
Relationship: grandchild	-0.007	0.020	0.732	-0.073	0.030	0.016
Relationship: not relative	-0.069	0.040	0.083	-0.111	0.047	0.018
Relationship: other relative	-0.015	0.021	0.478	-0.086	0.025	0.001
Ethnicity: gadangme	-0.047	0.025	0.056	-0.014	0.033	0.671
Ethnicity: ewe	0.041	0.023	0.075	0.013	0.029	0.639
Ethnicity: guan	-0.089	0.028	0.002	0.010	0.044	0.820
Ethnicity: moledagbani	0.051	0.023	0.029	0.020	0.030	0.495
Ethnicity: grusi	0.003	0.029	0.921	-0.027	0.039	0.490
Ethnicity: gurma	-0.066	0.023	0.004	-0.062	0.033	0.063
Ethnicity: mande	0.010	0.053	0.849	0.023	0.058	0.697
Ethnicity: other	-0.202	0.035	0.000	-0.106	0.045	0.017
Religion: anglican	0.145	0.052	0.005	-0.102	0.081	0.207
Religion: methodist	0.005	0.026	0.847	0.026	0.037	0.473
Religion: presbyterian	0.065	0.026	0.014	-0.007	0.038	0.858
Religion: pentecostal						
charismatic	0.039	0.015	0.011	-0.005	0.023	0.817
Religion: other Christian	0.025	0.018	0.177	-0.039	0.028	0.159
Religion: Islam	0.010	0.019	0.602	-0.107	0.026	0.000
Religion: traditional spiritualist	0.011	0.022	0.612	-0.024	0.039	0.541
Religion: no religion	-0.029	0.023	0.220	-0.028	0.038	0.460
Central	-0.313	0.048	0.000	-0.141	0.049	0.004

Greater Accra	0.181	0.060	0.003	0.280	0.071	0.000
Volta	0.243	0.058	0.000	0.479	0.058	0.000
Eastern	0.103	0.052	0.049	0.306	0.047	0.000
Ashanti	0.042	0.052	0.415	0.140	0.049	0.004
Brong Ahafo	0.229	0.056	0.000	0.522	0.052	0.000
Northern	0.233	0.064	0.000	0.555	0.061	0.000
Upper East	0.080	0.088	0.361	0.549	0.065	0.000
Upper West	-0.003	0.094	0.972	0.538	0.066	0.000
Ever married				-0.218	0.094	0.021
Observations	7813			3682		
Pseudo R2	0.172			0.149		

Table A.4: Factors Associated with Children Attending School at Appropriate Grade (Logit Model Regression): Children currently enrolled in school only

	Appropriate grade (children attending school)					
	Age 07-12			Age 13-15		
	Marginal effect	Standard error	P-value	Marginal effect	Standard error	P-value
Frequency of reading books	0.014	0.014	0.334	-0.007	0.025	0.776
Have books	0.046	0.014	0.001	0.039	0.026	0.140
Participate in PTA	0.013	0.017	0.453	0.009	0.025	0.714
Discuss progress with teacher	-0.022	0.015	0.146	0.015	0.025	0.534
Help child with homework	0.027	0.013	0.045	0.015	0.024	0.538
Child age	-0.030	0.004	0.000	-0.060	0.012	0.000
Urban	0.008	0.015	0.594	0.004	0.026	0.888
Wealth Index	0.009	0.001	0.000	0.011	0.002	0.000
Household size	0.001	0.002	0.762	-0.007	0.004	0.093
Head-male	-0.028	0.017	0.096	-0.021	0.028	0.454
Head's age	0.002	0.001	0.000	0.002	0.001	0.059
Road density	-0.000	0.001	0.972	0.005	0.002	0.006
Number of siblings	-0.015	0.005	0.001	-0.024	0.007	0.001
Mother's years of education	0.015	0.002	0.000	0.018	0.003	0.000
Father's years of education	0.004	0.002	0.036	0.008	0.003	0.004
Read books to child	0.024	0.016	0.134	-0.013	0.025	0.609
Encourage child to read books	-0.032	0.018	0.078	0.059	0.033	0.072
Tell child their expectation	0.034	0.017	0.045	-0.008	0.030	0.782
Provide lamp with child	0.016	0.013	0.210	-0.011	0.022	0.635
Male	-0.014	0.011	0.218	-0.022	0.020	0.253
Ethnicity: gadangme	-0.081	0.028	0.003	-0.010	0.054	0.847
Ethnicity: ewe	-0.003	0.026	0.898	-0.011	0.043	0.803
Ethnicity: guan	0.011	0.038	0.770	-0.027	0.053	0.611
Ethnicity: moledagbani	-0.064	0.023	0.006	-0.044	0.040	0.278
Ethnicity: grusi	-0.084	0.033	0.010	0.001	0.048	0.987
Ethnicity: gurma	-0.023	0.027	0.402	-0.018	0.051	0.731
Ethnicity: mande	-0.031	0.053	0.552	-0.286	0.079	0.000
Ethnicity: other	-0.099	0.054	0.068	0.108	0.089	0.227
Religion: anglican	0.196	0.074	0.008	-0.171	0.124	0.168
Religion: methodist	-0.048	0.035	0.167	-0.144	0.057	0.011
Religion: presbyterian	-0.016	0.042	0.708	-0.012	0.051	0.815
Religion: pentecostal						
charismatic	-0.042	0.017	0.016	0.003	0.031	0.935
Religion: other christian	-0.049	0.021	0.021	-0.032	0.038	0.396
Religion: islam	-0.024	0.023	0.296	0.036	0.037	0.327
Religion: traditional spiritualist	-0.082	0.028	0.003	-0.072	0.059	0.219
Religion: no religion	-0.066	0.030	0.027	-0.083	0.066	0.211
Relationship: adopted or foster	0.038	0.040	0.339	-0.090	0.051	0.078
Relationship: not relative	-0.161	0.064	0.012	-0.195	0.081	0.016
Relationship: grandchild	-0.077	0.026	0.003	-0.038	0.044	0.384
Central	-0.027	0.043	0.535	-0.208	0.048	0.000
Greater Accra	0.048	0.032	0.132	-0.149	0.054	0.006
Volta	-0.002	0.034	0.960	-0.164	0.053	0.002
Eastern	0.017	0.027	0.531	-0.153	0.041	0.000

