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INEQUALITY OF OPPORTUNITY IN EDUCATIONAL ATTAINMENT IN MIDDLE EAST AND NORTH AFRICA: EVIDENCE FROM HOUSEHOLD SURVEYS

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Abstract

Education is widely considered as the most important path to social mobility in the Middle East and North Africa (MENA), yet there are very few studies of the extent to which it fulfills this promise. In this paper we use survey data from seven MENA countries to understand the relationship between schooling attainment of youth and the circumstances into which they are born, namely gender, parent education, and type of community. We consider both the probability of entry and of reaching secondary school using censored ordered probit. We find an alarming degree of inequality of opportunity in attainment in most of these countries, especially in Iraq and Yemen. Previous results of inequality of opportunity in MENA in achievement show that building a level playing field in learning requires much more than free provision of schools; the results of this study find the same for attending and staying in school.

JEL Classifications: O12, I21, C25

Keywords: Educational Attainment, Equality of Opportunity, Middle East.

ملخص

يعتبر التعليم أهم مسار للحراك الاجتماعي في الشرق الأوسط وشمال أفريقيا ، ولكن هناك عدد قليل جدا من الدراسات عن المدى الذي يجعله يحقق هذا الوعد. في هذه الورقة نستخدم بيانات مسح من سبعة بلدان فى الشرق الأوسط لفهم العلاقة بين التعليم المدرسي للشباب والظروف التي يولد فيها، وهما النوع ودرجة تعلم الوالدين، ونوع المجتمع المحيط به. ونضع فى الاعتبار كل من احتمال دخول ووالصول الى المدرسة الثانوية باستخدام الاحتمالية المراقبة (censored ordered probit). نجد أن هناك درجة تنذر بالخطر من عدم تكافؤ الفرص في التحصيل في معظم هذه البلدان، ولا سيما في العراق واليمن. النتائج السابقة من عدم تكافؤ الفرص في منطقة الشرق الأوسط تبين أن ايجاد فرص متكافئة في التعليم يتطلب أكثر بكثير من توفيرمناطق خالية للمدارس؛ نتائج هذه الدراسة تظهر الشئ نفسه بالنسبة للحضور والبقاء في المدرسة.

1. Introduction

During the past three decades countries of the Middle East and North Africa (MENA) have made notable progress in raising the education level of their citizens. However, this progress has been limited to the *quantity* of education (years of schooling), and little has been achieved in terms of quality or equality of opportunity (Salehi-Isfahani et al. 2013). The analysis of data from Trends in the Study of Mathematics and Science Study (TIMSS) by Salehi-Isfahani et al. (2013) revealed a surprisingly high level of inequality of opportunity (IOP) in achievement in several MENA countries, as measured by math and science scores of 8th graders. In this paper we extend that analysis to educational attainment (years of schooling). For a number of countries for which we have access to survey data (mainly household expenditure and incomes surveys) we link attainment to family and community characteristics of high school-age children.

In principle, attainment and achievement are closely correlated. Parents and communities, that offer better educational opportunities for children, help them stay in school longer and learn more. However, there are two reasons why we might expect to find a lower level of IOP in attainment that in achievement. First, parents play a larger role in providing their children with the incentive to learn, by teaching them themselves or by paying for private schools and private tutors, so we would expect children who grow up in better off families and in communities with better public or private schools do better in tests that measure learning. Second, governments have greater influence on attainment because they provide public schools that enable children from various backgrounds to attend school and progress through grades, so IOP in attainment could be lower and the role of family background smaller compared to achievement.

Our main objectives in this paper are to quantify the level of IOP in attainment and compare them to the estimate of IOP in achievement obtained from the TIMSS data (Salehi-Isfahani et al. 2013). We use household surveys from 7 MENA countries (Egypt, Jordan, Tunisia, Palestine, Yemen, Iraq and Syria) to estimate the relationship between two measures of attainment and child circumstances. We measure attainment through a categorical variable that indicates whether a child attended school at all, and if so, the level of schooling they reached. Our sample includes children 12-18 years of age who live with their parents. These surveys typically do not provide any information on the parental characteristics of children who live away from their parents, so we have to limit the age range to reduce selection as much as possible. We use a censored ordered probit model to estimate the probability of the highest level of schooling attained, taking into account that not all children have completed their schooling by the time of the interview.

The rest of the paper is organized as follows. Section 2 presents the stylized facts of educational attainment in MENA; section 3 describes the data; section 4 presents the econometric model; and section 5 the empirical results. Section 6 concludes.

2. Review of Attainment in MENA

International data on schooling attainment portray the rise of schooling in the MENA region in a good light (Salehi-Isfahani 2012), though the levels themselves are low by international standards and given income levels in the regions. Figure 1 shows the average years of schooling for the population aged 15-19 plotted against GDP per capita. Most MENA countries are below the fitted line from the regression of years of schooling on GDP per capita.

For the population 15 years and older, the average years of schooling is 7.12 years, which is lower than the world average of 7.76 years; about 23.3% of them have completed secondary education, compared to 38.1% for East Asia and the Pacific, and 25.3% Latin America and the Caribbean. There is high variation in educational attainment across the MENA region, as for instance 24% of the population in Algeria attained at least lower secondary education, while this ratio is 73% for Jordan (UNESCO 2011).

The MENA region has one of the largest discrepancies in average years of education by gender, as it is only preceded by South Asia, which has an average gender gap of 1.95 years. This gap is close to zero in Latin America and the Caribbean (0.11), and negative in Europe and Central Asia. The gender disparity is favorable for women in some countries in the region; namely Kuwait, United Arab Emirates and Qatar, where local women have higher educational attainment than migrant males. Thus, females have higher educational attainment than males on average in these countries.

3. Data

We use Household Income, Expenditure and Consumption Surveys (HIECS) from a number of MENA counties: Syria 2004, Tunisia 2005, Yemen 2006, Iraqi 2007, Egypt and Palestine 2009, and Jordan 2010. The HIECS data are nationally representative samples collected by the national statistical agencies of the respective countries and harmonized by the Economic Research Forum (ERF). Some of these harmonized data are available from the ERF data portal.[1]

The harmonized data are 50 percent samples drawn from the original surveys, with the exception Palestine (100 percent) and Jordan (25 percent). Table 1 presents sample sizes for the original and working samples.

The HIECS contain detailed information on the demographic characteristics of individuals, household expenditure and household assets.

As with most such surveys, we do not have information on parents for all individuals in the survey. We can obtain such information only for the children of the head of the household. To minimize selection we limit our sample to children 18 years of age and younger. Table 2 shows the percentage of young individuals who are the children of the head of household by age and sex. With the exception of Iraq and Yemen, about 95% of boys are sons of the household head and are therefore not excluded from our sample. About 10% of 18 year-old boys in Iraq and 18% in Yemen are excluded from our sample because they live with others (or with their grandparents) so we cannot match them with their parents. For girls selection is a more serious problem. In most countries we are observing less than 90% of the 18 year-old girls. Presumably, girls leave parental home earlier because they get married at an earlier age. In Iraq and Yemen, about a third of these girls are not in our sample.

In all these cases, boys and girls excluded from our sample are less educated than those included. The selection bias introduced from excluding these less educated children is likely in the direction of understating the extent of IOP in educational attainment because they are most likely raised by less educated parents. Our sample contains more educated children and parents than are in the population and therefore shows less IOP than there actually is. And, Table 3 provides the descriptive statistics for the samples used in this study.

4. Methodology

The analysis of the probability of entry and the highest level attained, which is a categorical variable, requires a censored ordered probit model, because many children are still in school so their education levels are right censored. The censored ordered probit model was originally developed by King and Lillard [1987] and later by Glewwe and Jacoby [1992], Alderman et al. [1995], Behrman et al. [1997] and Holmes [1999]. The essential idea behind the censored ordered probit model is as follows: Define S^* as the desired level of schooling, which is a

[1] www.erfdataportal.com

continuous variable depending on a set of explanatory variables X_i and a residual term ε_i so that

$S_i^* = \beta X_i + \varepsilon_i$ for each individual *i*.

