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Disparity in School Children's Reading Skills in 11 African Countries

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Abstract

To promote SDG Goal 4 and "education for all", this study investigates children's basic reading skills in 11 low-income and lower-middle-income African countries, using standardized reading tests from the Multiple Indicator Cluster Surveys (MICS). Research specifically examining children's reading skills and disparities across socioeconomic groups in African contexts remains scarce. This study addresses a critical knowledge gap by providing comparative evidence on reading skills disparities across diverse social backgrounds, including children with disabilities.

Our study provides new evidence on the "Learning Crisis in the Global South", revealing alarmingly low levels of reading skills but with considerable variation across the 11 African countries studied. Substantial reading skills differences exist between children from disadvantaged backgrounds—those with disabilities, living in rural areas, and from poorer, less educated families—and their non-disadvantaged peers. Notably, these disparities are often more pronounced in countries with higher overall reading proficiency.

Moreover, there are persistent gaps between children with and without disabilities across the countries and socioeconomic groups in this study. Encouragingly, children with disabilities benefit from improved socioeconomic conditions just as much as non-disabled children. These findings underscore the diverse challenges faced by children from different disadvantaged backgrounds in varying contexts.

Keywords: Africa, Children with disabilities (CWD), Educational inequality, Poverty, Reading skills, Socioeconomic background, Urban-rural disparity

JEL codes: I24: Education and Inequality

1. Introduction

The UN Sustainable Development Goal 4 underscores the importance of achieving inclusive and equitable quality education for all (UN, 2015; UNESCO, 2016). There is a growing interest in understanding the educational outcomes of children from disadvantaged backgrounds and identifying the factors that contribute to variations in these outcomes, which can inform the development of effective educational policies (Evans & Mendez Acosta, 2021; Bashir et al., 2018; Musau, 2018). In recent years, following the debate on the "Learning Crisis in the Global South" (World Bank, 2018; UNESCO, 2014), reading proficiency has emerged as a crucial focus in sub-Saharan Africa, recognized as a key indicator of learning outcomes and the success of formal education. The percentage of students attaining the minimum proficiency level in reading skills is a key indicator for achieving SDG Goal 4, given the emphasis on reading skills by the UNESCO Global Education Monitoring Report (2014).

Previous research in developed contexts has emphasized the persistent differences in reading skills between children from disadvantaged and non-disadvantaged backgrounds (Hernandez, 2011; Heckman, Pinto & Savelyev, 2013; Dolean et al., 2019). In developing countries, efforts have traditionally centred on socioeconomic factors such as gender, education, income, and geographical location (Zhang, 2006; Clercq, 2020; Chmielewski, 2019). Numerous cross-country studies on children's reading performance have offered valuable insights into the role of gender, home environment, school socioeconomic status, and literacy interventions in shaping children's reading (León et al., 2022; Kim et al., 2020; Park 2008; Chiu and McBride-Chang 2006, 2010; Shiel and Eivers 2009). However, these studies often rely on international standard learning assessments, such as PIRLS (the Progress in International Reading Literacy Study) and PISA (Programme for International Student Assessment). These assessments primarily target developed or OECD countries, with limited participation from African nations.

Of the 102 countries that have ever participated in PISA, only eight are from Africa, including just four from Sub-Saharan Africa. PIRLS has even fewer African participants.

Due to data constraints, comparative studies on educational outcomes in African countries tend to focus primarily on school enrolment, attendance, and completion rate (Wodon et al., 2018). Research specifically examining children's learning performance, such as reading or numeracy skills, and the disparities in these outcomes across socioeconomic groups in African contexts, remain scarce. One notable exception is Zhang and Holden (2023), who analysed children's numeracy skills across eight African countries using MICS data, with a special focus on children with disabilities.

The challenges faced by children with disabilities (CWD) and their low learning performance have only recently garnered attention, particularly following the adoption of the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD) in 2006 (UN, 2006). Recent studies have made efforts to understand the schooling challenges faced by CWD, focusing on differences in school access, attendance and enrolment in developing countries (Filmer, 2008; Mizunoya et al., 2018; UNESCO, 2018). However, studies specifically addressing how much CWDs are falling behind in reading skills learning are rare in the context of developing countries, with only a few exceptions from individual studies in Asia (Singal et al., 2020), and none in the African context.

Based on nationally representative data across 11 low-income and lower-middle-income African countries, we evaluate the reading skills of children aged 10 to 14 years old and investigate variations in reading skills across rural versus urban areas, between children with disabilities (CWD) versus children without disabilities (CWOD), as well as between children from poor and less educated families versus better-off and more educated families. More specifically, we assess the relative performance of CWD vs. CWOD within various social groups as well as examine how these disparities vary across different African countries.

Our research aims to answer the following research questions: 1) To what extent do children from disadvantaged backgrounds (e.g., children from poor or less educated families, rural areas, or with disabilities) lag behind their peers (children from more affluent or educated families, urban areas, or without disabilities) in basic reading skills? 2) Do disadvantaged children benefit equally from improvements in their country's overall reading proficiency? 3) Can improvements in micro-level social factors help mitigate the learning constraints faced by children with disabilities?

This paper is unique in its exclusive focus on school children's reading skills performance across low-income and lower-middle-income African countries, all of which were included in the sixth round of Multiple Indicator Cluster Surveys (MICS) between 2017 and 2020. First, we present comprehensive, nationally representative evidence of the substantial variation in basic reading skills among children from different socioeconomic backgrounds. We employ consistent, standardized tests and measurements of reading skills both within and across countries. We identify substantial differences in reading skills across the 11 countries, as well as across socioeconomic groups within each country.

Second, we utilize the standardized identification of children with disabilities in the MICS survey to assess their reading skills, using children without disabilities in each country as a counterfactual. Overall, children with disabilities lag behind children without disabilities. However, an interesting finding is that children with disabilities in better-performing countries outperform children without disabilities in other countries. This suggests that children with disabilities benefit from strong educational systems as much as children without disabilities in terms of improving their basic reading skills.

2. Conceptual framework

Reading skills are crucial for the development of various other academic skills in school and can greatly impact children's likelihood of repeating grades or dropping out (Reschly, 2010).

Several social, familial and individual factors influence children's learning, and the mechanisms through which these factors influence learning are multifaceted (Taylor & Yu, 2009). Pace et al. (2017) identify three potential pathways by which socioeconomic status might influence children's language development, which are child characteristics, parent-child interaction, and the availability of learning resources.

This paper aims to evaluate children's reading skills performance among children who are disadvantaged in any of the three potential pathways as suggested by Pace et al. (2017). First, children who have functional challenges in one of the four main functional domains – vision, hearing, physical, intellectual – or with multiple functional challenges. Second, children from poor families, defined as those in the lowest quintile of the asset index, and children from families without schooling. These children quite often have little access to critical learning resources and parental engagement for language development. Finally, children living in rural areas, where learning resources are constrained and school quality is often lower.

Families with higher social status, including better income and higher education levels, tend to provide better support for their children's learning. Children from more advantaged backgrounds often begin their learning process earlier than their peers from disadvantaged families (Lee & Burkham, 2002). Additionally, they may indirectly benefit from residing in neighbourhoods with higher-quality schools (Anderson, Case and Lam, 2001). Parents with higher social status are also more likely to actively engage with the school community, thereby contributing to overall school quality.

The neighbourhood environment can influence children's learning outcomes. In the African context, although not extensively studied, there is evidence of urban-rural disparities in schooling (Zhang, 2006). Rural areas often face challenges related to school quality due to a lack of infrastructure, educational resources, and qualified teachers. Furthermore, in neighbourhoods characterized by high levels of poverty in rural areas, various social issues

affecting disadvantaged families can be exacerbated. Children are also exposed to the influences of their peers in the same neighbourhood or school (Leventhal and Brooks-Gunn, 2001).

The challenges related to learning reading skills vary greatly across different disability types due to the diverse nature of functional difficulties (Premeaux, 2001; Anastasiou & Kauffman, 2011). Children with vision disabilities may have the same capability to develop reading skills as their peers, but the real challenges often stem from the availability of aids, such as corrective lenses, optical devices, and glasses (Le Fanu et al., 2022), as well as access to consultative instructional services (Corn & Koenig, 2002). For children with hearing disabilities, the challenge of learning to read often arises from a lack of exposure to their first language before the critical period (Kushalnagar et al., 2010). This puts them at high risk of linguistic deprivation (Mayberry, 1994). Children with physical disabilities may not face apparent functional challenges in learning reading skills, but they frequently experience high rates of school absenteeism due to factors like long distances to school and lack of infrastructure, materials, and support (Tanya et al., 2023). Children with intellectual disabilities struggle with developing reading skills due to challenges in various abilities, including information processing, cognitive abilities, and attentive behaviours (Tolar et al., 2016; Chan & Dally, 2001). Children with multiple disabilities are exposed to higher risks related to several different functional challenges. Moreover, the availability of appropriate teaching materials and pedagogical interventions for CWD can enhance their skill development.