Ashanti	0.090	0.028	0.001	-0.100	0.044	0.022
Brong Ahafo	0.028	0.024	0.241	-0.113	0.037	0.003
Northern	0.122	0.028	0.000	-0.043	0.048	0.373
Upper East	0.181	0.024	0.000	-0.065	0.050	0.192
Upper West	0.116	0.027	0.000	-0.185	0.055	0.001
Ever married				0.025	0.124	0.843
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Observations	6,316			2,792		
Pseudo R2	0.160			0.197		
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Table A.5: Factors Associated with Poverty Status (Probit Model Regression)

	Probit: poverty status		
	Marginal effect	Standard error	P-value
Primary	-0.025	0.006	0.000
Junior secondary	-0.085	0.007	0.000
Senior secondary	-0.109	0.009	0.000
Higher education	-0.177	0.013	0.000
ICT Skills	-0.097	0.010	0.000
Private Wage	-0.087	0.008	0.000
Public wage	-0.146	0.013	0.000
Non-Agric..	-0.146	0.007	0.000
Agric cont..	0.009	0.007	0.174
other work	-0.093	0.010	0.000
Not working	-0.060	0.010	0.000
Central	-0.059	0.014	0.000
Greater Accra	-0.275	0.018	0.000
Volta	0.012	0.022	0.565
Eastern	-0.078	0.017	0.000
Ashanti	-0.021	0.018	0.230
Brong Ahafo	0.018	0.020	0.368
Northern	0.058	0.028	0.042
Upper East	0.060	0.032	0.058
Upper West	0.170	0.033	0.000
Household size	0.018	0.001	0.000
Share of dependents	0.106	0.015	0.000
Share of adult male	0.063	0.011	0.000
Share of children	0.078	0.016	0.000
Female	-0.007	0.005	0.157
Age	-0.001	0.000	0.000
Access to market	0.000	0.000	0.001
Drought	-0.008	0.002	0.000
Flood	0.003	0.001	0.007
NDVI	0.377	0.048	0.000
NPP	-0.487	0.047	0.000
Precipitation	0.003	0.001	0.003
Road density	-0.002	0.001	0.000
Soil erosion	0.001	0.001	0.041
Temperature	0.063	0.009	0.000
Observations	28,206		
Pseudo R2	0.337		

Table A.6: Factors Associated with Gaining Wage Work (Probit Model Regression)

	Probit: wage work		
	Marginal effect	Standard error	P-value
Primary	0.008	0.006	0.234
Junior secondary	0.056	0.007	0.000
Senior secondary	0.173	0.011	0.000
Higher education	0.367	0.014	0.000
ICT Skills	0.111	0.009	0.000
Central	-0.025	0.012	0.031
Greater Accra	0.002	0.021	0.937
Volta	0.036	0.022	0.099
Eastern	-0.006	0.016	0.727
Ashanti	0.034	0.017	0.054
Brong Ahafo	0.023	0.020	0.244
Northern	-0.012	0.025	0.627
Upper East	-0.021	0.027	0.450
Upper West	-0.032	0.026	0.221
Household size	-0.008	0.001	0.000
Share of dependents	-0.165	0.014	0.000
Share of adult male	-0.013	0.009	0.160
Share of children	0.094	0.016	0.000
Female	-0.110	0.005	0.000
Age	0.000	0.000	0.008
Access to market	-0.001	0.000	0.000
Drought	-0.001	0.001	0.502
Flood	-0.003	0.001	0.001
NDVI	-0.199	0.041	0.000
NPP	0.044	0.043	0.312
Precipitation	0.002	0.001	0.021
Road density	0.001	0.000	0.235
Soil erosion	0.000	0.001	0.632
Temperature	0.017	0.008	0.023
Observations	26,324		
Pseudo R2	0.265		