In practice however we do not observe desired schooling S^*. Instead, we observe a discrete level of completed education *S*, for both the enrolled children (the censored sample) and the children who already left school (the uncensored sample) where:[2]

$$S_i = \begin{cases} 0 \; did\ not\ enroll \\ 1 \; enrolled\ in\ primary\ but\ did\ not\ complete\ it \\ 2 \; completed\ primary \\ 3 \; completed\ lower\ secondary \\ 4 \; enrolled\ in\ upper\ secondary \end{cases}$$

The discrete level of observed schooling S_i relates to the latent variable S_i^* as follows:

$$S_i = \begin{cases} 0 \; if\ S_i^* \leq \mu_1 \\ 1 \; if\ \mu_1 < S_i^* \leq \mu_2 \\ 2 \; if\ \mu_2 < S_i^* \leq \mu_3 \\ 3 \; if\ \mu_3 < S_i^* \leq \mu_4 \\ 4 \; if\ S_i^* > \mu_4 \end{cases}$$

where μ_1, μ_2, μ_3 and μ_4 are the cutoffs separating each of the discrete states from the next state.

The censoring indicator $c_i = 1$ if the child is currently enrolled in any of the above levels and $c_i = 0$ if they reached the level and dropped out.

Also let $S_{ik} = 1\ if\ S_i = k$, and $S_{ik} = 0$, otherwise, for $k = 0,..,4$. Under the assumption of normally distributed errors, we estimate an ordered probit model that takes censoring into account using full information maximum likelihood. The log-likelihood function we maximize is:

$$lnL_i = (1 - c_i)\ln[S_{i0}\phi(\mu_1 - \beta X_i) + S_{i1}[\phi(\mu_2 - \beta X_i) - \phi(\mu_1 - \beta X_i)] +$$
$$S_{i2}[\phi(\mu_3 - \beta X_i) - \phi(\mu_2 - \beta X_i)] + S_{i3}[\phi(\mu_4 - \beta X_i) - \phi(\mu_3 - \beta X_i)] +$$
$$S_{i4}[1 - \phi(\mu_4 - \beta X_i)]] + c_i ln[S_{i0} + S_{i1}[1 - \phi(\mu_1 - \beta X_i)] +$$
$$S_{i2}[1 - \phi(\mu_2 - \beta X_i)] + S_{i3}[1 - \phi(\mu_3 - \beta X_i)] + S_{i4}[1 - \phi(\mu_4 - \beta X_i)]]$$

Having obtained the parameter estimates $\widehat{\beta}$, $\hat{\mu}_1, \hat{\mu}_2, \hat{\mu}_3$ and $\hat{\mu}_4$ from maximum likelihood estimation, we use them to predict the probability of reaching each level for any individual with characteristics *X* as follows:

$$\Pr(S = 0) = \phi(\hat{\mu}_1 - \hat{\beta}X)$$
$$\Pr(S = 1) = \phi(\hat{\mu}_2 - \hat{\beta}X) - \phi(\hat{\mu}_1 - \hat{\beta}X)$$
$$\Pr(S = 2) = \phi(\hat{\mu}_3 - \hat{\beta}X) - \phi(\hat{\mu}_2 - \hat{\beta}X)$$
$$\Pr(S = 3) = \phi(\hat{\mu}_4 - \hat{\beta}X) - \phi(\hat{\mu}_3 - \hat{\beta}X)$$
$$\Pr(S = 4) = 1 - (\hat{\mu}_4 - \hat{\beta}X)$$

[2] For Egypt, the data does not allow us to distinguish between achieving primary and lower secondary. The two states are merged in that case leading to a total of four attainment states instead of five.

The explanatory variables represented by *X* include both individual and household level characteristics such as the age and sex of the child, the highest education attained by the mother and the father and whether the region of residence is urban or rural, the wealth quintile of the household and interactions between the wealth quintile dummies and the rural dummy. Table 3 and Table 4 present the summary statistics for the variables used in the empirical analysis.

5. Empirical Results

The results of the censored ordered probit for educational attainments are presented in Table 5. These offer a mixed view inequality of opportunity due to gender. While girls are more likely to go further in school in Jordan, Palestine and Tunisia, the reverse is true in Iraq and Yemen. The coefficient of the female dummy is positive but not significant in Egypt. Parental education affects attainment positively in all countries, but the patterns of influence differ. The empirical literature often finds that father's education matters more for boys and mother's education for girls. This is the case in Egypt and Syria; for others the difference is either negligible or switches by gender.

We present our detailed estimation results in Tables 5-7 in the Appendix. In this section we briefly describe the general findings of these estimates and instead focus more on a discussion of simulation results based on them. Our estimates (see Table 5) conform to the general understanding of the production function of attainment, with a strong role for parental background. Both mother and father education are highly significant determinants of attainment and their effects are in the expected direction.

The rural dummy, which indicates the differences in attainment between urban and rural areas for the lowest wealth quintile, has the expected negative coefficient in Iraq, Palestine, Tunisia and Yemen, and is insignificant in Egypt and Syria, and is somewhat unexpectedly positive in the case of Jordan. Evidently, rural children in Jordan in the lowest wealth quintile have higher attainment. We should note that our wealth index is created using the Filmer and Pritchett (2001) methodology, which measures urban wealth better than rural wealth because agricultural land is not accounted for. We may therefore be underestimating the wealth level of rural households.

The wealth quintiles are also significant indicating that attainment increases with wealth. However, the interactions of wealth quintile with the rural dummy are generally insignificant suggesting that wealth has similar effects on attainment in both urban and rural areas.

We also run separate regressions for boys and girls (see Table 6 and Note: *** $p<0.001$, ** $p<0.01$, *$p<0.05$

Table 6) and use the estimates in these tables to simulate the probability of not entering and of reaching secondary for individuals with different profiles. The results are similar to those in Table 5 with the female dummy.

6. Simulation Results

6.1 Comparison of the least and most advantaged children

The best way to summarize the combined impact of parental education and household assets on attainment is to compare the predicted probabilities of the two extreme outcomes – not entering school at all and enrolling in secondary school -- for two types of children: a "most advantaged" boy or girl (urban with parents with above secondary education and in the top wealth quintile), and a "most vulnerable boy or girl (rural with illiterate parents in the lowest wealth quintile), with the exception of boys in Egypt and boys and girls in Jordan where this child is urban (see above for the positive coefficient of the rural dummy for the reference category which is the lowest wealth quintile). Figure 2 and Figure 3 present the comparisons between these two types of children for all seven countries.

Figure 2 compares the probabilities of *never* entering school for the most vulnerable and the most advantaged boy and girl by country. There are several important observations to be made based on this graph. A striking difference exists between Iraq and Yemen on the one hand as the least opportunity equal countries in the group, based on this measure, with Tunisia, Jordan, and Syria on the other as the most opportunity equal countries (in that order). Egypt and Palestine are in-between cases. In most of these countries girls have a significantly higher probability of not entering school. The most advantaged boy or girl in all countries enjoy 100 percent probability of entering school. But in Yemen, which is the worst case, the most vulnerable girl has only a 6% chance of entering school (40% for a boy); in Iraq these chances are 14% and 38%, in Egypt 75% and 83%, in Palestine about 66% and 81%. By contrast, in Jordan and Tunis even the most vulnerable girl and boy have a high probability of entering school: respectively, 89% and 99% in Jordan and 95% and nearly 100% in Tunisia. As far as entry is concerned, Tunisia is the only country in the group with high equality of opportunity country for boys and girls.

Figure 3 makes the same comparison for a different outcome, the probability of reaching secondary school. Again, the most advantaged children in all countries do quite well, though there are small differences in their probabilities of reaching secondary school. In Egypt, Tunisia, and Yemen nearly all advantaged children, boy or girl, reach secondary school, whereas in Iraq, Jordan, Palestine and Syria the probability is closer to 95%, and there are small differences between boys and girls in this respect.

