Emigration and education: the schooling of the left behind in Nigeria

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Emigration and education: the schooling of the left behind in Nigeria

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Abstract: The potential effects of migration on the welfare of the left behind consist in an important part of the debate around migration. In this paper we use data from the World Bank's migration and remittance household survey to examine the impact of family migration on educational attainment. Because migration status of households is endogenous, we use proportion of migrants in a local district and distance to foreign missionary station in 1921 as instruments for *migration of household member*. We find that being in a migrant household increases the probability of completing secondary school and attending some post-secondary education. We also find that being in a migrant household increases the probability of own future migration. We further explore channels through which migration of family member affects education. We find that the expectation of an individuals own future migration may be a driver of the increased educational attainment.

Keywords: Migration; Human Capital.

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1 Introduction

Despite recent political backlash in Europe and the United States, international migration remains a formidable force with wide-ranging consequences in destination and origin countries. The presence of a migrant family member living in a developed country could have multifaceted implications for the welfare of the left behind. This paper attempts to examine the impacts of international migration on the education of family members in Nigeria. Specifically, we study the net effects of the presence of a migrant family member living in a foreign country on the educational attainment of family members back at home at both secondary and post-secondary levels. We then examine the role of the prospect of future migration, inspired by the presence of a family member abroad, as a potential channel mediating the effect of emigration on family education. By conducting such analysis for Nigeria, the most populous country on the African continent, we hope to shed light on the human capital implications of migration in one of the poorest regions in the world.

The link between emigration and education is often viewed from the point of the view of the emigrant without much consideration for spillover effects on those left behind. That is why the issue of migration from developing countries tends to raise the specter of brain drain. This is a legitimate concern given the selectivity involved in attracting skilled migrants from developing countries that do not share borders with developed countries. However, this concern has been countered with the argument that the prospect of migration may lead to a net increase in the stock of human capital of the origin country by encouraging more individuals than who will eventually emigrate to invest in education (Mountford 1997, Vidal 1998, Beine et al. 2008). In this regard, the potentially positive impact of migration on the education of the left behind might not be limited to household wellbeing. It could also extend to improving aggregate human capital despite initial loss through brain drain.

The presence of a migrant family member in a foreign, and usually, more developed country could influence the education of the left behind through a number of potential channels. The first potential channel is remittances. Remittances may help to relax the

credit constraint that is often behind underinvestment in education in many developing countries. As a second potential channel, the absence of family members from home may affect education of the left behind negatively by depriving them of proper guidance and role models or burdening them with extra household responsibilities. The third potential channel is the improved probability of future migration of the left behind. The argument for this channel rests on two assumptions. First, the presence of family members and other social networks in destination countries plays an important role in encouraging new emigration to those destinations (Massey and Espana 1987, Palloni et al. 2001). Second, on average, there is higher return to education in destination countries than in origin countries.

In this paper, the primary objective is identifying the net effect of the emigration of a family member on education that may have been transmitted through a variety of channels. But, as a secondary objective, we also test the effect of future own emigration as a channel. We focus on the probability of future emigration as a potential channel for two reasons. First, the prospect of future emigration is deemed to affect the expected returns to education more directly than competing channels such as remittances which exert influence through the budget constraint. Second, as far as our geographical focus is concerned, more migrants from African countries move to the US and the European Union through the help of family reunification programmes than any other means, lending credence to the importance of family network for migration (Lucas 2015).

Although the key propositions we test are rooted in human capital theory, the scope of this study is mainly empirical. We use completion of secondary school and attendance of postsecondary education as alternative outcome variables. Completion of secondary schooling has become an important indicator of social progress in developing countries since the expansion of primary schooling in most of these places in recent years has led to churning out of students eligible for secondary education. Moreover, secondary education is arguably the minimum requirement for most migrants to be able to cope up with life and work in foreign countries.[1] In this regard, we expect that migration of a family member has a positive

impact on completion of secondary education by the left behind. Postsecondary education, on the other hand, may involve more strategic considerations than secondary schooling. For instance, people might defer investing in postsecondary education in their home countries if they expect to migrate to another country in the near future. But, it could also be the case that postsecondary education increases both the chance of migration and the return to education in prospective destination countries. Thus, the effect of migration on postsecondary education depends on a number of factors including timing, perceived probability of migration and the comparative quality and cost of education in origin and destination countries.

We employ household and individual level data from the migration and remittances survey conducted by the World Bank in 2009 to do the empirical analysis. Making causal inference regarding the link between migration and education requires identifying an exogenous source of variation for migration. We *instrument having a migrant in the household with* proportion of international migrants form the same town as the respondent and distance to a foreign mission/church in 1921. Accordingly, we use *bivariate probit* estimation to measure the net effect of migration on the education of the left behind. Once we have estimated the main coefficients of interest, we then test the relevance of the prospect of future migration of the left behind as a channel. This is done by estimating the predicted probability of migration as a function of *having a migrant in the household.* We then estimate the effect of the predicted probability of future migration on educational attainment.