We set up the first hypothesis concerning the role of factors related to child characteristics, parent-child interaction, and the availability of learning resources:

H1. The percentages of school children aged 10-14 with satisfactory reading skills among children with a) families in the lowest quintile of asset index, b) families without schooling, c) rural residence, d) disabilities (vision, hearing, physical, intellectual, and multiple

disabilities) are significantly lower than that among other children without such disadvantaged backgrounds.

Several cross-country studies, focusing on school enrolment, have shown that disparities in enrollment and attendance for disadvantaged children are more pronounced in countries with higher overall enrollment rates and better socio-economic development (Filmer, 2008; Mizunoya et al., 2018; Lewis et al., 2022). We formulate the second hypothesis to explore whether disadvantaged children benefit equally from improvements in their country's overall reading proficiency:

H2. The differences in the percentage of school children with satisfactory basic reading skills are more pronounced in countries with higher overall reading proficiency, when comparing a) poor (children from families in the lowest quintile of asset index) vs. non-poor, b) children from families without vs. with schooling, c) rural vs. urban children, and d) CWD vs. CWOD.

The fundamental question revolves around whether CWD, when raised in families with a more advantageous social background (urban residence, higher income, higher education), can successfully bridge the academic performance gap compared to CWOD. Can improvements in micro-level social factors help mitigate the learning constraints faced by children with disabilities? We set up the third hypothesis related to the reading skills associated with children's disabilities across different social groups:

H3. The differences in the percentage of school children with satisfactory basic reading skills between CWD and CWOD are smaller in a) urban, b) higher-income, c) more educated families.

Our H3a-c hypotheses are based on the notion that families with advantageous conditions can better support CWD in overcoming learning challenges. Finally, due to data

limitations, our assessment is confined to children who were enrolled in school during the survey period.

3. Data and estimation strategy

3.1 Data description

We use publicly available data from the sixth round of MICS national representative surveys conducted by the United Nations International Children's Emergency Fund (UNICEF) between 2017 and 2020 in 11 African countries: Central Africa Republic, Chad, DRCongo, Ghana, Lesotho, Madagascar, Malawi, The Gambia, Togo, Tunisia, Zimbabwe. These surveys underwent review and received approvals from ethics committees in each respective country. Furthermore, participants were provided with verbal information about the surveys and their consent was obtained[1].

The sixth round of MICS adopted the Washington Group Child Functioning Module (WG-CFM) to assess functional difficulties among children aged 6-17 (Groce & Mont, 2017; WG, 2020). Out of the 13 functional domains covered by WG-CFM, this paper focuses on eight domains that include four severity scales, categorized into five types of disabilities: vision, hearing, walking, intellectual and multiple[2] disabilities.

Our analysis primarily relies on the reading test designed for children aged 10-14 in the MICS survey. This reading test is highly standardized and consistently applied across countries.

[1] Detailed information is provided in section 2.4 in the survey report for each country.

[2] Five functional domains for behavioural and psychological disabilities: accepting change, controlling behaviour, making friends, anxiety, and depression, are not included since their prevalence rates across the countries vary greatly. It might indicate a large disparity in interpreting these functional domains in the local context. We classify vision disability as severe difficulty (cannot at all or a lot of difficulty) in vision even with glasses or contact lenses, hearing disability as severe difficulty in hearing even with a hearing aid, physical disability as severe difficulty in self-care or walking 500 meters on level ground without equipment or assistance, and intellectual disability as severe difficulties in communication, learning, remembering, or concentrating on activities that the child enjoys doing. Finally, those who reported more than one co-occurring severe functional difficulty are categorized as having multiple disabilities.

It consists of a brief story consisting of approximately 60-80 words[3], followed by a comprehensive test containing five questions related to the content of the text. From this test, we derive two key indicators: Q1, representing the proportion of correctly read words (ranging from 0 to 1), and Q2, indicating the proportion of correctly answered questions (with values of 0, 0.2, 0.4, 0.6, 0.8, 1). The reading test score is subsequently computed as the average of Q1 and Q2.

The distribution of these test scores shows a substantial number of extreme values, with children either facing reading difficulties or being proficient in reading. Therefore, instead of using the reading test score as a continuous measure, this study employs the indicator of the percentage of school children with satisfactory reading ability to surpass the threshold score of 0.85[4].

Although the 0.85 threshold is somewhat arbitrary, it allows a maximum of one incorrect comprehensive question and a limited number of errors in reading the story (up to 10 percent of words). To ensure robustness, we conduct sensitivity analyses using alternative cutoff points (0.8, 0.9) to assess whether they would significantly change our primary findings. The results of these sensitivity analyses, detailed in Appendix II, show no large sensitivity to the selection of different cutoff thresholds.

In the MICS survey, one child aged between 6 and 17 is selected from the participating households to take the reading test. Table 1 provides an overview of the total sample size by country and the size of non-response.

Table 1 Here

[3] MICS survey reading tests mainly use same text with primary official teaching languages in these countries, which are English in The Gambia, Ghana, Lesotho, Malawi, and Zimbabwe; French in Central African Republic, Chad, DRCongo, Madagascar, Togo, and Tunisia. The story is same across all countries, but total number of words vary depending on the language used.

[4] The threshold at 0.9 might be little bit too strict, because if the child did not answer one of the questions correctly, the child will have to read all the words 100% correctly, or the child has to answer all the 5 questions correctly.

In many countries, the majority of children who have never attended school (99.6 percent) or have dropped out (78.5 percent) did not take the reading test, accounting for 16.0 percent of the sample. Additionally, 2.7 percent of children did not take the reading test because the test was not available in their primary teaching language. In most countries, the test is administered in an official foreign language, such as English or French[5]. Finally, 13.6 percent of non-responses were due to refusals, with 4.7 percent attributed to families refusing to involve their child, and 8.9 percent to children themselves refused to take the reading test.

The sample size of the children who completed the reading tests is presented in Table 2, categorized by urban vs. rural location, CWD vs. CWOD, children from poor (in the lowest quintile of the asset index) vs. non-poor families (not in the lowest quintiles), as well as children from families with vs. without schooling, across the 11 African countries.

Table 2 Here

3.2 Estimation strategy

The MICS data is a national sample of children aged 6-17. However, the non-response rate in the MICS reading tests is as high as 32 percent. The majority of out-of-school children and all children taught in minority languages are excluded from the reading tests. As a result, our analysis can only confidently speak about in-school children taught in the main language.

We are able to address one of the selection problems in the data, non-participation due to refusal. To address this potential selection issue due to refusals, we employ inverse probability weighting (IPW). IPW relies on estimating the probability of exposure (in this case, taking the reading test) for each person in the sample by using probit regression models.

We first use a probit model to evaluate the likelihood of children in the sample taking the reading test in each respective country in the following :

[5] In Malawi and Zimbabwe, some children whose main teaching language is local language only did a reading test for local language.

$$Selection_i^m = \alpha_0^m + \alpha_{1j}^m D_{ij}^m + \alpha_3^m UR_i^m + \alpha_{2k}^m EDU_i^m + \alpha_{2k}^m ASS_i^m + \alpha_4^m Age_i^m + \alpha_5^m Gender_i^m + \varepsilon_i \quad (1)$$

To address potential sample selection, we include variables that could be correlated with a child's probability of taking the reading tests. These variables encompass: 1) asset index indicator quintiles (ASS_i), constructed using weighted assets owned by the household through the first principal component based on principal component analysis (PCA) at the household level (Naveed et al., 2021); 2) highest completed educational level among the household members (EDU_i); 3) location variable UR_i, indicating urban or rural residence; 4) disability status (D_{ij}), represented by dummy variables indicating no disability, vision, hearing, physical, intellectual, and multiple disabilities; and 5) children's age and gender. Here, subscript *i* represents each individual child, m represents countries, *j* represents different disability statuses.