There are much bigger differences in the probability of entering secondary school between the countries and between boys and girls when it comes to the most vulnerable children. In Iraq the probability for a most vulnerable boy is only 8% and for a girl 3%, followed by Syria (17% and 10%), Palestine (25% and 31%) and Yemen at 27% and 4%. Surprisingly, the most vulnerable children do relatively well in Egypt with a 54% chance of reaching secondary school for a boy and 43% for a girl, beating Tunisia with 41% and 30%. To understand these differences they should be viewed in light of the differences in the probability on entering school. For example, the vulnerable children in Egypt have a much lower chance of entering school compared to Tunisia (75% vs. 100%), but in Egypt persistence in school is greater so that those who do enter school have a greater chance of reaching secondary school. A factor that explains the high persistence in Egypt is that most poor children who reach secondary school can stay in school because they are enrolled in the inferior technical track that leads to a terminal secondary degree and almost never leads to higher education. Historically, this degree has been the minimum threshold of education for getting a government jobs, and parents tried hard to get their children enrolled in at least a technical secondary education.

We take a closer look at the impact of family wealth, as measured by the Filmer and Pritchett index of household assets. Figure 4 presents the comparison of predicted probabilities of never entering school for boys and girls in rural and urban areas by quintiles of wealth, and Figure 5 shows the probabilities of reaching secondary school. In estimating the wealth effect we set the parents' education variables to illiterate and the child age to 18. The general pattern we observe is as expected, with the probability of not entering school negatively related to household wealth and the probability of reaching secondary positively related, though the strength of the relationship differs by outcome, country, place of residence, and gender.

Iraq and Yemen stood out, again, in that household wealth significantly affect the chance of entering school, especially for rural girls. In Yemen, the chance of entering school for a boy in the top quintile is twice that of a boy in the lowest quintile (81% to 40% in rural and urban areas); for girl it rises from about 25% to 75% in rural areas and 6% to 41% in rural areas. A similarly strong relationship between the probability of school entry and wealth exists in Iraq, where the probability of entering school for a rural boy nearly doubles from 38% in the lowest wealth quintile to 68% in the highest quintiles, and more than doubles for a rural girl from 24% to 56%.

In Jordan, Syria, and Tunisia wealth has little effect on the chance of ever entering school, although it does matter more in both Jordan and Syria for girls. Rural girls from the bottom wealth quintile in Jordan and Syria have an 89% and 79% probability of entering, respectively, compared to a 100% and 93% probability for girls in the top wealth quintile in the two countries, respectively. The effect of wealth on the probability of school entry is somewhat more important in Egypt and Palestine and again more pronounced for girls than for boys. While the probability of entering school increases from 83% to 94% for a rural boy as he goes from the bottom to the top wealth quintile in Egypt, it goes up nearly twice as much for a rural girl, from 75% to 93%. The fact that wealth affects girls probability of entry more than that of boys is expected as parents tend to treat girls' schooling as more of a luxury relative to boys' schooling, which is thought of as more of a necessity.

In most countries, the likelihood of reaching secondary education was more strongly affected by wealth than the probability of ever entering school. This is to be expected because family resources matter more for persistence in school than the probability of entering it. Even in Jordan and Tunisia, where wealth had a weak impact on the probability of entering school, wealth seems to matter significantly in reaching secondary education. In Tunisia, a rural boy can see his probability of entering secondary increase by one and a half times (41% vs. 63%) as he goes from the bottom to the top quintile, and a rural girl can see her probability double (30% to 60%). In Jordan, the odds ratios are similar, but with girls in the top wealth quintiles performing better than boys in terms of reaching secondary school. Palestine exhibits a similar pattern.

Again, Yemen and Iraq exhibit the greatest degree of inequality of opportunity along the household wealth dimension when it comes to reaching secondary school. A rural Yemeni boy from the top wealth quintile has nearly 2.6 times the probability of reaching secondary school as one from the bottom wealth quintile (70% vs. 27%). The contrast is even sharper among rural girls, where the ratio is eight to one (32% vs. 4%). The penalty from living in rural areas is greatest for girls in Yemen, followed by Iraq. In Iraq, wealth is less important than in Yemen, albeit because children from all quintiles have a low chance of reaching secondary education, about 25% for those in the top quintile relative to about 8% for the lowest quintile. Similarly to Iraq, wealth appears to have a lower effect on reaching secondary in Syria, but, again, this is because that probability is relatively low for all children of wealthy backgrounds.

A seemingly surprising result is the relative equality of opportunity in reaching secondary school in Egypt across wealth quintiles. In fact, Egypt appears to be similar to Tunisia, one of the most opportunity equal countries with respect to educational attainment among the countries we are examining. As explained earlier, this is because Egypt has managed to open up the relatively inferior technical secondary education track to the children of the poor. The selection into general vs. technical secondary in Egypt exhibits a great deal of inequality of opportunity, with the university bound general secondary being highly inaccessible to the poor (See Assaad 2010).

7. Conclusion

This paper uses available survey data from seven MENA countries to understand the role of gender, family background, and place of residence on child educational attainment. Interest in the extent of inequality of opportunity in education in the Arab world has increased considerably following political and social turmoil in several Arab countries that began in 2010 and continues to this day. Much has been written about the frustrations of their youth in employment, on poverty, and income inequality, but very little has been available on inequality of opportunity (the two exceptions are Belhaj-Hassine (2011) and Salehi-Isfahani et al. 2013).

Understanding inequality of opportunity in education is particularly important because since MENA countries gained independence in the mid 20th century, free access to education has been an important part of the social compact between authoritarian regimes and the people they ruled. People in the lower social strata have also viewed it as the main path to economic and social mobility. In a more expansive study of educational achievement containing 16 MENA countries, Salehi-Isfahani et al. (2013) use data from international test scores in mathematics and science (TIMSS) to understand inequality of opportunity in learning. They find surprisingly large shares of total inequality that is explained by family background and community characteristics. In this paper we work with attainment in a smaller number of countries and do not directly estimate the share of opportunities in total inequality in years of schooling, but we find levels of inequality of opportunity that are alarming and consistent with those found for achievement.

The surprising result in this paper is how similar Iraq is, or has become, to the region's poorest country, Yemen. We found that in Iraq, the odds of reaching secondary school was 12 times as high for a most advantaged boy or girl relative to the most vulnerable child. In this case it was worse than Yemen with an odds ratio of 3.6. The country with the second highest level of inequality of opportunity in reaching high school is Syria, with an odds ratio of 5.4. This result also surprised us given the claims of the Baathist regime in Syria to provide equal access to schools. In Syria the chances of ever entering school was also highly unequal for the children from the most and least advantaged. Palestine also appears highly unequal in educational opportunity according to this measure with an odds ratio of 3.6 for the two types of backgrounds. In Egypt, the odds of ever entering was high (given its investments in free education, but the chances of reaching secondary was least unequal (odds of 2.3). Gender, which is often considered as an important source of inequality of opportunity in general in MENA countries, does not appear to matter for schooling attainment.

Equality of opportunity in attainment, unlike in achievement, lends itself more to public policy because it is more sensitive to investment in public education. In countries in which formal jobs, especially public jobs, are allocated mainly based on attainment, building schools and providing minimal incentives to attend school would go a long way to level the playing field in attainment. The findings of high inequality of opportunity in Salehi-Isfahani et al. (2013), suggest that reaching a level playing field in learning requires much more than free provision of schools. Given the difficulty of counter balancing the advantage that children of educated and well-off parents have in learning, it behooves the region's governments to at least equalize the likelihood of attending and staying in school.