Firstly, we find a positive and significant impact of having a migrant member of the household on the probability of completing secondary school, and attending post secondary school. This result is robust to various specifications and estimations techniques and is validated by using various exogenous measures of migrant networks as instruments. Secondly, we find that being in a migrant household increases the probability of own future migration. Finally, we find that the probability of own future migration is positively correlated with the probability of completing secondary school or attending post secondary school. Our re-

sults help understand the dynamics and channels through which migration influences human capital development of those left behind.

The remainder of this paper is organized as follows. Section 2 presents the conceptual framework of the paper. Section 3 discusses the empirical strategy. Section 4 describes the data used for the analysis and section 5 discusses the results. Finally, section 6 concludes.

2 Conceptual framework

The link between emigration of family members and education of the left behind is anchored in two separate theoretical frameworks. One is human capital theory of education while the other is the social capital theory of migration. The human capital theory of education characterizes schooling decisions as one of investment, which is a function of future returns, opportunity cost and direct costs. Generally, schooling decision can be specified as follows:

$$S_i = s(R_i, C_i, Z_i) \tag{1}$$

where S is years of schooling, R is expected returns, C is expected cost and Z is a vector of other factors that influence schooling decision. Individuals face heterogeneous returns to education depending on, among other things, their level of access to high-return foreign labor markets. This assertion is based on the assumption that global labor markets are segmented according to wealth into high and low return markets. In the presence of credit market imperfections, individuals also face heterogeneous direct costs which may depend on their endowments and other flows such as remittances. Finally, nonpecuniary factors including environmental conditions such as role models influence education. In this regard, the physical absence of family members due to migration can reduce their use as role models to individuals who attend school in the country of origin. Thus, we can claim that expected own migration or current migration of other family members can potentially affect schooling

decision through one or more of the constructs identified in equation 1.

Among the two dimensions of migration identified above as consequential to educational outcomes, expected own migration can be predicted using the presence of migrant family members *in a foreign country*. This is where the social capital theory of migration comes into play. According to social capital theory, migrant networks exist due to interpersonal ties between potential migrants and previous migrants occurring in the form of kinship, friendship, and shared community origin. Migrant networks "increase the likelihood of international movement because they lower the costs and risks of movement and increase the expected net returns to migration" (Massey et al, 1998, pp. 42-3). In this light, the presence of a migrant family member *in a foreign country* can be expected to have a significant impact on the probability of own future migration.

Assuming that migrants can acquire schooling in foreign countries, the level of schooling individuals with a non-zero probability of migration attain in the country of origin depends on the following considerations. On the one hand, education acquired in country of origin may increase the probability of migration itself. On the other hand, education obtained in destination country may be more relevant and worthy of higher return than education obtained in country of origin. If the latter consideration outweighs the former, we can expect the presence of a migrant family member *in a foreign country* to have a negative effect on the education of the left behind by encouraging them to defer investing in education until they emigrate. On the contrary, if the gain in the probability of migration from domestic education outweighs the return differential due to foreign education, the presence of a migrant family member *in a foreign country* encourages immediate investment in education in the home country.

Considering all direct and indirect channels, the net effect of the presence of a migrant family member *in a foreign country* on the education of the left behind can be either positive or negative depending on the magnitude of competing effects. In the case of the current study, we expect emigration of a family member to have a positive effect on completion

of secondary school. The potentially negative impact of emigration that could occur via parental absence is minimized because temporary labor migration, which is often the reason for parental absence, is not common in Nigeria. Moreover, deferment of education until prospective emigration is unlikely to happen for basic education at young age. In the case of postsecondary education as well, we expect the positive effects of remittances and expected own migration to outweigh the negative impacts of deferment and parental absence.

3 Empirical strategy

We begin formulating our empirical strategy by specifying a reduced form of the human capital investment function laid out in equation 1,

$$S_i = \alpha_0 + \alpha_1 M_i + \alpha_2' X_i + \varepsilon_i \tag{2}$$

where S is either completion of secondary schooling or attainment of postsecondary education, M_i is an indicator variable *for having a migrant in the household*, X_i is a vector of control variables that often determine the demand for education. ε is a random disturbance term. α_i captures the net effect of *having a migrant in the household* on education of the left behind. Primarily, we estimate equation 2 to reveal this effect. Secondarily, we attempt to explicate the impact of the probability of future own emigration as a channel. Accordingly, expected own emigration is written as the following latent variable,

$$Q_i^* = \beta_0 + \beta_1 M_i + \beta_2 S_i^* + \zeta_i \tag{3}$$

where ζ is a random disturbance term. Expected own emigration is a function of *having a migrant in the household*, M, and expected level of schooling, S^*. Finally, equation 2 can be written as a function of expected own migration as follows,

$$S_i = \gamma_0 + \gamma_1 Q_i^* + \gamma_2' X_i + \varsigma_i \tag{4}$$

where ς is a random disturbance term. *The above simultaneous equation system suggests that the portion of expected own migration that is explained by the presence of a migrant household member in a foreign country can be used to predict level of schooling. Accordingly,* in order to determine the effect of expected own emigration as a channel, we predict the latent probability of migration using equation 3. We then use those results in equation 4 to estimate the impact of family emigration as channeled by the prospect of own migration.