If the coefficients for these variables are statistically significant, it indicates evidence of sample selection. The predicted probability of selection from the full model (1) is $\widehat{Selection1_i^m}$. Next, we rerun a reduced probit model with covariates that are insignificant in (1) and the predicted probability from the reduced model is $\widehat{Selection2_i^m}$. The inverse probability weight is calculated as the ratio between the two predicted probabilities:

$$Weight_i^m = \widehat{Selection2_i^m} \ / \ \widehat{Selection1_i^m}. \quad (2)$$

The inverse probability weight is used on the sample consisting of children who have completed the reading test. The approach helps adjust for potential selection bias related to family and individual characteristics since children with similar characteristics to those who refused the reading test will receive higher weights[6].

[6] Note that IPW cannot adjust the bias if the bias is related with other characteristics that we do not have information on.

In the second stage model, only school children with reading test scores will be included, weighted by IPW.

We first test hypothesis H1, which states that the percentages of school children aged 10-14 with satisfactory reading skills among children with a) families in the lowest quintile of asset index, b) families without schooling, c) rural residence, d) disabilities (vision, hearing, physical, intellectual, and multiple disabilities) are significantly lower than that among other children without such disadvantaged backgrounds.

We employ country-fixed effects models and include Asset index quintile (ASS_i), Families' educational level (EDU_i), urban/ rural residence (UR_i), disability status (D_{ij}), as well as additional control variables such as age and gender in the models. Initially, we run four separate models, each including only one of these factors alongside the control variables, to test the treatment effect of each factor individually. Then, we run the model with all factors and control variables including, using the following model specification:

$$Reading_i = \beta_0 + \beta_{1j} D_{ij} + \beta_2 UR_i + \beta_3 ASS_i + \beta_4 EDU_i + \beta_5 Age_i + \beta_6 Gender_i + \beta_7 Country_i + u_i \quad (3)$$

Here, subscript *i* represents each individual child.

To test hypothesis H2, which states that the differences in the percentage of school children with satisfactory reading skills between disadvantaged and non-disadvantaged backgrounds are more pronounced in countries with higher overall reading proficiency, we include interaction terms between different factors and country variable. Similarly, we run four separate models, each including the interaction term between country and one factor F_{ij} (poverty status, family schooling, urban/ rural residence, and disability status). The model specification is as following:

$$Reading_i = \pi_{10} + \pi_{11} F_{ij} + \pi_{12} Country_i + \pi_{13} F_{ij} * Country_i + \pi_{14} UR_i + \pi_{15} ASS_i + \pi_{16} EDU_i + \pi_{17} Age_i + \pi_{18} Gender_i + u_{1i} \quad (4)$$

Sample size is relatively small for some groups in certain countries, particularly for children with disabilities, resulting in high variance in the estimations. Therefore, we also

categorize the 11 countries in the sample into three country groups (CGrp): low-reading country, mid-reading country, and high-reading country. We run separate models again similar to (4) with the country group variable. The new set of regressions follows the model specification:

$$Reading_i = \pi_{10} + \pi_{11}F_{ij} + \pi_{12}CGrp_i + \pi_{13}F_{ij} * CGrp_i + \pi_{14}UR_i + \pi_{15}ASS_i + \pi_{16}EDU_i + \pi_{17}Age_i + \pi_{18}Gender_i + u_{1i} \quad (5)$$

To test hypothesis H3, which states that the differences in the percentage of school children with satisfactory reading skills between CWD and CWOD are smaller in a) urban, b) higher-income, c) more educated families, we include interaction terms between disability status and other micro-level indicators:

$$Reading_i = \pi_{20} + \pi_{21}D_i + \pi_{22}UR_i + \pi_{23}ASS_i + \pi_{24}EDU_i + \pi_{25}D_i * UR_i + \pi_{26}D_i * ASS_i + \pi_{27}D_i * EDU_i + \pi_{28}Age_i + \pi_{29}Gender_i + \pi_{30}Country_i + u_{2i} \quad (6)$$

Due to the limitations in the size of samples for some disability types, we will not estimate the treatment effect of different disability types but include disability status D_i as a catch-all category.

4. Results

4.1 Reading skills across 11 African countries

The percentage of school children aged 10-14 with satisfactory reading skills (reading score 0.85 or above) in each country is displayed in Table 3, showing substantial variation. This percentage ranges from a low of 17.8% in the Central African Republic to a high of 87.7% in Tunisia. Seven countries have more than 50% of children with unsatisfactory reading skills.

Table 3 Here

Based on the overall reading skills proficiency of these countries, we can categorize them into three groups: low-reading countries, which include the Central Africa Republic, Chad, DRCongo, and The Gambia; mid-reading countries, which include Ghana, Madagascar, Malawi, and Togo; and high-reading countries, which include Lesotho, Tunisia, and Zimbabwe.

4.2 Reading skills across micro-level factors

In the first set of regressions, we run inverse probability weighted[7] pooled least squares regression models by including one of the four micro factors in each of four models: 1) household asset index quintile, 2) family members' highest educational level, 3) location (rural vs. urban), and 4) disability status. The final regression, labelled as Model 5, includes all the micro-level factor variables and control variables (Table 4).

Table 4 Here

Table 4 indicates large differences in the share of school children with satisfactory reading skills across various groups. Children from the wealthiest quintile of the asset index outperform those from the poorest quintile by 37 percentage points (Model 1). Children in families with primary education show a 6 percentage-point advantage over those from families without any schooling, while those from families with a member has completed junior secondary education or higher achieve 21 percentage-point advantage (Model 2). In the full model incorporating all factors, the coefficients for wealth and education from Models 1 and 2 are reduced, likely reflecting a correlation between these factors.

Urban children outperform their rural counterparts by 23 percentage points in satisfactory reading skills before accounting for micro-level factors (Model 3) and by 9 percentage points after these factors are controlled for (Model 5).

[7] The outputs for the first stage of selection model are presented in Appendix I.

Compared to CWOD, children with hearing disabilities (15 percentage points lower), intellectual disability (16 percentage points lower) and multiple disabilities (17 percentage points lower) exhibit lower proficiency rates (Model 4). The finding remains consistent with or without controlling for other factors (Model 4 and 5).

4.3 Disparities in reading skills across 11 African countries

To test hypothesis H2, we include country-specific dummy variables and interaction terms between micro-level factors and individual countries. Figure 1 presents the estimated proportion of 14-year-old children with satisfactory reading skills across various disadvantaged groups: rural children, children with disabilities (CWD), children from poor families in the lowest quintile of the asset index, and children from families without schooling. The figure also includes data on children who do not belong to these disadvantaged groups, offering a comparative analysis across the 11 African countries in our sample.

Figure 1 Here

Disparities in reading skills between children from poor and non-poor families are significantly larger in countries with mid-level reading proficiency, such as Ghana (23 percentage points), Madagascar (23 percentage points), Togo (15 percentage points), and Zimbabwe (14 percentage points), and Lesotho (10 percentage points). In contrast, these disparities are much smaller in countries with low reading proficiencies, such as Chad (8 percentage points) and DRCongo (6 percentage points), or even no significant disparities, such as in the Central Africa Republic and The Gambia. In Tunisia, where most children have high basic reading proficiency, the differences are also insignificant. An exception is Malawi, which, despite having mid-level reading proficiency, shows no significant disparity between poor and non-poor children. Disparities in reading skills between children from families with and without

schooling have largely mirrored those between poor and non-poor children, with much lower disparities in countries with overall low reading proficiency.

Urban-rural disparities in reading skills are the most pronounced in Ghana (24 percentage points), Togo (22 percentage points) and Zimbabwe (21 percentage points), while they are significant but small in DRCongo (12 percentage points), Lesotho (12 percentage points), and Madagascar (8 percentage points). For other countries, the urban-rural disparities are not significant. Disparities in reading skills for children with disabilities (CWD) are significant across all 11 African countries, ranging from 7 to 22 percentage points. The largest disparity is observed in the Gambia, while countries with lower reading proficiency show smaller differences.

The sample size for CWD is quite limited in several countries, resulting in a large variance in the estimated outcomes for CWD. Consequently, we further analyze the data across the three country groups defined in Section 4.1 (Fig 2). The results from group-level analysis are similar to those from the country-level analysis. Disparities in reading skills between children from poor and non-poor families and between children from families with and without schooling are not significant in low-reading countries but are much larger in mid-reading and high-reading countries. The urban-rural disparity is especially high in the high-reading countries. However, disparities between CWD and CWOD remain consistently significant across countries with different levels of reading proficiency.

Fig 2 Here

4.4 Disparities in reading skills related to disabilities

To test hypothesis H3, we include all micro-level indicators, as well as the interaction terms between disability status and other micro-level indicators (urban/rural residence, wealth index,

and family's highest educational level) in the country fixed effect model. The regression results at various cutoff points are presented in Appendix II.