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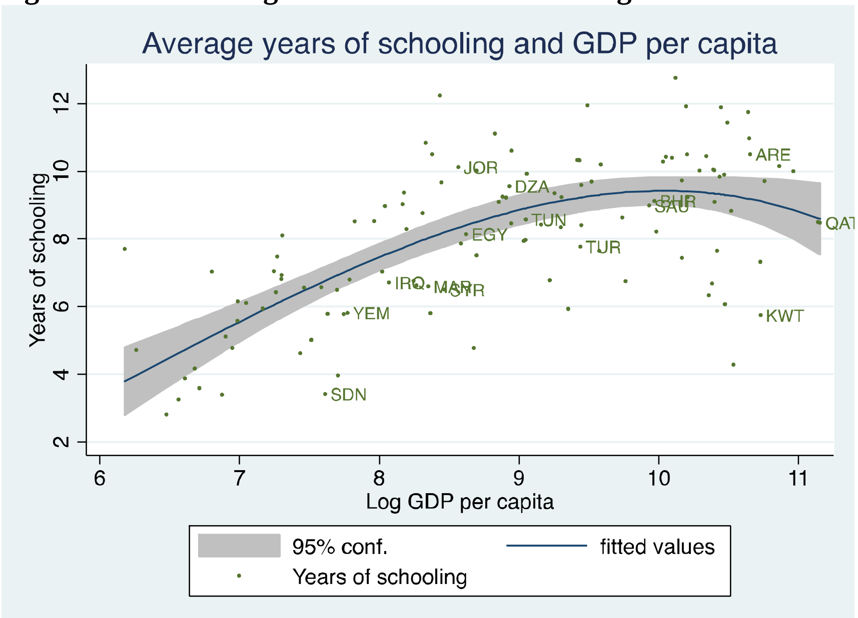
Figure 1: Average Years of Schooling Are Below Global Standards



Source: Barro and Lee (2010) and World Bank World Development Indicators.

Figure 2: Probability of Not Entering School for Most Vulnerable and Most Advantaged Child, by Sex

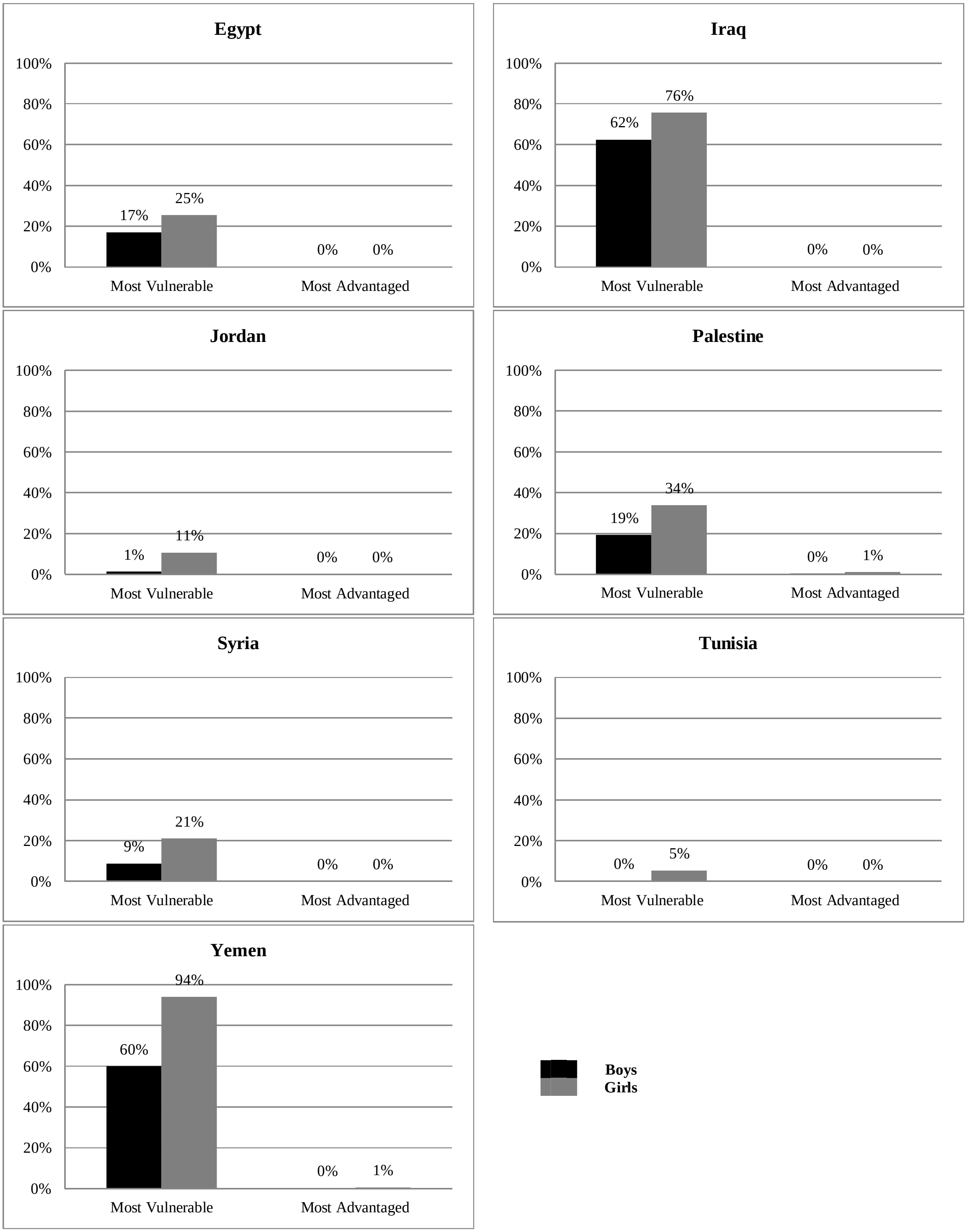


Figure 3: Probability of Reaching Secondary for Most Vulnerable and Most Advantaged Child, by Sex