Table A.7: Factors Associated with BECE Completion and Senior Secondary School Enrollment

	Marginal effect	Probit Standard error	P-value
Ever pregnant	-0.271	0.033	0.000
Consumption: bottom 20	-0.076	0.026	0.003
Access to market	0.000	0.000	0.494
Drought	-0.004	0.006	0.521
Flood	0.006	0.004	0.147
NDVI	0.035	0.180	0.847
Nightlight	0.000	0.001	0.794
Precipitation	-0.002	0.003	0.472
Road density	-0.001	0.002	0.718
Soil erosion	-0.001	0.002	0.591
Urban	0.025	0.026	0.344
Household size	0.009	0.004	0.027
Head born in same area	0.021	0.020	0.294
Number of children	-0.023	0.010	0.015
Improved toilet	0.057	0.024	0.016
Improved water	0.031	0.028	0.270
Electricity	0.030	0.024	0.207
Have farm land	-0.026	0.023	0.261
Have livestock	-0.026	0.023	0.259
Receive remittance	0.008	0.020	0.673
Receive LEAP	0.062	0.057	0.276
Age in years	-0.099	0.006	0.000
Disability	-0.193	0.095	0.042
Number of siblings	-0.011	0.007	0.129
Mother's age	0.001	0.001	0.385
Mother's education: primary	-0.021	0.031	0.495
Mother's education: secondary	0.021	0.032	0.516
Mother's education: high-school	0.007	0.065	0.913
Mother's education: higher	0.246	0.128	0.055
Mother: disability	-0.169	0.104	0.104
Mother: contraceptive	0.019	0.031	0.550
Mother: wage work or not	-0.158	0.051	0.002
Mother: work or not	0.029	0.040	0.469
Father's age	0.000	0.001	0.739
Father's education: primary	0.089	0.033	0.007
Father's education: high-school	-0.006	0.054	0.910
Father's education: higher	-0.090	0.077	0.242
Father: disability	0.101	0.084	0.229
Father: wage work or not	-0.043	0.043	0.315
Father: work or not	0.018	0.047	0.709
Ethnicity: Akan	0.174	0.080	0.030
Ethnicity: ewe	0.207	0.089	0.019
Ethnicity: ga dangme	0.311	0.089	0.000
Ethnicity: guan	0.168	0.092	0.070
Ethnicity: mande	0.245	0.103	0.017

Ethnicity: mole dagbani	0.188	0.089	0.035
Ethnicity: other gur people	0.179	0.081	0.027
Religion: catholic	0.295	0.076	0.000
Religion: islam	0.264	0.077	0.001
Religion: other Christian	0.244	0.076	0.001
Religion: Pentecostal Christian	0.317	0.074	0.000
Religion: protestant	0.317	0.077	0.000
Religion: traditionalist	0.259	0.093	0.005
Relationship: adopted or fostered	-0.049	0.073	0.503
Relationship: son / daughter	-0.056	0.039	0.154
Relationship: grandchild	0.069	0.050	0.174
Relationship: head	-0.295	0.096	0.002
Relationship: house help	-0.354	0.097	0.000
Relationship: other relative	-0.286	0.128	0.026
Relationship: non-relative	-0.103	0.091	0.258
Relationship: son / daughter-in-law	-0.232	0.077	0.003
Relationship: wife / husband	-0.341	0.113	0.003
Survey month: 2	0.030	0.045	0.512
Survey month: 3	0.004	0.044	0.928
Survey month: 4	-0.033	0.042	0.439
Survey month: 5	-0.024	0.042	0.573
Survey month: 6	-0.047	0.083	0.571
Survey month: 7	-0.147	0.044	0.001
Survey month: 8	-0.134	0.042	0.002
Survey month: 9	-0.057	0.042	0.182
Survey month: 10	-0.033	0.041	0.426
Survey month: 11	-0.110	0.055	0.046
Survey month: 12	-0.009	0.051	0.858
Mother's occupation: clerical support workers	0.041	0.176	0.817
Mother's occupation: craft and related trades workers	0.053	0.096	0.581
Mother's occupation: elementary occupations	0.040	0.077	0.607
Mother's occupation: managers	0.293	0.285	0.303
Mother's occupation: professionals	0.316	0.131	0.016
Mother's occupation: service and sales workers	0.051	0.050	0.315
Mother's occupation: skilled agricultural forestry and fishery	0.021	0.052	0.688
Father's occupation: clerical support workers	-0.110	0.183	0.547
Father's occupation: craft and related trades workers	0.004	0.086	0.960
Father's occupation: elementary occupations	0.017	0.099	0.864
Father's occupation: managers	0.019	0.124	0.881
Father's occupation: plant and machine operations	0.093	0.113	0.408
Father's occupation: professionals	0.060	0.083	0.468
Father's occupation: service and sales workers	-0.062	0.071	0.378
Father's occupation: skilled agricultural forestry and fishery	-0.029	0.059	0.631
Father's occupation: technicians and associate professionals	-0.186	0.106	0.079
Central	-0.017	0.052	0.745
Greater Accra	-0.142	0.093	0.126
Volta	-0.049	0.090	0.586