Figure 3 displays the estimated proportion of 14-year-old children with satisfactory reading skills. These predictions are made with covariates set at their means for both CWD and CWOD in different social groups (urban vs. rural, high vs. low socio-economic status, more vs. less educated families). These disparities in reading skills between CWD and CWOD in schools are visually represented as lines connecting two estimated reading skill proficiency rates in various social groups. A steeper incline in the line indicates a higher disparity between CWD and CWOD, while a flatter line suggests a smaller disparity.

Figure 3 Here

Figure 3 suggests that disparities in reading skills proficiency between CWD and CWOD do not vary significantly across different social groups. These disparities remain relatively constant at around 15 percentage points in various groups. The most significant disparities are observed in urban areas (19 percentage points) and among families without any schooling (21 percentage points).

Furthermore, it is noteworthy that CWD in social groups with advantaged backgrounds (urban, rich and more-educated families) have achieved similar levels of reading skill proficiency as their CWOD peers in social groups with disadvantaged backgrounds (rural, economically disadvantaged, and less-educated families).

5. Discussion and study limitations

5.1 Discussion

In this section, we will discuss the findings related to the key hypotheses. We will also discuss important limitations of our study and provide some suggestions for future research.

Utilizing a standardized reading test, the paper reveals particularly low overall reading skills and considerable variations among school children across the 11 African countries. The proportion of school children attaining satisfactory reading skills ranges widely, from 18 percent in the Central Africa Republic to 88 percent in Tunisia. In our combined sample from these 11 countries, less than half (45 percent) of the school children have reached a satisfactory reading level, namely, they are able to read the basic text properly. It is important to note that there is substantial variation in the level of school attendance across these countries, with rates ranging from 43 percent in Chad to 69 percent in Madagascar, and reaching as high as 95 percent in Lesotho, Malawi, and Tunisia. Since we expect a much lower reading skill level for children not enrolled in school, the overall reading skill level and actual gap in learning across these countries is likely higher when differences in school attendance are considered. For instance, while the average reading skill proficiency rate is 21 percent among schoolchildren in Chad, school attendance is only 43 percent.

The first set of models support hypothesis H1, showing that children from 1a) impoverished backgrounds, 1b) less-educated households, and 1c) rural areas, exhibit significantly lower reading skills than their peers from affluent families, more educated households, or urban areas. Hypothesis H1d) is only partially supported: the percentage of school children with satisfactory reading skills is significantly lower among those with hearing, intellectual, and multiple disabilities[8] compared to their CWOD peers. However, it is important to note that children with vision or physical disabilities do not significantly lag behind, and the conclusion regarding children with hearing disabilities does not remain statistically significant when all control variables are included in the analysis.

[8] The coefficient for children with multiple disabilities become insignificant when more control variables included. The sample size is quite limited due to the very low school attendance in this group of children, which may lead to high standard error.

As demonstrated by numerous studies in developed contexts (Pace, etc., 2017), children from disadvantaged backgrounds tend to lag behind in reading abilities. Notably, our analysis shows that family poverty has the strongest correlation with children's reading skills. The proportion of school children in the richest quintile group who have achieved satisfactory reading skills is approximately 24-35 percentage points higher than those in the poorest quintile group.

What is particularly notable in our study is the observation that a substantial proportion of school children obtain extreme values in their reading test scores, either very low or very high scores. The concern here is primarily for school children who, at their current age, continue to achieve very low scores in basic reading tests. This underscores the substantial challenges they may have encountered in developing proficient reading skills in the long future. Children from disadvantaged backgrounds are particularly representative.

Furthermore, our study indicates that school children with vision and physical disabilities do not exhibit significant differences in their reading skills compared to the non-disabled children. It is plausible that they have managed adequately with basic reading skills. However, if more comprehensive reading tests were to be introduced, these children might also encounter challenges and potential difficulties in meeting advanced reading skill requirements.

Our findings support Hypothesis H2a, H2b, and H2c, indicating that disparities in reading proficiency rates across socioeconomic groups and urban-rural disparities are more pronounced in countries with higher overall reading proficiency. In countries with very low reading proficiency, such as the Central African Republic (average reading skills score of 18 percent), Chad (21per cent), and DRCongo (19 percent), disparities in reading skills across socioeconomic groups are either insignificant or much smaller compared to other countries.

The largest disparities across socioeconomic groups are observed in countries with mid-level reading proficiency, such as Ghana (47 percent), Madagascar (51 percent), Togo (38

percent), and Zimbabwe (56 percent). Urban-rural disparities are also most pronounced in countries with relatively high reading proficiency. However, in Tunisia, which boasts the highest level of socio-economic development and the highest reading proficiency (88 percent) among the 11 countries, no significant disparities in reading skills are found among children from different disadvantaged backgrounds.

Our findings do not support Hypothesis H2d, which posits that disparities in reading proficiency rates between children with and without disabilities are more pronounced in countries with higher overall reading proficiency. Meanwhile, Tunisia, the country with the highest reading proficiency (88 percent), exhibits relatively high disparities in reading skills between CWD and CWOD. However, a closer examination shows that the gap of 20 percentage points, when considered in proportion to the overall proficiency level, is not larger compared to the 7-12 percentage points gaps observed in countries with significantly lower reading proficiency, such as the Central African Republic, Chad, and DRCongo (with overall proficiency levels ranging from 18 to 21 percent). In countries with mid-level reading proficiency (35-58 percent), disparities between CWD and CWOD range from 12 to 25 percentage points, further suggesting that disability-related disparities are not significantly different across countries with different reading proficiency.

Our findings do not support Hypothesis H3 that disparities in the percentage of school children with satisfactory reading skills between CWD and CWOD would be less pronounced in households with more advantaged backgrounds. Instead, these disparities have remained relatively constant across different social groups. It is worth emphasizing that these results are based on children who are currently enrolled in school. When we consider out-of-school children, recognising the overrepresentation of CWD in this group, it becomes apparent that disparities in social groups with disadvantaged backgrounds may have been underestimated.

However, as long as children are enrolled in school, a consistent gap between CWD and CWOD appears to persist.

5.2 Study limitations

Several limitations should be considered when interpreting the findings of this study.

First, the reading test used in the MICS survey is relatively basic. Given the age range of children tested (10-14 years), it may not comprehensively assess more advanced reading skills. However, even with the basic test, the prevalence of satisfactory reading skills among children aged 10-14 in most of these countries is notably low, indicating limited reading abilities across many African countries. Introducing a more comprehensive reading test could potentially reveal even greater difficulties, especially among children from disadvantaged backgrounds, and is likely to expose even larger disparities in reading proficiency.

Second, it is crucial to recognize that this study exclusively focuses on children currently enrolled in school. Many children not attending school and therefore not taking the reading test are disproportionately from disadvantaged backgrounds. As a result, the disparities estimated in this group may have been underestimated.

Moreover, there is substantial variation in school attendance rates across the countries studied. Careful consideration is needed when analysing countries with low school enrolment. It is important to emphasize that the conclusions drawn in this paper are applicable exclusively to children enrolled in school and cannot be generalized to encompass all children in these countries.

Third, the selection of countries in this study was not guided by strict predefined criteria but was rather constrained by data availability. It is essential to interpret the estimated disparities cautiously due to the inherent randomness associated with the selection of countries in this paper.

6. Conclusion

Our study provides new evidence on the reading proficiency of school children aged 10-14 across 11 African countries, drawing from unique nationally representative data. Through a standardized reading test, the paper uncovers notably low overall reading skills and significant disparities among school children across 11 African countries. By examining the correlations between diverse regional, familial, and individual factors, we aimed to uncover important factors that may influence school children's acquired reading skills. Benefiting from the large sample size from country-pooled data in the MICS standardized data, this study emphasizes the heterogeneous disability effect on children's reading skills related to disability type, which has been overlooked by many studies due to sample size limits.

A comparative analysis across 11 African countries suggests that disparities in reading skills among children from disadvantaged backgrounds are non-existent or minimal in countries with low overall reading proficiency. In contrast, these disparities are more pronounced in some countries with mid-level reading proficiency. Notably, despite having the highest overall reading proficiency, Tunisia shows no significant differences in reading skills across the social groups examined. On the other hand, given the basic nature of the reading test in this study, we can only conclude that there are no significant disparities in basic reading skills among disadvantaged children in Tunisia. However, larger disparities may emerge if more comprehensive reading skills are assessed.