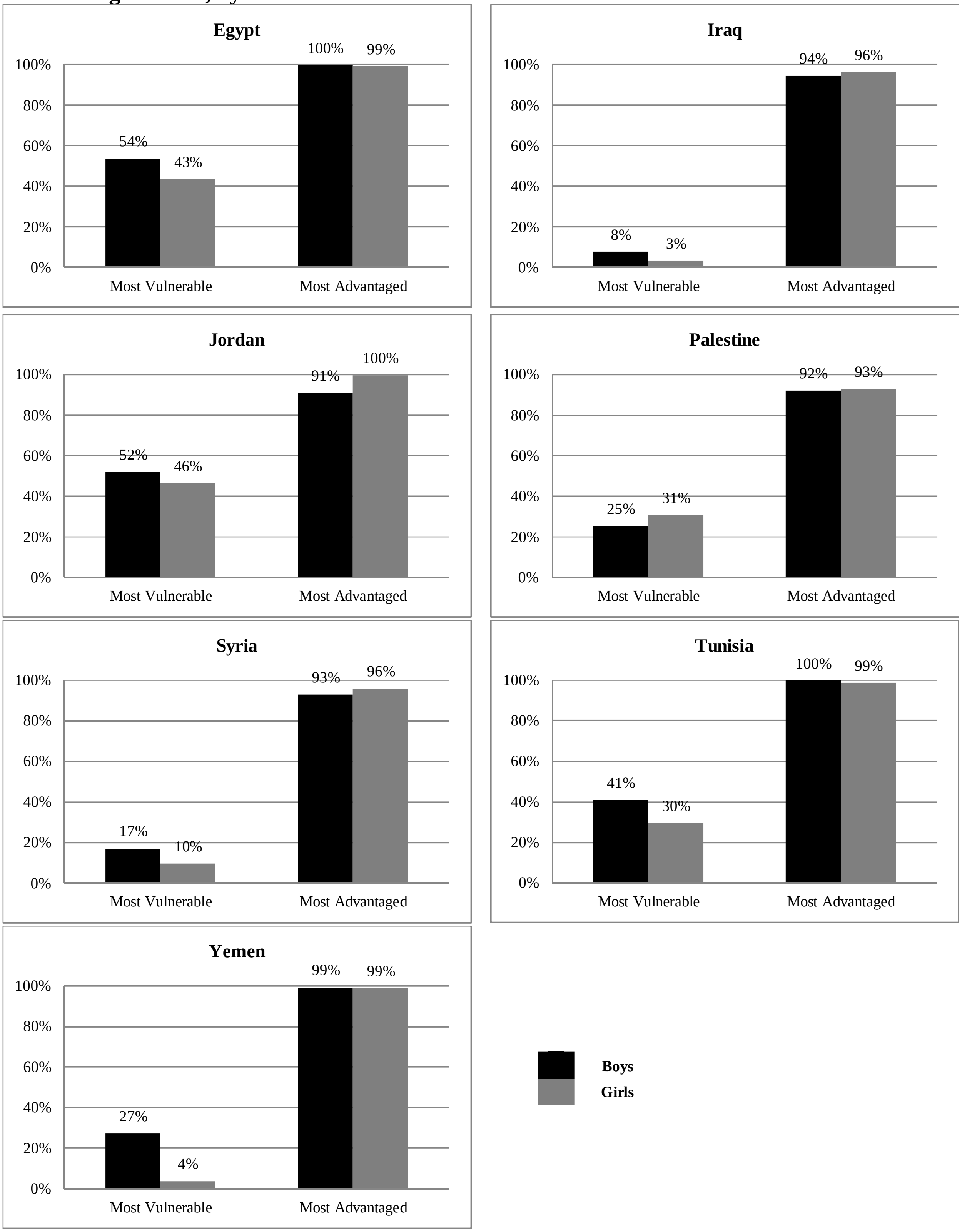


Figure 4: Predicted Probability of Not Entering School by Wealth Quintile, Urban/Rural Location and Sex

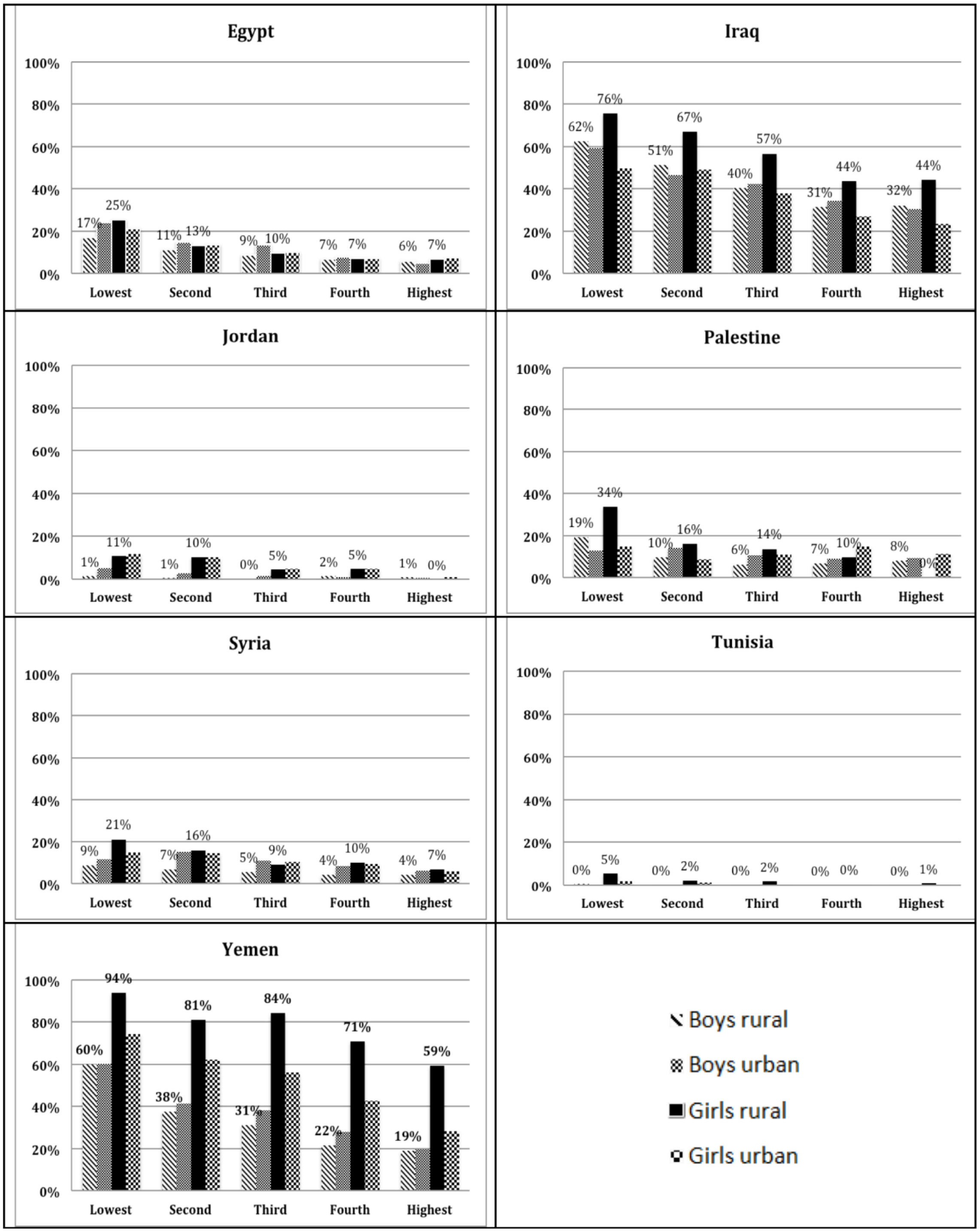


Figure 5: Predicted Probability of Reaching Secondary School by Wealth Quintile, Urban/Rural Location and Sex