Eastern	-0.084	0.066	0.206
Ashanti	-0.028	0.063	0.654
Brong Ahafo	-0.044	0.074	0.550
Northern	-0.009	0.096	0.924
Upper East	0.023	0.100	0.818
Upper West	0.088	0.094	0.347
Observations	3,183		
Pseudo R2	0.238		

Table A.8: Factors Associated with Reading Comprehension (Logit Model Regression)

	Reading: age 7-11			Reading: age 12-14		
	Marginal effect	Standard error	P-value	Marginal effect	Standard error	P-value
Household size	-0.002	0.002	0.521	-0.006	0.006	0.339
Urban	0.058	0.013	0.000	0.052	0.027	0.053
Head-male	-0.016	0.012	0.178	-0.050	0.024	0.041
Number of child	0.003	0.004	0.444	0.013	0.009	0.142
Wealth index	0.027	0.005	0.000	0.035	0.014	0.011
Child age	0.025	0.003	0.000	0.020	0.013	0.115
Disability	-0.008	0.026	0.758	-0.061	0.049	0.216
Oldest child dummy	0.004	0.011	0.698	-0.021	0.031	0.491
Receive school support	-0.022	0.011	0.055	0.034	0.023	0.135
School type: govt/public	0.022	0.032	0.489	0.147	0.078	0.061
School type: private	0.015	0.034	0.665	0.163	0.085	0.055
School type: religious/faith	-0.015	0.036	0.664	0.136	0.082	0.098
Hours of child labor	0.000	0.001	0.777	-0.003	0.001	0.056
Hours of housework	-0.001	0.001	0.260	-0.004	0.001	0.004
Participate in PTA	-0.026	0.013	0.045	0.040	0.031	0.201
Receive homework	0.084	0.023	0.000	0.132	0.037	0.000
Help child with homework	0.027	0.011	0.014	-0.019	0.021	0.357
Teacher absence	0.003	0.016	0.831	-0.034	0.038	0.367
Absence due to disaster	-0.034	0.014	0.014	0.003	0.031	0.922
Parents attend school event	0.011	0.011	0.309	0.010	0.023	0.654
Discuss progress with teacher	0.025	0.012	0.039	0.073	0.022	0.001
Number of books	0.017	0.010	0.070	0.051	0.020	0.010
Report card	0.031	0.018	0.093	0.111	0.033	0.001
Child labor	0.001	0.012	0.933	-0.006	0.023	0.795
Housework	0.007	0.011	0.552	0.047	0.033	0.147
Mother-alive	-0.002	0.024	0.937	-0.027	0.038	0.476
Live with mother	0.032	0.014	0.021	-0.006	0.033	0.865
Mother's education: primary school	0.014	0.015	0.359	-0.007	0.046	0.879
Father-alive	0.013	0.016	0.434	-0.001	0.027	0.966
Live with father	0.002	0.014	0.895	0.025	0.028	0.380
Attending primary	0.062	0.049	0.206	-0.065	0.106	0.541
Attending J Secon				0.204	0.020	0.000
Region: east	-0.033	0.017	0.044	-0.046	0.037	0.214
Region: north	-0.000	0.013	0.981	-0.021	0.032	0.522
Region: south	0.027	0.015	0.083	0.002	0.042	0.954
Ethnicity: krio	0.011	0.046	0.816	0.059	0.138	0.668
Ethnicity: mende	-0.007	0.040	0.868	0.070	0.122	0.568
Ethnicity: temne	-0.028	0.039	0.471	0.080	0.121	0.508
Ethnicity: mandingo	-0.020	0.042	0.626	0.201	0.129	0.119
Ethnicity: loko	-0.032	0.046	0.486	0.092	0.134	0.494
Ethnicity: sherbro	-0.005	0.046	0.919	0.105	0.139	0.449
Ethnicity: limba	0.020	0.041	0.616	0.217	0.125	0.082
Ethnicity: kissi	-0.101	0.064	0.115	0.095	0.137	0.489