Another unique contribution of our study lies in its findings related to children with disabilities (CWD), a topic that has received relatively little attention in recent literature, likely due to data limitations. Our study highlights a persistent gap in reading skills between CWD and CWOD across countries and various social groups, underscoring the unique challenges CWD faces. Interestingly, improvements in micro-level conditions have not impacted these

gaps. Nonetheless, it is encouraging to note that the proportion of CWD with adequate reading skills increases similarly to CWOD in response to improved conditions.

This paper underscores the critical role of micro-level socioeconomic factors in addressing challenges faced by vulnerable populations and enhancing reading skills for all. However, certain vulnerable groups, such as CWD, encounter unique challenges in acquiring reading skills. While CWD can make similar gains to CWOD when school quality and socioeconomic conditions improve, a persistent gap between these groups remains. Further targeted and in-depth research is essential to understand the underlying dynamics and identify tailored interventions, which extend beyond the scope of this paper.

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8. Tables

Table 1 Sample size and non-response by countries

Country	Missing due to Out of school[1]		Missing due to Language		Missing due to refusal[2]		Done reading test		**Total**
	Number	Percent (%)	Number	Percent (%)	Number	Percent (%)	Number	Percent (%)	
Central African Republic	361	17.8	145	7.1	444	21.9	1081	53.2	**2,031**
Chad	2,568	54.1	107	2.3	490	10.3	1582	33.3	**4,747**
DR Congo	769	16.6	305	6.6	754	16.2	2813	60.6	**4,641**
Ghana	176	5.0	112	3.2	267	7.6	2937	84.1	**3,492**
Lesotho	42	2.2	0	-	287	14.9	1598	82.9	**1,927**
Madagascar	958	22.3	1	0.0	656	15.3	2686	62.5	**4,301**
Malawi	204	3.0	69	1.0	1498	22.4	4930	73.6	**6,701**
The Gambia	366	18.7	190	9.7	179	9.2	1220	62.4	**1,955**
Togo	119	6.6	5	0.3	110	6.1	1576	87.1	**1,810**
Tunisia	20	1.1	0	-	77	4.4	1651	94.5	**1,748**
Zimbabwe	137	5.6	43	1.8	105	4.3	2156	88.3	**2,441**
Total	**5,720**	**16.0**	**977**	**2.7**	**4,867**	**13.6**	**24,230**	**67.7**	**35,794**

Note

[1] including children never-in-school and dropouts

[2] including family and child refusal

Table 2 Number of tested children by location, disability status, socioeconomic factors and country, ages 10-14

Country	Location		Disability Status		Poverty Status		Family Schooling	
	Rural	Urban	CWD	CWOD	Poor	Non-poor	No school	Other
Central African Republic	472	609	66	1,015	108	973	190	888
Chad	994	588	41	1,541	163	1,419	662	918
DR Congo	1,673	1,140	45	2,768	625	2,188	335	2,477
Ghana	1,502	1,435	219	2,718	664	2,273	912	2,018
Lesotho	1,142	456	39	1,559	421	1,177	212	1,377
Madagascar	1,871	815	138	2,548	372	2,314	505	2,166
Malawi	4,124	806	153	4,777	697	4,233	654	4,256
The Gambia	582	638	21	1,199	386	834	761	454
Togo	1,031	545	83	1,493	340	1,236	532	1,031
Tunisia	514	1,137	49	1,602	326	1,325	197	1,448
Zimbabwe	1,518	638	90	2,066	428	1,728	131	2,024
Total	15,423	8,807	944	23,286	4,530	19,700	5,091	19,057

"Poor" refers to children from families in the lowest quintile of the asset index, while "Non-poor" includes all children not in this quintile. "No school" refers to children from families without any schooling, while "Other" includes all children from families with some level of formal education.

Table 3 Percentage of tested children with satisfactory reading skills (score > 85%) by countries, ages 10-14

	Mean (%)	Std. Err.	[95% Conf.	Interval]	Sample size	Year of survey
Central Africa Republic	17.8	0.012	0.155	0.201	1,080	2019
Chad	21.2	0.010	0.192	0.232	1,548	2019
DR Congo	18.9	0.008	0.175	0.204	2,730	2017
Ghana	47.0	0.009	0.452	0.488	2,916	2017
Lesotho	58.4	0.012	0.559	0.608	1,568	2018
Madagascar	51.2	0.010	0.492	0.531	2,477	2018
Malawi	49.4	0.007	0.480	0.508	4,883	2020
The Gambia	34.6	0.014	0.319	0.373	1,213	2018
Togo	37.9	0.012	0.355	0.403	1,574	2017
Tunisia	87.7	0.008	0.861	0.893	1,607	2018
Zimbabwe	56.3	0.011	0.542	0.585	2,056	2019
Total	**44.7**	**0.003**	**0.441**	**0.454**	**23,652**	

Table 4 IPW least squares regressions on the proportion of children with satisfactory reading skills (score > 85%), by urban/rural and micro-level factors

	Model1	Model2	Model3	Model4	Model5
Wealth index (base category=Poorest)					
Second quintile	0.059***				0.044***
	(0.009)				(0.009)
Middle	0.109***				0.076***
	(0.009)				(0.010)
Fourth quintile	0.209***				0.145***
	(0.010)				(0.011)
Richest	0.367***				0.257***
	(0.010)				(0.013)
Highest Educational level in the household (base category=No school)					
Primary		0.059***			0.033***
		(0.009)			(0.009)
Junior secondary		0.210***			0.098***
		(0.010)			(0.010)
Senior secondary or higher		0.211***			0.085***
		(0.011)			(0.011)
Location (base category: urban)			-0.225***		-0.090***
			(0.008)		(0.009)
Disability status (base category: non-disabled)					
Vision disability				0.05	0.039
				(0.036)	(0.035)
Hearing disability				-0.145**	-0.105*
				(0.049)	(0.047)
Physical disability				0.037	0.073*
				(0.035)	(0.036)
Intellectual disability				-0.157***	-0.150***
				(0.016)	(0.015)
Multiple disabilities				-0.174***	-0.128*
				(0.051)	(0.050)
Gender	X	X	X	X	X
Age	X	X	X	X	X
Country FE	X	X	X	X	X
Sample size	23591	23572	23591	23591	23572
R2	0.214	0.176	0.19	0.153	0.226

Figure 1 Estimated proportion of 14-year-old children with satisfactory reading skills across social groups by country, with 95% confidence intervals

Note: The predictions are calculated at the means of covariates, with separate predictions for each country.
"Poor" refers to children from families in the lowest quintile of the asset index, while "Non-poor" includes all children not in this quintile.
"No school" refers to children from families without any schooling, while "Other" includes all children from families with some level of formal education.
CA: Cenral Africa Republic; CH: Chad; DRC:DRCongo; GH: Ghana; LE: Lesotho; MD: Madagascar; ML: Malawi; TGA: The Gambia; TO: Togo; TN: Tunisia; ZI: Zimbabwe