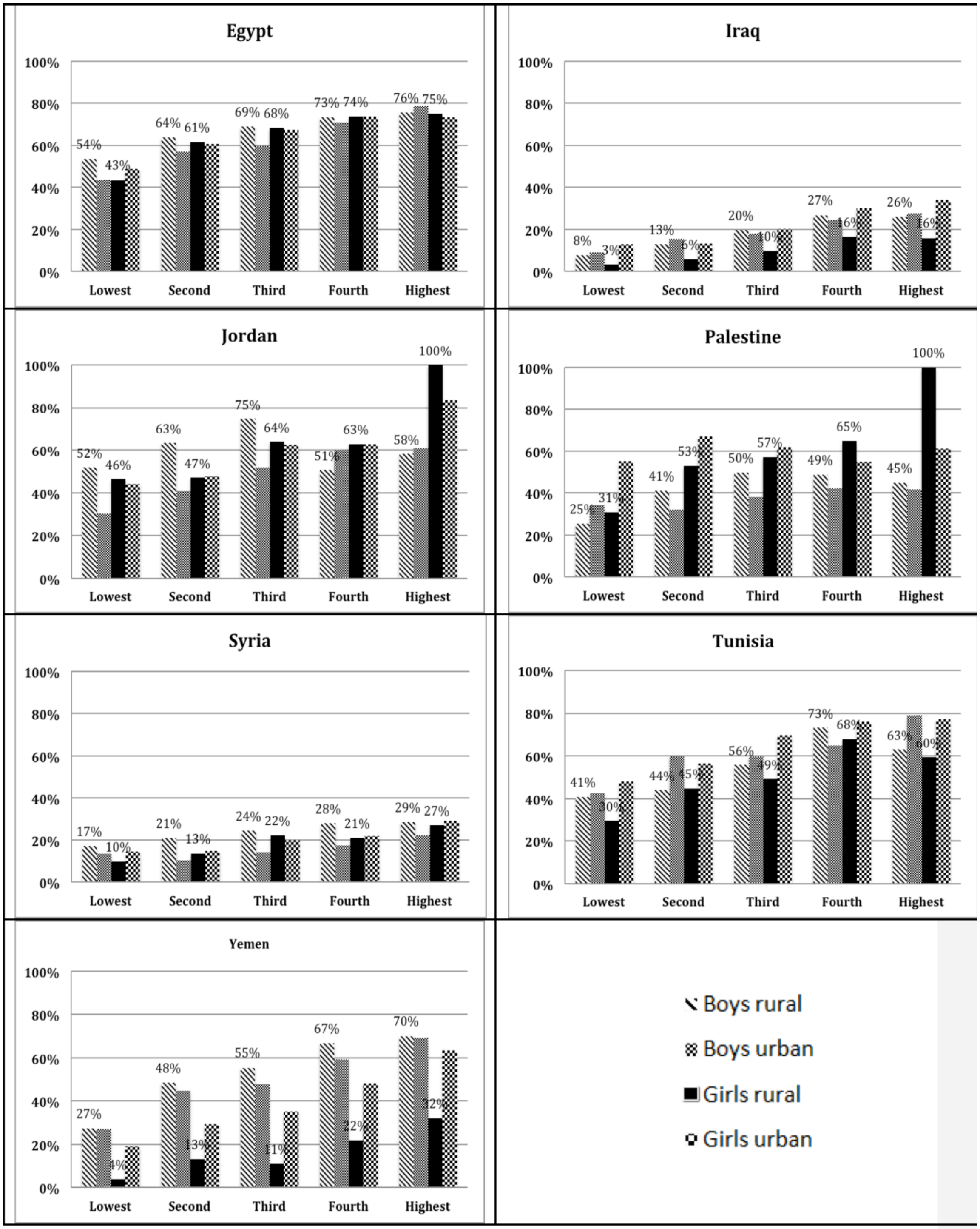


Table 1: Sample Sizes

		Individuals of all ages	Individuals of age 12 to 17
Egypt	2009	109,763	15,507
Iraq	2007	127,188	18,177
Jordan	2010	15,472	2,542
Palestine	2009	23,178	4,246
Syria	2004	173,371	32,158
Tunisia	2005	56,947	8,468
Yemen	2006	98,941	15,709

Source: Constructed by the authors using HIECS data.

Table 2: Percentage of Youth 12-22) Who Are Sons or Daughters of The Household Head by Age and Sex

Age	Egypt	Iraq	Jordan	Palestine	Syria	Tunisia	Yemen
				Boys			
12	93.5	88.6	97.3	97.0	97.3	94.7	83.3
13	93.5	90.1	96.4	96.8	97.3	93.8	84.3
14	93.9	89.5	97.9	98.9	98.0	94.4	84.5
15	93.3	91.7	96.5	97.7	97.4	95.1	85.3
16	94.9	89.9	96.7	96.8	97.1	93.2	84.6
17	94.0	89.6	97.8	97.1	97.5	96.3	83.9
18	93.7	89.4	98.9	97.7	97.4	93.8	81.8
19	93.5	88.5	96.5	97.9	96.5	95.7	82.5
20	92.9	86.1	98.7	98.0	93.7	95.5	77.9
21	91.4	83.6	94.7	94.9	94.6	95.4	76.7
22	90.3	80.0	95.5	91.6	94.4	94.2	74.0
Age				**Girls**			
12	91.6	88.4	95.6	96.0	97.4	93.7	85.2
13	94.2	89.2	95.2	98.1	97.6	95.6	86.0
14	93.7	88.0	99.0	96.9	98.0	93.3	85.4
15	94.6	82.3	97.6	97.7	96.9	94.9	83.2
16	93.3	79.8	92.2	96.0	94.9	91.6	80.5
17	90.0	72.1	92.7	92.0	91.8	94.0	74.5
18	82.9	66.6	89.4	88.4	86.4	92.0	65.7
19	79.0	57.5	86.3	80.9	84.1	91.5	58.8
20	65.7	52.8	78.4	70.1	70.4	91.3	48.0
21	57.1	48.5	74.4	59.2	71.9	87.1	44.5
22	48.5	42.1	70.1	51.4	61.0	82.2	41.5

Source: Constructed by the authors using the harmonized HIECS data from seven MENA countries.

Table 3: Descriptive Statistics for the Educational Attainment Variables

		Egypt 2009		Iraq 2007		Jordan 2010		Palestine 2009		Syria 2004		Tunisia 2005		Yemen 2006	
		N	**Mean**	**N**	**Mean**	**N**	**Mean**	**N**	**Mean**	**N**	**Mean**	**N**	**Mean**	**N**	**Mean**
Ever Attended	Male	8078	0.929	9496	0.941	1305	0.994	2192	0.993	16753	0.983	4245	0.989	8233	0.952
	Female	7429	0.925	8681	0.865	1237	0.993	2054	0.991	15405	0.958	4223	0.977	7476	0.781
Currently Attending	Male	8078	0.788	9496	0.656	1305	0.850	2192	0.847	16753	0.661	4245	0.824	8233	0.758
	Female	7429	0.785	8681	0.529	1237	0.916	2054	0.932	15405	0.643	4223	0.842	7476	0.555
Never Attended	Male	7576	0.076	9462	0.059	1286	0.006	2191	0.007	16749	0.017	4232	0.008	8159	0.042
	Female	7003	0.079	8651	0.135	1224	0.007	2054	0.009	15401	0.042	4200	0.018	7426	0.217
No Certificate	Male	7576	0.167	9462	0.364	1286	0.057	2191	0.068	16749	0.110	4232	0.001	8159	0.377
	Female	7003	0.151	8651	0.314	1224	0.048	2054	0.063	15401	0.111	4200	0.003	7426	0.376
Achieved Primary	Male	NA	NA	9462	0.423	1286	0.593	2191	0.472	16749	0.640	4232	0.595	8159	0.348
	Female	NA	NA	8651	0.391	1224	0.604	2054	0.440	15401	0.607	4200	0.573	7426	0.246
Achieved Preparatory	Male	NA	NA	9462	0.015	1286	0.085	2191	0.073	16749	0.027	4232	0.141	8159	0.031
	Female	NA	NA	8651	0.011	1224	0.037	2054	0.024	15401	0.027	4200	0.114	7426	0.017
Achieved Primary or Prep.	Male	7576	0.397	/	/	/	/	/	/	/	/	/	/	/	/
	Female	7003	0.415	/	/	/	/	/	/	/	/	/	/	/	/
Ever Attended Secondary	Male	7576	0.360	9462	0.139	1286	0.260	2191	0.378	16749	0.207	4232	0.254	8159	0.202
	Female	7003	0.356	8651	0.148	1224	0.304	2054	0.464	15401	0.212	4200	0.292	7426	0.144

Note: All the variables in the table are dummy variables.