Ethnicity: kono	0.001	0.044	0.991	0.113	0.128	0.377
Ethnicity: susu	-0.048	0.048	0.318	0.034	0.129	0.795
Ethnicity: fullah	-0.018	0.042	0.666	0.146	0.125	0.241
Ethnicity: yalunka	0.005	0.073	0.946	0.047	0.184	0.797
Ethnicity: koranko	-0.049	0.049	0.324	0.124	0.136	0.361
Religion: christian	-0.052	0.043	0.235	-0.228	0.155	0.141
Religion: islam	-0.056	0.043	0.192	-0.267	0.155	0.085
Male	-0.000	0.009	0.960	0.033	0.020	0.102
Relationship: adopted / fostered	0.029	0.022	0.184	0.026	0.038	0.495
Relationship: other not related	0.073	0.028	0.010	0.068	0.062	0.272
Relationship: grandchild	0.018	0.016	0.250	-0.003	0.032	0.921
Observations	4,681			2,033		
Pseudo R2	0.379			0.373		

Table A.9: Factors Associated with Numeracy Skills (Logit Model Regression)

	Numeracy: age 7-11			Numeracy: age 12-14		
	Marginal effect	Standard error	P-value	Marginal effect	Standard error	P-value
Household size	0.003	0.002	0.137	0.005	0.006	0.387
Urban	0.057	0.012	0.000	0.133	0.027	0.000
Head-male	-0.013	0.011	0.209	-0.037	0.025	0.139
Number of child	0.000	0.003	0.974	-0.011	0.008	0.188
Wealth index	0.010	0.005	0.072	-0.005	0.014	0.714
Child age	0.017	0.003	0.000	0.029	0.013	0.025
Disability	-0.036	0.022	0.101	-0.025	0.045	0.581
Oldest child dummy	0.004	0.011	0.717	-0.016	0.030	0.591
Receive school support	-0.001	0.010	0.951	0.027	0.024	0.273
School type: govt/public	-0.015	0.041	0.715	0.074	0.066	0.260
School type: private	-0.021	0.044	0.629	0.081	0.074	0.273
School type:						
religious/faith	-0.029	0.042	0.497	0.049	0.069	0.475
Hours of child labor	0.002	0.001	0.020	0.001	0.001	0.564
Hours of housework	-0.001	0.001	0.092	-0.001	0.001	0.354
Participate in PTA	0.027	0.013	0.030	0.069	0.032	0.032
Receive homework	0.051	0.019	0.006	0.074	0.037	0.049
Help child with						
homework	0.033	0.011	0.002	0.014	0.022	0.515
Teacher absence	-0.024	0.015	0.108	0.036	0.033	0.276
Absence due to disaster	-0.030	0.013	0.021	-0.033	0.031	0.283
Parents attend school						
event	0.032	0.011	0.003	0.051	0.025	0.038
Discuss progress with						
teacher	-0.010	0.011	0.346	0.034	0.023	0.145
Number of books	0.006	0.009	0.536	-0.017	0.022	0.440
Report card	0.044	0.015	0.003	0.037	0.031	0.227
Child labor	0.016	0.011	0.132	0.002	0.024	0.920
Housework	-0.001	0.010	0.929	-0.030	0.033	0.362
Mother-alive	-0.023	0.020	0.254	0.055	0.042	0.195
Live with mother	0.023	0.013	0.072	0.005	0.034	0.873
Mother's education:						
primary school	-0.009	0.017	0.609	-0.036	0.043	0.402
Father-alive	-0.016	0.015	0.309	-0.008	0.033	0.800
Live with father	-0.002	0.012	0.864	0.041	0.030	0.170
Attending primary	0.067	0.066	0.313	0.070	0.148	0.634
Attending J second.				0.104	0.022	0.000
Region: east	-0.016	0.015	0.280	-0.034	0.041	0.395
Region: north	-0.020	0.013	0.129	-0.043	0.033	0.188
Region: south	-0.002	0.015	0.872	0.016	0.043	0.717
Ethnicity: krio	-0.032	0.044	0.464	-0.070	0.099	0.482
Ethnicity: mende	-0.060	0.038	0.110	-0.035	0.080	0.667
Ethnicity: temne	-0.058	0.037	0.113	-0.025	0.078	0.744
Ethnicity: mandingo	-0.020	0.039	0.617	0.060	0.090	0.500
Ethnicity: loko	-0.098	0.045	0.029	0.044	0.091	0.627
Ethnicity: sherbro	-0.053	0.045	0.233	-0.032	0.101	0.752
Ethnicity: limba	-0.040	0.038	0.301	0.040	0.083	0.631
Ethnicity: kissi	-0.027	0.044	0.537	0.092	0.092	0.319