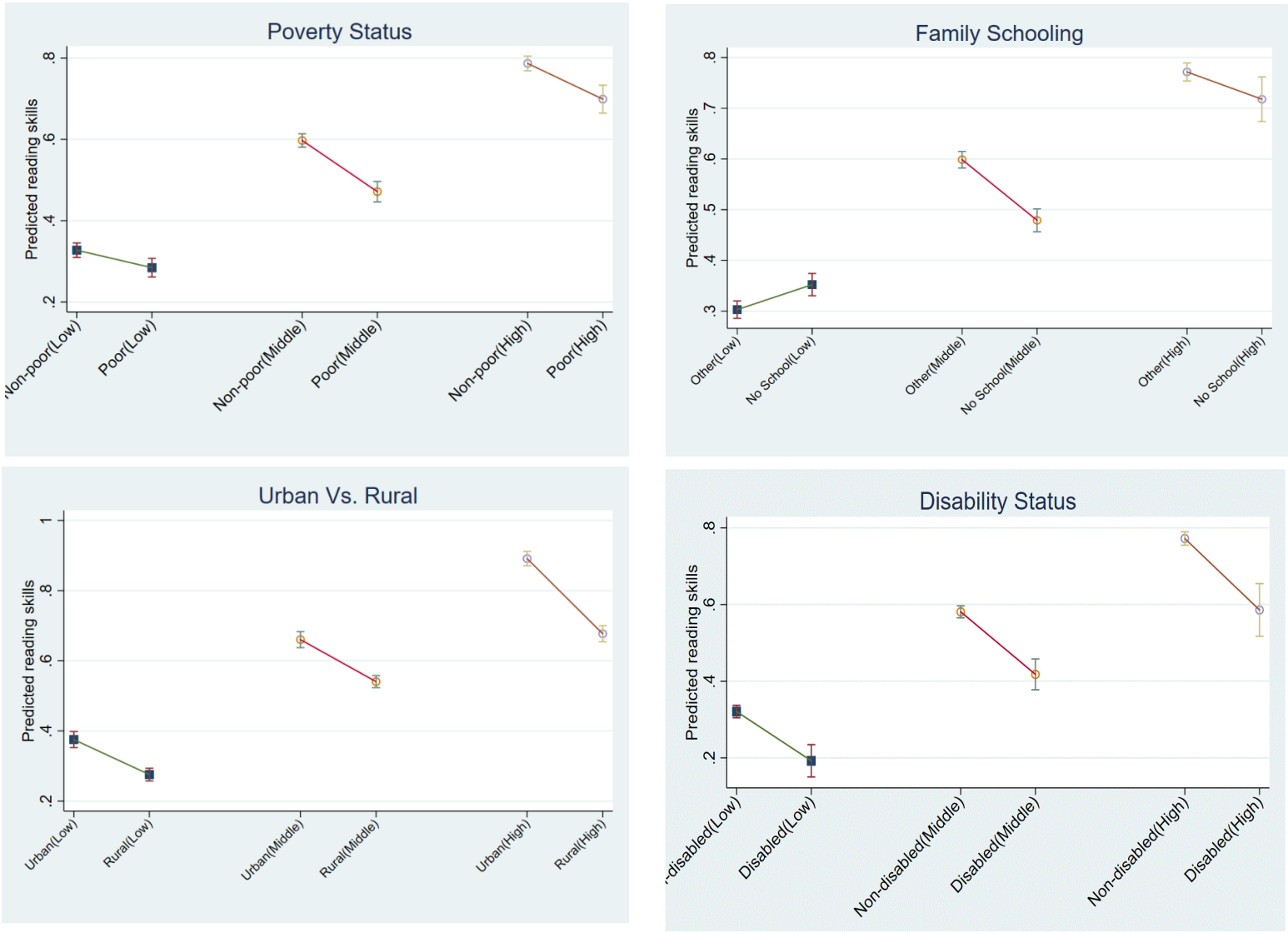

Figure 2 Estimated proportion of 14-year-old children with satisfactory reading skills by country groups, with 95% confidence intervals

Note: The predictions are calculated at the means of covariates, with separate predictions for each country group with low, middle or high reading skills proficiency.
"Poor" refers to children from families in the lowest quintile of the asset index, while "Non-poor" includes all children not in this quintile.
"No school" refers to children from families without any schooling, while "Other" includes all children from families with some level of formal education.
Low: Cenral Africa Republic, Chad, DRCongo, and The Gambia; Middle: Ghana, Madagascar, Malawi, and Togo; High: Lesotho, Tunisia, and Zimbabwe

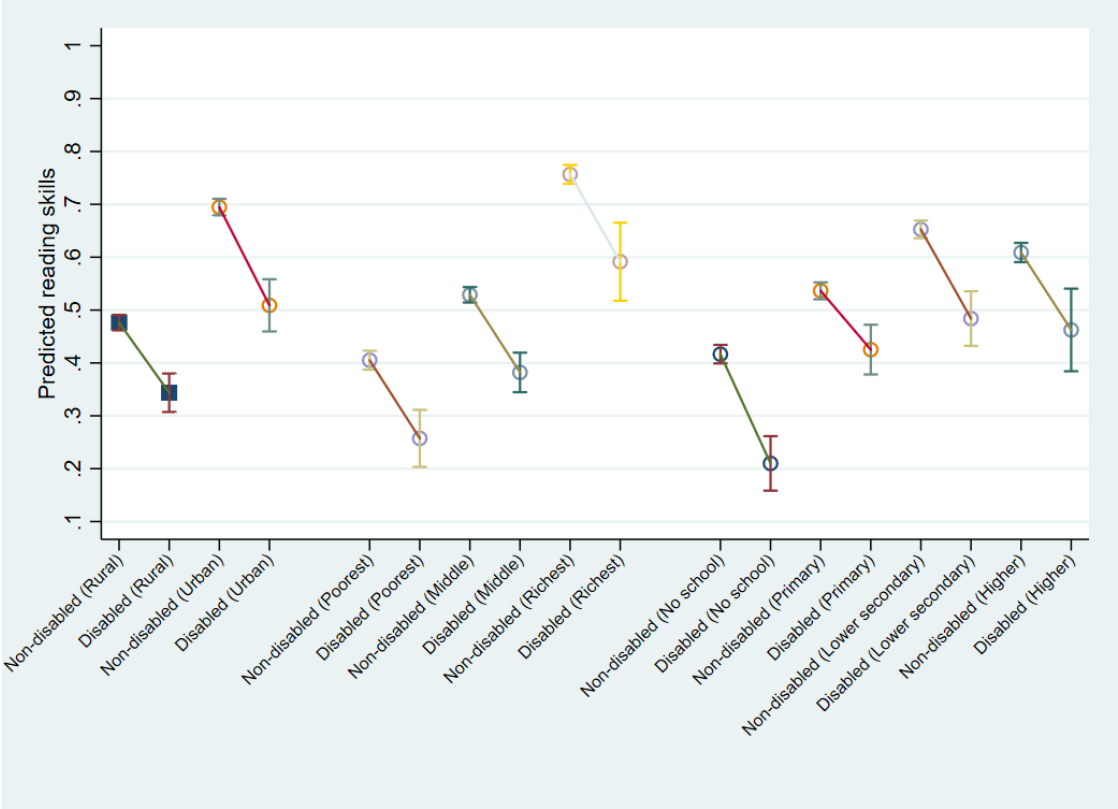

Figure 3 Estimated proportion of 14-year-old children with satisfactory reading skills for CWD and CWOD across various social groups (Country FE), with 95% confidence intervals.

Note: The predictions are calculated at the means of covariates across all countries, with separate predictions for various social groups related to rural and urban residences, family wealth index, and the highest educational level among household members.

Appendix

Appendix I

Regression results from first stage of selection model for each country

Variable	Central Africa R.	Chad	DRCongo	Ghana	Lesotho	Madagascar	Malawi	The Gambia	Togo	Tunisia	Zimbabwe
Disabled	-0.292*	-0.07	-0.592***	-0.440***	-0.389*	-0.16	-0.309***	-0.714**	0.045	-0.305	0.078
Location (base category: urban)											
	-0.280**	-0.253**	-0.197**	-0.290***	-0.169	0.038	-0.130*	-0.212	-0.24	0.189	0.378
Wealth index (base category=Poorest)											
Second quintile	0.12	0.239*	0.033	0.014	0.251*	0.268**	0.156**	-0.184	0.09	-0.166	0.155
Middle	0.102	0.354**	0.253***	0.208	0.353**	0.367***	0.272***	-0.231	0.068	0.169	0.167
Fourth quintile	0.300*	0.323**	0.490***	0.304*	0.282*	0.455***	0.383***	-0.28	0.117	0.288	0.747**
Richest	0.343*	0.507***	0.811***	0.256	0.573***	0.334**	0.539***	0.096	0.14	0.233	0.664*
Highest Educational level in the household (base category=No school)											
Primary	-0.08	0.007	-0.055	-0.104	0.227*	0.105	0.155**	0.148	0.061	-0.109	0.244
Junior High	0.066	0.138	0.066	0.023	0.074	0.11	0.366***	0.159	-0.094	-0.128	0.28
Senior High+	0.047	0.085	0.066	0.185	-0.148	0.047	0.568***	-0.038	-0.001	-0.119	0.795
Age (Base category=10)											
11	-0.018	0.021	0.053	0.098	0.202	0.12	0.196***	0.172	0.137	-0.175	0.111
e12	-0.057	0.094	0.166*	0.273**	0.134	0.125	0.303***	0.254	-0.086	-0.045	0.085
age13	0.056	0.077	0.323***	0.349***	0.157	0.261**	0.430***	0.492**	0.034	-0.167	0.117
age14	0.116	0.203	0.495***	0.631***	0.176	0.336***	0.571***	0.512***	0.241	-0.223	0.222
Gender (Base category: Boys)	-0.167*	0.063	-0.091	-0.099	0.290***	0.058	0.258***	0.222*	-0.066	-0.019	0.371***
Constant	1.133***	0.790***	0.889***	1.704***	0.458	0.29	-0.131	1.068**	1.934***	1.681***	-0.08
Sample size	1458	1910	3468	3159	1823	2972	6332	1355	1663	1669	2144

Appendix II

Sensitivity test to the selection of different cutoff thresholds for the outcome variable of reading proficiency. Regression results for the first hypothesis with cutoff points at 80% and 90% are presented in Table II.1 and Table II.2. Regression results for the second hypothesis with cutoff points at 80%, 85%, and 90% are presented in Table II.3. Regression results for the third hypothesis with cutoff points at 80%, 85%, and 90% are presented in Table II.4. No large sensitivity to the selection of different cutoff thresholds is detected.