Table 4: Descriptive Statistics for the Explanatory Variables

	Egypt 2009		Iraq 2007		Jordan 2010		Palestine 2009		Syria 2004		Tunisia 2005		Yemen 2006	
	N	**Mean**	**N**	**Mean**	**N**	**Mean**	**N**	**Mean**	**N**	**Mean**	**N**	**Mean**	**N**	**Mean**
Girl dummy	15507	0.479	18177	0.478	2542	0.487	4246	0.484	32158	0.479	8468	0.499	15709	0.476
Urban dummy	15507	0.389	18177	0.642	2542	0.704	4246	0.703	32158	0.492	8468	0.557	15709	0.616
Father, illiterate	15507	0.588	18177	0.397	2542	0.226	4246	0.184	32158	0.306	8468	0.330	15709	0.702
Father < sec	15507	0.097	18177	0.355	2542	0.450	4246	0.475	32158	0.505	8468	0.396	15709	0.149
Father, secondary	15507	0.176	18177	0.071	2542	0.134	4246	0.147	32158	0.066	8468	0.213	15709	0.070
Father > sec.	15507	0.139	18177	0.177	2542	0.190	4246	0.193	32158	0.123	8468	0.062	15709	0.079
Mother, illiterate	15507	0.661	18177	0.610	2542	0.225	4246	0.170	32158	0.519	8468	0.465	15709	0.912
Mother < sec.	15507	0.081	18177	0.290	2542	0.471	4246	0.553	32158	0.388	8468	0.364	15709	0.061
Mother, secondary	15507	0.168	18177	0.031	2542	0.140	4246	0.172	32158	0.039	8468	0.136	15709	0.014
Mother > sec	15507	0.090	18177	0.069	2542	0.163	4246	0.105	32158	0.054	8468	0.035	15709	0.013
Wealth quintile 1	15507	0.215	18174	0.200	2542	0.276	4246	0.201	32142	0.167	8411	0.221	15509	0.116
Wealth quintile 2	15507	0.227	18174	0.186	2542	0.198	4246	0.192	32142	0.213	8411	0.241	15509	0.155
Wealth quintile 3	15507	0.186	18174	0.194	2542	0.181	4246	0.247	32142	0.193	8411	0.191	15509	0.149
Wealth quintile 4	15507	0.231	18174	0.216	2542	0.166	4246	0.177	32142	0.218	8411	0.180	15509	0.255
Wealth quintile 5	15507	0.141	18174	0.204	2542	0.179	4246	0.183	32142	0.208	8411	0.167	15509	0.325
Urban*Wealth 1	15507	0.043	18174	0.073	2542	0.174	4246	0.126	32142	0.053	8411	0.063	15509	0.026
Urban*Wealth 2	15507	0.082	18174	0.091	2542	0.118	4246	0.131	32142	0.060	8411	0.091	15509	0.057
Urban*Wealth 3	15507	0.041	18174	0.128	2542	0.149	4246	0.175	32142	0.106	8411	0.116	15509	0.067
Urban*Wealth 4	15507	0.141	18174	0.176	2542	0.120	4246	0.138	32142	0.122	8411	0.145	15509	0.182
Urban*Wealth 5	15507	0.082	18174	0.173	2542	0.143	4246	0.132	32142	0.150	8411	0.141	15509	0.292

Appendix Tables
Table 5: Censored Ordered Probit Results for Attainment

	Egypt	Iraq	Jordan	Palestine	Syria	Tunisia	Yemen
	b/se	**b/se**	**b/se**	**b/se**	**b/se**	**b/se**	**b/se**
girl	0.010	-0.324***	0.415***	0.517***	-0.090***	0.086*	-0.853***
	(0.027)	(0.019)	(0.085)	(0.062)	(0.016)	(0.039)	(0.023)
father below secondary	0.411***	0.242***	-0.057	0.264***	0.396***	0.026	0.274***
	(0.049)	(0.022)	(0.099)	(0.071)	(0.019)	(0.045)	(0.035)
father secondary	0.648***	0.662***	0.397*	0.602***	0.868***	0.407***	0.490***
	(0.055)	(0.046)	(0.167)	(0.112)	(0.043)	(0.069)	(0.054)
father above secondary	0.828***	0.845***	0.320	0.799***	0.877***	0.779***	0.877***
	(0.098)	(0.037)	(0.167)	(0.121)	(0.036)	(0.165)	(0.068)
mother below secondary	0.333***	0.371***	0.328***	0.319***	0.407***	0.168***	0.348***
	(0.061)	(0.024)	(0.097)	(0.072)	(0.020)	(0.048)	(0.065)
mother secondary	0.871***	0.849***	0.695***	0.607***	1.032***	0.484***	1.036***
	(0.076)	(0.076)	(0.158)	(0.111)	(0.063)	(0.095)	(0.221)
mother above secondary	1.009***	1.342***	0.970***	0.612***	1.360***	0.947***	1.136***
	(0.142)	(0.072)	(0.195)	(0.153)	(0.065)	(0.277)	(0.293)
2nd wealth quintile	0.333***	0.167***	0.192	0.035	-0.076	0.331***	0.409***
	(0.066)	(0.045)	(0.136)	(0.100)	(0.046)	(0.098)	(0.075)
3rd wealth quintile	0.450***	0.364***	0.494***	0.127	0.116**	0.488***	0.536***
	(0.081)	(0.043)	(0.142)	(0.099)	(0.042)	(0.096)	(0.074)
4th wealth quintile	0.699***	0.624***	0.615***	0.126	0.213***	0.610***	0.851***
	(0.071)	(0.042)	(0.164)	(0.110)	(0.043)	(0.100)	(0.067)
5th wealth quintile	0.820***	0.729***	0.794***	0.156	0.417***	0.879***	1.192***
	(0.102)	(0.044)	(0.167)	(0.114)	(0.042)	(0.110)	(0.067)
rural	0.072	-0.393***	0.339*	-0.471***	-0.060	-0.277***	-0.418***
	(0.056)	(0.041)	(0.150)	(0.121)	(0.041)	(0.082)	(0.069)
2nd wealth quintile*rural	0.025	0.084	-0.102	0.535*	0.246***	-0.067	0.141
	(0.077)	(0.059)	(0.229)	(0.216)	(0.055)	(0.113)	(0.088)
3rd wealth quintile*rural	0.072	0.158**	0.112	0.573**	0.290***	-0.035	0.031
	(0.091)	(0.060)	(0.323)	(0.200)	(0.055)	(0.123)	(0.088)
4th wealth quintile*rural	-0.036	0.193**	-0.489	0.654**	0.220***	0.318	0.066
	(0.091)	(0.069)	(0.275)	(0.248)	(0.055)	(0.163)	(0.084)
5th wealth quintile*rural	-0.099	0.062	-0.207	0.804**	0.130*	-0.178	-0.057
	(0.128)	(0.076)	(0.375)	(0.247)	(0.059)	(0.180)	(0.096)
age dummies (from 12 to 17)	YES	YES	YES	YES	YES	YES	YES
Cutoff 1	-0.733***	-1.058***	-1.496***	-1.323***	-1.521***	-2.272***	-0.955***
	(0.060)	(0.044)	(0.166)	(0.123)	(0.042)	(0.097)	(0.068)
Cutoff 2	-0.502***	-0.038	-1.210***	-0.944***	-1.158***	-2.248***	0.009
	(0.060)	(0.043)	(0.156)	(0.116)	(0.041)	(0.096)	(0.067)
Cutoff 3	0.111	0.964***	-0.316*	-0.195	0.868***	-1.267***	0.046
	(0.059)	(0.044)	(0.136)	(0.109)	(0.041)	(0.088)	(0.067)
Cutoff 4		1.078***	0.531***	0.348**	1.027***	0.159	0.303***
		(0.044)	(0.134)	(0.108)	(0.041)	(0.084)	(0.068)
Model p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N (Observations)	**15506**	**18110**	**2510**	**4245**	**32132**	**8375**	**15276**