Ethnicity: kono	-0.061	0.040	0.128	-0.051	0.091	0.574
Ethnicity: susu	-0.093	0.051	0.070	-0.072	0.093	0.441
Ethnicity: fullah	-0.039	0.039	0.319	-0.082	0.088	0.349
Ethnicity: yalunka	-0.011	0.061	0.858	0.213	0.125	0.087
Ethnicity: koranko	-0.185	0.065	0.004	-0.007	0.095	0.945
Religion: christian	-0.006	0.045	0.895	-0.148	0.123	0.230
Religion: islam	-0.028	0.045	0.536	-0.179	0.121	0.138
Male	0.006	0.008	0.443	0.049	0.020	0.017
Relationship: adopted / fostered	0.010	0.022	0.652	0.053	0.047	0.258
Relationship: other not related	0.000	0.052	0.998	0.125	0.085	0.141
Relationship: grandchild	0.013	0.014	0.360	0.021	0.035	0.540
Observations	4,681			2,033		
Pseudo R2	0.282			0.211		

Table A.10: Factors Associated with School enrollment among Girls Age 15 to 19 (Probit Model Regression)

	Marginal effect	Probit Standard error	P-value
Ever pregnant	-0.270	0.033	0.000
Consumption: bottom 20	-0.077	0.026	0.003
Access to market	0.000	0.000	0.477
Drought	-0.003	0.006	0.616
Flood	0.006	0.004	0.121
NDVI	0.122	0.202	0.546
Nightlight	0.000	0.001	0.924
Precipitation	-0.002	0.003	0.495
Road density	-0.001	0.002	0.751
Soil erosion	-0.001	0.002	0.563
Temperature	0.032	0.033	0.338
Urban	0.026	0.026	0.326
Household size	0.009	0.004	0.031
Head born in same area	0.021	0.020	0.288
Number of children	-0.023	0.010	0.015
Improved toilet	0.058	0.024	0.015
Improved water	0.030	0.028	0.280
Electricity	0.032	0.024	0.181
Have farm land	-0.025	0.023	0.269
Have livestock	-0.023	0.023	0.302
Receive remittance	0.008	0.020	0.688
Receive LEAP	0.064	0.056	0.254
Age in years	-0.099	0.006	0.000
Disability	-0.194	0.095	0.042
Number of siblings	-0.011	0.007	0.128
Mother's age	0.001	0.001	0.379
Mother's education: primary	-0.022	0.031	0.482
Mother's education: secondary	0.020	0.032	0.524
Mother's education: high-school	0.010	0.065	0.874
Mother's education: higher	0.241	0.128	0.059
Mother: disability	-0.166	0.103	0.106
Mother: contraceptive	0.018	0.031	0.569
Mother: wage work or not	-0.157	0.051	0.002
Mother: work or not	0.030	0.040	0.459
Father's age	0.000	0.001	0.741
Father's education: primary	0.088	0.033	0.007
Father's education: high-school	-0.005	0.054	0.927
Father's education: higher	-0.090	0.076	0.241
Father: disability	0.105	0.084	0.207
Father: wage work or not	-0.043	0.043	0.316
Father: work or not	0.016	0.048	0.738
Ethnicity: Akan	0.174	0.080	0.029
Ethnicity: Ewe	0.208	0.088	0.018
Ethnicity: Ga Dangme	0.315	0.088	0.000
Ethnicity: Guan	0.165	0.092	0.072

Ethnicity: Mande	0.239	0.102	0.019
Ethnicity: Mole Dagbani	0.186	0.088	0.035
Ethnicity: Other Gur people	0.177	0.080	0.026
Religion: Catholic	0.294	0.076	0.000
Religion: Islam	0.265	0.077	0.001
Religion: Other Christian	0.244	0.076	0.001
Religion: Pentecostal Charismatic	0.316	0.074	0.000
Religion: Protestant	0.317	0.076	0.000
Religion: Traditionalist	0.257	0.093	0.006
Relationship: adopted or fostered	-0.049	0.073	0.504
Relationship: son / daughter	-0.057	0.039	0.149
Relationship: grandchild	0.067	0.050	0.182
Relationship: head	-0.297	0.096	0.002
Relationship: house help	-0.354	0.097	0.000
Relationship: other relative	-0.293	0.130	0.024
Relationship: non-relative	-0.108	0.091	0.238
Relationship: son / daughter-in-law	-0.234	0.077	0.002
Relationship: wife / husband	-0.344	0.113	0.002
Survey month: 2	0.031	0.045	0.500
Survey month: 3	0.005	0.044	0.907
Survey month: 4	-0.030	0.042	0.470
Survey month: 5	-0.021	0.043	0.619
Survey month: 6	-0.043	0.083	0.604
Survey month: 7	-0.144	0.044	0.001
Survey month: 8	-0.134	0.042	0.002
Survey month: 9	-0.056	0.042	0.185
Survey month: 10	-0.031	0.041	0.452
Survey month: 11	-0.109	0.055	0.049
Survey month: 12	-0.007	0.051	0.883
Mother's occupation: clerical support workers	0.041	0.177	0.818
Mother's occupation: craft and related trades workers	0.050	0.096	0.601
Mother's occupation: elementary occupations	0.039	0.077	0.613
Mother's occupation: managers	0.290	0.286	0.312
Mother's occupation: professionals	0.310	0.131	0.018
Mother's occupation: service and sales workers	0.049	0.050	0.328
Mother's occupation: skilled agricultural forestry and fishery	0.021	0.052	0.686
Father's occupation: clerical support workers	-0.108	0.183	0.556
Father's occupation: craft and related trades workers	0.006	0.086	0.942
Father's occupation: elementary occupations	0.016	0.099	0.869
Father's occupation: managers	0.019	0.124	0.877
Father's occupation: plant and machine operations	0.095	0.112	0.395
Father's occupation: professionals	0.063	0.083	0.444