Table II.1 IPW least squares regressions by micro-level factors (outcome variable cutoff at 80%)

	Model1	Model2	Model3	Model4	Model5
Wealth index (base category=Poorest)					
Second quintile	0.057***				0.042***
	(0.010)				(0.010)
Middle	0.112***				0.080***
	(0.009)				(0.010)
Fourth quintile	0.208***				0.146***
	(0.010)				(0.011)
Richest	0.372***				0.265***
	(0.010)				(0.012)
Highest Educational level in the household (base category=No school)					
Primary		0.058***			0.031***
		(0.009)			(0.009)
Junior secondary		0.208***			0.094***
		(0.010)			(0.010)
Senior secondary or higher		0.211***			0.082***
		(0.011)			(0.011)
Location (base category: urban)			-0.225***		-0.087***
			(0.008)		(0.009)
Disability status (base category: non-disabled)					
Vision disability				0.032	0.022
				(0.036)	(0.036)
Hearing disability				-0.137**	-0.096*
				(0.050)	(0.047)
Physical disability				0.028	0.064
				(0.035)	(0.035)
Intellectual disability				-0.165***	-0.158***
				(0.016)	(0.016)

Multiple disabilities				-0.167***	-0.119*
				(0.050)	(0.050)
Gender (Base category: Men)	0.037***	0.042***	0.040***	0.043***	0.035***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Age (Base category=10)					
age11	0.064***	0.067***	0.065***	0.073***	0.063***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
age12	0.117***	0.121***	0.116***	0.120***	0.115***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
age13	0.170***	0.176***	0.171***	0.175***	0.170***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
age14	0.216***	0.227***	0.222***	0.229***	0.215***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Country (Base category=Central Africa R.)					
Chad	0.039*	0.077***	0.082***	0.033	0.065***
	(0.016)	(0.018)	(0.018)	(0.018)	(0.017)
DRCongo	0.092***	-0.021	0.045**	0.002	0.064***
	(0.014)	(0.016)	(0.015)	(0.016)	(0.015)
Ghana	0.348***	0.292***	0.310***	0.300***	0.338***
	(0.015)	(0.017)	(0.016)	(0.019)	(0.015)
Lesotho	0.490***	0.439***	0.470***	0.409***	0.492***
	(0.017)	(0.017)	(0.018)	(0.018)	(0.017)
Madagascar	0.416***	0.400***	0.424***	0.373***	0.429***
	(0.016)	(0.017)	(0.017)	(0.018)	(0.016)
Malawi	0.378***	0.370***	0.426***	0.334***	0.407***
	(0.014)	(0.015)	(0.015)	(0.015)	(0.015)
The Gambia	0.239***	0.227***	0.173***	0.164***	0.238***
	(0.018)	(0.019)	(0.019)	(0.020)	(0.018)
Togo	0.276***	0.243***	0.259***	0.216***	0.284***
	(0.018)	(0.019)	(0.019)	(0.020)	(0.017)
Tunisia	0.772***	0.716***	0.686***	0.716***	0.736***
	(0.013)	(0.014)	(0.015)	(0.015)	(0.014)
Zimbabwe	0.440***	0.369***	0.440***	0.385***	0.431***
	(0.015)	(0.017)	(0.016)	(0.018)	(0.015)
Constant	-0.177***	-0.107***	0.123***	0.017	-0.116***
	(0.016)	(0.016)	(0.016)	(0.015)	(0.019)
Sample size	23591	23572	23591	23591	23572
R2	0.225	0.186	0.199	0.163	0.237

Table II.2 IPW least squares regressions by micro-level factors (outcome variable cutoff at 90%)

	Model1	Model2	Model3	Model4	Model5
Wealth index (base category=Poorest)					
Second quintile	0.055***				0.042***
	(0.009)				(0.009)
Middle	0.101***				0.073***
	(0.009)				(0.009)
Fourth quintile	0.186***				0.131***
	(0.009)				(0.010)
Richest	0.337***				0.240***
	(0.010)				(0.012)
Highest Educational level in the household (base category=No school)					
Primary		0.046***			0.022**
		(0.008)			(0.008)
Junior secondary		0.185***			0.083***
		(0.009)			(0.009)
Senior secondary or higher		0.190***			0.075***
		(0.011)			(0.011)
Location (base category: urban)			-0.203***		-0.078***
			(0.008)		(0.009)
Disability status (base category: non-disabled)					
Vision disability				0.022	0.013
				(0.036)	(0.036)
Hearing disability				-0.127**	-0.090*
				(0.047)	(0.045)
Physical disability				0.038	0.071
				(0.036)	(0.036)
Intellectual disability				-0.148***	-0.141***
				(0.015)	(0.014)

Multiple disabilities				-0.142**	-0.099*
				(0.048)	(0.048)
Gender (Base category: Men)	0.034***	0.038***	0.037***	0.040***	0.032***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Age (Base category=10)					
age11	0.054***	0.057***	0.055***	0.063***	0.053***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
age12	0.093***	0.096***	0.092***	0.096***	0.091***
	(0.008)	(0.009)	(0.009)	(0.009)	(0.008)
age13	0.135***	0.139***	0.135***	0.140***	0.135***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
age14	0.173***	0.183***	0.178***	0.185***	0.172***
	(0.009)	(0.009)	(0.009)	(0.010)	(0.009)
Country (Base category=Central Africa R.)					
Chad	0.040**	0.074***	0.079***	0.035*	0.062***
	(0.015)	(0.016)	(0.016)	(0.016)	(0.015)
DRCongo	0.073***	-0.030*	0.031*	-0.008	0.046***
	(0.013)	(0.014)	(0.013)	(0.014)	(0.013)
Ghana	0.283***	0.232***	0.248***	0.239***	0.273***
	(0.014)	(0.016)	(0.015)	(0.017)	(0.014)
Lesotho	0.361***	0.316***	0.342***	0.288***	0.363***
	(0.017)	(0.018)	(0.018)	(0.019)	(0.017)
Madagascar	0.290***	0.277***	0.298***	0.252***	0.303***
	(0.015)	(0.016)	(0.016)	(0.017)	(0.015)
Malawi	0.258***	0.251***	0.301***	0.218***	0.284***
	(0.013)	(0.013)	(0.014)	(0.014)	(0.014)
The Gambia	0.196***	0.183***	0.137***	0.128***	0.193***
	(0.016)	(0.017)	(0.017)	(0.018)	(0.016)
Togo	0.204***	0.174***	0.189***	0.150***	0.211***
	(0.015)	(0.016)	(0.016)	(0.017)	(0.015)
Tunisia	0.680***	0.630***	0.602***	0.629***	0.647***
	(0.014)	(0.015)	(0.015)	(0.015)	(0.015)
Zimbabwe	0.428***	0.365***	0.428***	0.379***	0.420***
	(0.015)	(0.017)	(0.016)	(0.017)	(0.015)
Constant	-0.178***	-0.111***	0.092***	-0.003	-0.121***
	(0.015)	(0.015)	(0.015)	(0.014)	(0.019)
Sample size	23591	23572	23591	23591	23572
R2	0.182	0.148	0.16	0.128	0.193

Table II.3 IPW least squares regressions, interaction terms between various factors and country groups (outcome variable cutoff at 85%, 80%, and 90%)