Note: *** p<0.001, ** p<0.01, *p<0.05

Table 6: Censored Ordered Probit Results for Boys

	Egypt	**Iraq**	**Jordan**	**Palestine**	**Syria**	**Tunisia**	**Yemen**
	b/se	b/se	b/se	b/se	b/se	b/se	b/se
father below secondary	0.461***	0.284***	-0.244	0.302***	0.399***	-0.087	0.317***
	(0.069)	(0.032)	(0.132)	(0.091)	(0.028)	(0.066)	(0.053)
father secondary	0.679***	0.727***	0.558*	0.702***	1.039***	0.324***	0.594***
	(0.076)	(0.066)	(0.244)	(0.138)	(0.062)	(0.094)	(0.090)
father above secondary	1.031***	1.002***	0.271	1.052***	0.965***	0.996***	0.963***
	(0.153)	(0.055)	(0.206)	(0.158)	(0.050)	(0.251)	(0.113)
mother below secondary	0.368***	0.274***	0.083	0.178	0.318***	0.122	0.265**
	(0.086)	(0.036)	(0.133)	(0.092)	(0.028)	(0.068)	(0.097)
mother secondary	0.752***	0.634***	0.563**	0.443**	0.931***	0.364**	1.088**
	(0.099)	(0.105)	(0.205)	(0.139)	(0.089)	(0.128)	(0.395)
mother above secondary	0.929***	1.188***	0.785**	0.562**	1.275***	0.994*	0.952*
	(0.198)	(0.102)	(0.239)	(0.197)	(0.087)	(0.439)	(0.429)
2nd wealth quintile	0.336***	0.323***	0.280	-0.066	-0.160*	0.442**	0.478***
	(0.088)	(0.064)	(0.179)	(0.122)	(0.064)	(0.139)	(0.107)
3rd wealth quintile	0.402***	0.425***	0.561**	0.103	0.028	0.432**	0.560***
	(0.109)	(0.061)	(0.184)	(0.124)	(0.059)	(0.134)	(0.106)
4th wealth quintile	0.713***	0.640***	0.766***	0.203	0.173**	0.566***	0.846***
	(0.094)	(0.059)	(0.212)	(0.137)	(0.059)	(0.136)	(0.096)
5th wealth quintile	0.957***	0.742***	0.790***	0.190	0.342***	0.988***	1.110***
	(0.144)	(0.062)	(0.203)	(0.144)	(0.058)	(0.156)	(0.096)
Rural	0.251***	-0.086	0.559**	-0.266	0.159**	-0.045	0.006
	(0.075)	(0.058)	(0.210)	(0.165)	(0.059)	(0.117)	(0.098)
2nd wealth quintile*rural	-0.077	-0.035	0.011	0.502	0.297***	-0.359*	0.088
	(0.105)	(0.085)	(0.331)	(0.278)	(0.078)	(0.162)	(0.127)
3rd wealth quintile*rural	0.001	0.139	0.058	0.558*	0.224**	-0.057	0.181
	(0.124)	(0.088)	(0.439)	(0.269)	(0.079)	(0.173)	(0.128)
4th wealth quintile*rural	-0.180	0.164	-0.797*	0.429	0.190*	0.284	0.192
	(0.122)	(0.099)	(0.358)	(0.325)	(0.078)	(0.232)	(0.124)
5th wealth quintile*rural	-0.352*	0.037	-0.631	0.345	0.043	-0.429	0.020
	(0.178)	(0.111)	(0.433)	(0.292)	(0.084)	(0.261)	(0.148)
age dummies (from 12 to 17)	YES	YES	YES	YES	YES	YES	YES
Cutoff 1	-0.702***	-0.882***	-1.935***	-1.625***	-1.652***	-2.647***	-0.880***
	(0.078)	(0.059)	(0.230)	(0.158)	(0.059)	(0.144)	(0.096)
Cutoff 2	-0.463***	0.232***	-1.636***	-1.135***	-1.197***	-2.627***	0.257**
	(0.078)	(0.058)	(0.214)	(0.143)	(0.057)	(0.144)	(0.094)
Cutoff 3	0.160*	1.199***	-0.481**	-0.230	0.951***	-1.346***	0.289**
	(0.077)	(0.060)	(0.174)	(0.132)	(0.056)	(0.123)	(0.094)
Cutoff 4		1.336***	0.511**	0.399**	1.108***	0.183	0.610***
		(0.061)	(0.172)	(0.132)	(0.056)	(0.116)	(0.095)
Model p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N (Observations)	**8077**	**9460**	**1286**	**2191**	**16739**	**4205**	**8029**

Note: *** p<0.001, ** p<0.01, *p<0.05

Table 7: Censored Ordered Probit Results for Girls

	Egypt	Iraq	Jordan	Palestine	Syria	Tunisia	Yemen
	b/se	b/se	b/se	b/se	b/se	b/se	b/se
father below secondary	0.361***	0.284***	-0.244	0.302***	0.399***	-0.087	0.317***
	(0.071)	(0.032)	(0.132)	(0.091)	(0.028)	(0.066)	(0.053)
father secondary	0.628***	0.727***	0.558*	0.702***	1.039***	0.324***	0.594***
	(0.080)	(0.066)	(0.244)	(0.138)	(0.062)	(0.094)	(0.090)
father above secondary	0.679***	1.002***	0.271	1.052***	0.965***	0.996***	0.963***
	(0.130)	(0.055)	(0.206)	(0.158)	(0.050)	(0.251)	(0.113)
mother below secondary	0.300***	0.274***	0.083	0.178	0.318***	0.122	0.265**
	(0.086)	(0.036)	(0.133)	(0.092)	(0.028)	(0.068)	(0.097)
mother secondary	1.030***	0.634***	0.563**	0.443**	0.931***	0.364**	1.088**
	(0.124)	(0.105)	(0.205)	(0.139)	(0.089)	(0.128)	(0.395)
mother above secondary	1.078***	1.188***	0.785**	0.562**	1.275***	0.994*	0.952*
	(0.205)	(0.102)	(0.239)	(0.197)	(0.087)	(0.439)	(0.429)
2nd wealth quintile	0.301**	0.323***	0.280	-0.066	-0.160*	0.442**	0.478***
	(0.099)	(0.064)	(0.179)	(0.122)	(0.064)	(0.139)	(0.108)
3rd wealth quintile	0.477***	0.425***	0.561**	0.103	0.028	0.432**	0.560***
	(0.121)	(0.061)	(0.184)	(0.124)	(0.059)	(0.134)	(0.106)
4th wealth quintile	0.667***	0.640***	0.766***	0.203	0.173**	0.566***	0.846***
	(0.107)	(0.059)	(0.212)	(0.137)	(0.059)	(0.136)	(0.096)
5th wealth quintile	0.656***	0.742***	0.790***	0.190	0.342***	0.988***	1.110***
	(0.147)	(0.062)	(0.203)	(0.144)	(0.058)	(0.156)	(0.096)
rural	-0.132	-0.086	0.559**	-0.266	0.159**	-0.045	0.006
	(0.086)	(0.058)	(0.210)	(0.165)	(0.059)	(0.117)	(0.098)
2nd wealth quintile*rural	0.154	-0.035	0.011	0.502	0.297***	-0.359*	0.088
	(0.115)	(0.085)	(0.331)	(0.278)	(0.078)	(0.162)	(0.127)
3rd wealth quintile*rural	0.162	0.139	0.058	0.558*	0.224**	-0.057	0.182
	(0.136)	(0.088)	(0.439)	(0.269)	(0.079)	(0.173)	(0.128)
4th wealth quintile*rural	0.129	0.164	-0.797*	0.429	0.190*	0.284	0.192
	(0.137)	(0.099)	(0.358)	(0.325)	(0.078)	(0.232)	(0.124)
5th wealth quintile*rural	0.180	0.037	-0.631	0.345	0.043	-0.429	0.021
	(0.188)	(0.111)	(0.433)	(0.292)	(0.084)	(0.261)	(0.148)
age dummies (from 12 to 17)	YES	YES	YES	YES	YES	YES	YES
cutoff 1	-0.795***	-0.882***	-1.935***	-1.625***	-1.652***	-2.647***	-0.881***
	(0.090)	(0.059)	(0.230)	(0.158)	(0.059)	(0.144)	(0.096)
cutoff 2	-0.573***	0.232***	-1.637***	-1.135***	-1.197***	-2.627***	0.257**
	(0.090)	(0.058)	(0.214)	(0.143)	(0.057)	(0.144)	(0.095)
cutoff 3	0.032	1.199***	-0.481**	-0.230	0.951***	-1.346***	0.289**
	(0.089)	(0.060)	(0.174)	(0.132)	(0.056)	(0.123)	(0.095)
cutoff 4		1.336***	0.511**	0.399**	1.108***	0.183	0.610***
		(0.061)	(0.172)	(0.132)	(0.056)	(0.116)	(0.095)
Model p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
N (Observations)	7429	9460	1286	2191	16739	4205	8029

Note: *** p<0.001, ** p<0.01, *p<0.05