Father's occupation: service and sales workers	-0.060	0.071	0.396
Father's occupation: skilled agricultural forestry and fishery	-0.025	0.059	0.678
Father's occupation: technicians and associate professionals	-0.183	0.106	0.085
Central	-0.014	0.052	0.790
Greater Accra	-0.160	0.094	0.088
Volta	-0.049	0.090	0.591
Eastern	-0.073	0.068	0.282
Ashanti	-0.009	0.067	0.889
Brong Ahafo	-0.032	0.075	0.671
Northern	-0.005	0.097	0.959
Upper East	0.038	0.101	0.707
Upper West	0.105	0.096	0.270
Observations	3,183		
Pseudo R2	0.238		

Table A.11: MICS Questionnaire: Reading and Numeracy Tasks

Reading tasks

<p>FL19. TURN THE PAGE TO REVEAL THE READING PASSAGE.</p> <p>THANK YOU. NOW I WANT YOU TO TRY THIS.</p> <p>HERE IS A STORY. I WANT YOU TO READ IT ALOUD AS CAREFULLY AS YOU CAN.</p> <p>YOU WILL START HERE (POINT TO THE FIRST WORD ON THE FIRST LINE) AND YOU WILL READ LINE BY LINE (POINT TO THE DIRECTION FOR READING EACH LINE).</p> <p>WHEN YOU FINISH, I WILL ASK YOU SOME QUESTIONS ABOUT WHAT YOU HAVE READ.</p> <p>IF YOU COME TO A WORD YOU DO NOT KNOW, GO ONTO THE NEXT WORD.</p> <p>PUT YOUR FINGER ON THE FIRST WORD. READY? BEGIN.</p>	Kofi	is	in	class	two.	One	day,
	1	2	3	4	5	6	7
	Kofi	was	going	home	after	school.	He
	8	9	10	11	12	13	14
	saw	some	red	flowers	growing	Nearby.	The
	15	16	17	18	19	20	21
	flowers	were	near	a	tomato	farm.	Kofi
	22	23	24	25	26	27	28
	wanted	to	get	some	flowers	for	his
	29	30	31	32	33	34	35
	Mother	Kofi	ran	across	the	farm	to
	36	37	38	39	40	41	42
	get	the	flowers.	He	fell	down	near
	43	44	45	46	47	48	49
	a	banana	tree.	Kofi	Cried.	The	farmer
	50	51	52	53	54	55	56
saw	him	and	came.	He	gave	Kofi	
57	58	59	60	61	62	63	
many	flowers.	Kofi	was	very	happy.		
64	65	66	67	68	69		
FL20. Results of the child's reading.	Last word attempted.....Number __ __ Total number of words incorrect or missed . Number __ __ —						
FL21. How well did the child read the story?	The child read at least one word correctly1 The child did not read any word correctly2 The child did not try to read the story3					2 ⇨ FL23 3 ⇨ FL23	

<p>FL22. Now I am going to ask you a few questions about what you have read.</p> <p>If the child does not provide a response after a few seconds, repeat the question. If the child seems unable to provide an answer after repeating the question, mark 'No response' and say: Thank you. That is ok. We will move on.</p> <p>Make sure the child can still see the passage and ask:</p> <p>[A] What class is Kofi in?</p> <p>[B] What did Kofi see on the way home?</p> <p>[C] Why did Kofi start crying?</p> <p>[D] Where did Kofi fall (down)?</p> <p>[E] Why was Kofi happy?</p>	<p>Correct ((Kofi is) in class two)1 Incorrect.....2 No response / Says 'I don't know'3</p> <p>Correct (He saw some flowers)1 Incorrect.....2 No response / Says 'I don't know'3</p> <p>Correct (Because he fell)1 Incorrect.....2 No response / Says 'I don't know'3</p> <p>Correct ((Kofi fell down) near a banana tree)1 Incorrect.....2 No response / Says 'I don't know'3</p> <p>Correct (Because the farmer gave him many flowers / Because he had flowers to give to his mother)1 Incorrect.....2 No response / Says 'I don't know'3</p>	
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Numeracy