	Family Schooling			Poverty Status			Urban Vs. Rural			Disability Status		
Cut point	0.85	0.8	0.9	0.85	0.8	0.9	0.85	0.8	0.9	0.85	0.8	0.9
Highest educational level in the household (base category=No school)												
Primary				0.034***	0.036***	0.018*	0.028***	0.029***	0.013	0.026**	0.028**	0.01
				(0.008)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
Junior secondary				0.100***	0.095***	0.091***	0.069***	0.062***	0.062***	0.067***	0.060***	0.060***
				(0.010)	(0.010)	(0.009)	(0.010)	(0.010)	(0.009)	(0.010)	(0.010)	(0.009)
Senior secondary or higher				0.116***	0.118***	0.103***	0.080***	0.081***	0.069***	0.081***	0.082***	0.071***
				(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)	(0.010)
No School	0.054***	0.056***	0.049***									
	(0.011)	(0.011)	(0.010)									
No School#Mid-reading country	-0.163***	-0.169***	-0.125***									
	(0.015)	(0.016)	(0.014)									
No School#High-reading country	-0.102***	-0.088***	-0.129***									
	(0.024)	(0.024)	(0.024)									
Wealth index (base category=Poorest)												
Second quintile	0.043***	0.042***	0.042***				0.040***	0.039***	0.037***	0.043***	0.042***	0.041***
	(0.010)	(0.010)	(0.009)				(0.010)	(0.010)	(0.009)	(0.010)	(0.010)	(0.009)
Middle	0.074***	0.079***	0.072***				0.070***	0.075***	0.065***	0.074***	0.079***	0.071***
	(0.010)	(0.010)	(0.009)				(0.010)	(0.010)	(0.009)	(0.010)	(0.010)	(0.009)
Fourth quintile	0.142***	0.144***	0.128***				0.137***	0.139***	0.120***	0.140***	0.143***	0.124***
	(0.011)	(0.011)	(0.010)				(0.011)	(0.011)	(0.010)	(0.011)	(0.011)	(0.010)
Richest	0.253***	0.261***	0.238***				0.245***	0.254***	0.225***	0.247***	0.256***	0.227***
	(0.012)	(0.012)	(0.012)				(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Poor				-0.043***	-0.046***	-0.037***						
				(0.012)	(0.012)	(0.010)						
Poor#Mid-reading country				-0.083***	-0.087***	-0.064***						
				(0.016)	(0.017)	(0.015)						
Poor#High-reading country				-0.045*	-0.037	-0.084***						
				(0.022)	(0.022)	(0.021)						
Location (base category: urban)	-0.124***	-0.120***	-0.114***	-0.185***	-0.185***	-0.168***	-0.075***	-0.081***	-0.045***	-0.115***	-0.112***	-0.106***
	(0.009)	(0.009)	(0.009)	(0.008)	(0.008)	(0.008)	(0.013)	(0.013)	(0.012)	(0.009)	(0.009)	(0.009)
Rural#Mid-reading country							-0.029	-0.014	-0.047**			
							(0.017)	(0.017)	(0.016)			
Rural#High-reading country							-0.117***	-0.104***	-0.164***			
							(0.018)	(0.018)	(0.018)			
Disabled (base category: non-disabled)	-0.156***	-0.164***	-0.140***	-0.169***	-0.178***	-0.153***	-0.158***	-0.167***	-0.143***	-0.131***	-0.142***	-0.111***
	(0.015)	(0.015)	(0.014)	(0.015)	(0.015)	(0.014)	(0.015)	(0.015)	(0.014)	(0.021)	(0.021)	(0.019)
Disabled#Mid-reading country										-0.03	-0.029	-0.026
										(0.027)	(0.028)	(0.025)
Disabled#High-reading country										-0.053	-0.041	-0.092*
										(0.042)	(0.041)	(0.039)

Age (Base category=10)												
age11	0.063***	0.063***	0.053***	0.064***	0.063***	0.054***	0.063***	0.062***	0.053***	0.062***	0.061***	0.052***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
age12	0.112***	0.117***	0.092***	0.111***	0.116***	0.092***	0.112***	0.117***	0.092***	0.111***	0.117***	0.092***
	(0.009)	(0.009)	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.008)	(0.009)	(0.009)	(0.008)
age13	0.163***	0.172***	0.135***	0.163***	0.173***	0.135***	0.162***	0.171***	0.134***	0.162***	0.171***	0.134***
	(0.009)	(0.009)	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
age14	0.207***	0.218***	0.174***	0.210***	0.221***	0.177***	0.207***	0.218***	0.174***	0.206***	0.217***	0.173***
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
Gender (Base category: Men)	0.038***	0.038***	0.034***	0.040***	0.040***	0.035***	0.038***	0.038***	0.034***	0.038***	0.038***	0.034***
	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Country												
	0.314***	0.337***	0.238***	0.307***	0.330***	0.237***	0.293***	0.305***	0.238***	0.279***	0.301***	0.214***
	(0.008)	(0.009)	(0.008)	(0.009)	(0.009)	(0.008)	(0.014)	(0.014)	(0.013)	0.008	0.008	0.007
	0.478***	0.483***	0.430***	0.457***	0.460***	0.418***	0.522***	0.520***	0.502***	0.456***	0.461***	0.410***
	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)	(0.010)	(0.013)	(0.013)	(0.014)	0.009	0.009	0.009
Constant	0.009	0.017	-0.004	0.113***	0.126***	0.094***	-0.040*	-0.026	-0.058***	-0.019	-0.01	-0.025
	(0.016)	(0.016)	(0.016)	(0.014)	(0.015)	(0.014)	(0.017)	(0.017)	(0.016)	0.016	0.016	0.016
Sample size	23572	23572	23572	23572	23572	23572	23572	23572	23572	23572	23572	23572
R2	0.208	0.215	0.175	0.192	0.198	0.163	0.207	0.214	0.178	0.206	0.212	0.175

Table II.4 IPW least squares regressions, interaction terms between disability status and social factors (outcome variable cutoff at 85%, 80%, and 90%)

Cut point	0.85	0.8	0.9
Disabled (base category: non-disabled)	-0.249***	-0.268***	-0.249***
	(0.045)	(0.047)	(0.040)
Location (base category: urban)	-0.117***	-0.114***	-0.103***
	(0.009)	(0.009)	(0.009)
Disabled # Location			
Disabled # Rural	0.055	0.054	0.092**
	(0.035)	(0.035)	(0.032)
Wealth index (base category=Poorest)			
Middle	0.081***	0.081***	0.076***
	(0.008)	(0.009)	(0.008)
Richest	0.232***	0.238***	0.218***
	(0.012)	(0.012)	(0.012)
Disabled # Wealth Index			
Disabled#Middle	0.000	0.02	-0.003
	(0.034)	(0.035)	(0.031)
Disabled#Richest	0.01	0.039	0.013
	(0.057)	(0.056)	(0.053)
Primary	0.034***	0.032***	0.024**
	(0.009)	(0.009)	(0.008)
Junior secondary	0.109***	0.105***	0.092***
	(0.010)	(0.010)	(0.010)
Senior secondary or higher	0.096***	0.095***	0.084***
	(0.011)	(0.011)	(0.011)
Disabled # Highest Education level in the household			
Disabled#1	0.094**	0.086*	0.058
	(0.036)	(0.037)	(0.031)
Disabled#2	0.049	0.056	0.041
	(0.039)	(0.041)	(0.034)
Disabled#3	0.073	0.048	0.098*
	(0.050)	(0.051)	(0.046)
Age (Base category=10)			
age11	0.064***	0.063***	0.054***
	(0.009)	(0.009)	(0.009)
age12	0.111***	0.116***	0.092***
	(0.009)	(0.009)	(0.008)
age13	0.162***	0.172***	0.136***
	(0.009)	(0.009)	(0.008)
age14	0.206***	0.217***	0.174***
	(0.009)	(0.009)	(0.009)
Gender (Base category: Boys)	0.036***	0.036***	0.032***
	(0.006)	(0.006)	(0.006)
Country			
Chad	0.065***	0.070***	0.068***
	(0.017)	(0.017)	(0.015)
DRCongo	0.043**	0.053***	0.037**
	(0.014)	(0.014)	(0.013)
Ghana	0.315***	0.332***	0.268***
	(0.015)	(0.015)	(0.014)
Lesotho	0.466***	0.487***	0.360***
	(0.017)	(0.017)	(0.017)
Madagascar	0.388***	0.431***	0.304***
	(0.016)	(0.016)	(0.015)
Malawi	0.379***	0.413***	0.289***
	(0.014)	(0.015)	(0.014)
The Gambia	0.221***	0.231***	0.187***
	(0.018)	(0.018)	(0.016)
Togo	0.270***	0.280***	0.208***
	(0.017)	(0.017)	(0.015)
Tunisia	0.698***	0.723***	0.636***
	(0.014)	(0.014)	(0.015)
Zimbabwe	0.427***	0.424***	0.414***
	(0.015)	(0.015)	(0.015)
_cons	-0.097***	-0.093***	-0.100***
	(0.019)	(0.019)	(0.018)
Sample size	23572	23572	23572
R2	0.222	0.233	0.19