<p>FL23. Turn the page in the Reading & Numbers Book so the child is looking at the list of numbers. Make sure the child is looking at this page.</p> <p>Now here are some numbers. I want you to point to each number and tell me what the number is.</p> <p>Point to the first number and say:</p> <p>Start here.</p> <p>If the child stops on a number for a while, tell the child what the number is, mark the number as 'No Attempt', point to the next number and say:</p> <p>What is this number?</p> <p>STOP RULE</p> <p>If the child does not attempt to read 2 consecutive numbers, say:</p> <p>Thank you. That is ok. We will go to the next activity.</p>	<p>9</p> <p>Correct1</p> <p>Incorrect.....2</p> <p>No attempt.....3</p> <p>12</p> <p>Correct1</p> <p>Incorrect.....2</p> <p>No attempt.....3</p> <p>30</p> <p>Correct1</p> <p>Incorrect.....2</p> <p>No attempt.....3</p> <p>48</p> <p>Correct1</p> <p>Incorrect.....2</p> <p>No attempt.....3</p> <p>74</p> <p>Correct1</p> <p>Incorrect.....2</p> <p>No attempt.....3</p> <p>731</p> <p>Correct1</p> <p>Incorrect.....2</p> <p>No attempt.....3</p>	
<p>FL23A. Check FL23: Did the child correctly identify two of the first three numbers (9, 12 and 30)?</p>	<p>Yes, at least two correct.....1</p> <p>No, at least 2 incorrect or with no attempt2</p>	<p>2 ⇨ FL28</p>

<p>FL24. Turn the page so the child is looking at the first pair of numbers. Make sure the child is looking at this page. Say:</p> <p>Look at these numbers. Tell me which one is bigger.</p> <p>Record the child's answer before turning the page in the book and repeating the question for the next pair of numbers.</p> <p>If the child does not provide a response after a few seconds, repeat the question. If the child seems unable to provide an answer after repeating the question, mark a 'Z' for the answer on the appropriate row on the questionnaire, turn the booklet page and show the child the next pair of numbers.</p> <p>If the child does not attempt 2 consecutive pairs, say:</p> <p>Thank you. That is ok. We will go to the next activity.</p>	<div>7 5 _____</div> <div>11 24 _____</div> <div>58 49 _____</div> <div>65 67 _____</div> <div>146 154 _____</div>	
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<p>FL25. Give the child a pencil and paper. Turn the page so the child is looking at the first addition. Make sure the child is looking at this page. Say:</p> <p>Look at this sum. How much is (number plus number)? Tell me the answer. You can use the pencil and paper if it helps you.</p> <p>Record the child's answer before turning the page in the book and repeating the question for the next sum.</p> <p>If the child does not provide a response after a few seconds, repeat the question. If the child seems unable to provide an answer after repeating the question, mark a 'Z' for the answer on the appropriate row on the questionnaire, turn the booklet page and show the child the next addition.</p> <p>If the child does not attempt 2 consecutive pairs, say:</p> <p>Thank you. That is ok. We will go to the next activity.</p>	$3 + 2 = \underline{\hspace{2cm}}$ $8 + 6 = \underline{\hspace{2cm}}$ $7 + 3 = \underline{\hspace{2cm}}$ $13 + 6 = \underline{\hspace{2cm}}$ $12 + 24 = \underline{\hspace{2cm}}$	
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FL26. Turn the page to the practice sheet for missing numbers. Say:

Here are some numbers. 1, 2, and 4. What number goes here?

If the child answers correctly say:

That's correct, 3. Let's do another one.

If the child answers incorrectly, do not explain to the child how to get the correct answer. Just say:

The number 3 goes here. Say the numbers with me. (Point to each number) 1, 2, 3, 4.
3 goes here. Let's do another one.

Now turn the page to the next practice sheet. Say:

Here are some more numbers. 5, 10, 15 and _____. What number goes here?

If the child answers correctly say:

That's correct, 20. Now I want you to try this on your own

If the child answers incorrectly say:

The number 20 goes here. Say the numbers with me. (Point to each number) 5, 10, 15, 20.
20 goes here. Now I want you to try this on your own.

<p>FL27. Now turn the page in the Reading & Numbers Book with the first missing number activity. Say:</p> <p>Here are some more numbers. Tell me what number goes here (pointing to the missing number).</p> <p>Record the child's answer before turning the page in the book and repeating the question.</p> <p>If the child does not provide a response after a few seconds, repeat the question. If the child seems unable to provide an answer after repeating the question, mark a 'Z' for the answer on the appropriate row on the questionnaire.</p> <p>If the child does not attempt 2 consecutive activities, say:</p> <p>Thank you. That is ok.</p>	<p>5 6 7 ____</p> <p>14 15 ____ 17</p> <p>20 ____ 40 50</p> <p>2 4 6 ____</p> <p>5 8 11 ____</p>	
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