In this paper, we argue that expected own migration, indirectly captured by the presence of migrant family members *in a foreign country*, influences the level of schooling. It is however likely that the presence of migrant family members *in a foreign country* is endogenous, i.e. both migration and education in a given family could be influenced by a common unobserved factor. For instance, family members such as parents and elder siblings may decide to migrate because they wish to improve the educational opportunities of younger members of the family through remittances and future migration to developed countries with better schools and universities. In this case, both migration and education of the left behind are determined by family-level preference for better human capital.

This problem of endogeneity poses a challenge for our estimation strategy. To deal with this problem we argue that migrant networks could act as a source for exogenous variation in the probability of migration. The migrant networks would however not directly influence the probability of any given person's level of schooling.

The idea that migrant networks influence an individual's probability of migration has been established in the literature. Theoretically, the presence of migrant networks reduces the costs of migration. Having friends or family members who have successfully migrated implies that new migrants have contacts who will guide and help them settle more easily. The reduced cost of migration, all things being equal, should increase the probability of migration. This idea of the impact of migrant networks, and its usefulness as a source of

exogenous variation, is not unique to this paper and has been used in other studies examining various impacts of migration. C. Batista et al (2012) use the length of migration of a family member, arguing that longer history of migration implies deeper access to migrant networks, and lower migration costs. Woodruff and Zenteno (2007) and McKenzie and Rapoport (2006) on the other hand use the historic level of migration in a given geographical area as proxy for migrant networks.

In this paper, we use two separate proxies to capture the strength of migrant network to which any given individual is exposed to. First, we use the proportion of international migrants in the town in which the individual is located. This instrument is similar to that used by Woodruff and Zenteno (2007). Towns with a larger proportion of migrant family members, are assumed to have deeper migrant networks. The variation in the proportion of migrant family members is however due to historic factors not influenced by an individual's level of schooling.*A possible concern with this instrument is that having own household in the computation of town level proportion makes the instrument endogenous. In order to address this concern, we exclude own household from the computation of proportion of migrants in town.*

Our second instrument uses one of these historic factors as a proxy for deeper migrant networks. Specifically, we use the distance from the town in which the migrant is located to the nearest missionary station in 1921. Missionary stations were typically associated with Europeans who presumably still maintained networks to their home countries. This maintenance of links to home countries is highlighted by one of the key factors behind the decisions on where to locate missions, the ability to import supplies from Europe (Hildegard Binder Johnson, 1967). According to Johnson (1967) mission stations locations were influenced by previous mission stations who provided information on surrounding areas. The result was a network of stations that together formed a series of a transshipment points from the coast to the interior (Nunn, 2010 pg. 148). Missions with these networks to their home countries, implied that people living closer to these missions were historically much more likely

to tap into these networks. This would imply lower costs of migration and therefore a higher probability of historical migration which in turn predicts larger present migration.

Although one could argue that the level of schooling is intergenerational, and therefore historic factors which influence migration would also influence the level of schooling. For instance, the work of missionaries in Nigeria was directly linked to their distribution of European education (Horton, 1971). To deal with this threat, we control for the level of education of the father and mother of the individual. Controlling for the level of education of the parents can potentially cancel out the possible influence of historic factors directly influencing the level of schooling of the individual. We also control for the relative level of development in the area, proxied by the average intensity of night light in the local government area where the individual is located, and the number of schools relative to the population of the state. This should capture all the town-level effect that the distance to the historic mission may have on the individuals' level of schooling.

4 Data

The study uses data from Migration and Remittance Household Survey (MRHS) conducted by the World Bank in 2009. Although the MRHS was designed to shed light on various aspects of migration and remittances, it also collected information on a variety of demographic, social and economic characteristics of all household members, including emigrants. The MRHS interviewed nationally representative sample of 2251 households. The households were selected using multistage stratified random sampling from 17 states and 93 towns. We restrict the sample for the study to children of household head aged 16 to 30 years who were living in the household in 2009. The sample consists of 2628 children living in 1156 households.

Migration and education are the key variables of interest in our study. Regarding migration, the MRHS asked all households if they currently have a member living outside of

Nigeria. Generally, surveys on migration tend to ask whether migration of household members occurred within the last five years prior to the survey. As opposed to other similar surveys, the MRHS captures information on migrants even if they left home a long time back. This adds to the suitability of our data for examining the impact of migration on education considering that the impact of migration on education persists over a long period of time. We define a child as living in a migrant household if the household has at least one international migrant family member. Summary statistics for key variables are presented in table 1. About 30 percent of children in our sample were living in a migrant household, ensuring enough variation in the explanatory variable.

The education system in Nigeria involves 6 years of primary education, 3 years of junior secondary education and 3 years of senior secondary education. Majority of Nigerians begin primary education at the age of 4. Primary education (grade 1 to 6) is free and compulsory since 1976. Junior secondary education (grade 7 to 9) also became compulsory with the introduction of the Universal Basic Education (UBE) programme in 1999. We choose 16 as the starting age for our sample because most students in Nigeria normally complete secondary school from age 16 onward. Around 38 percent of 16 year-old children in our sample completed secondary school.

Education is measured using number of years required to complete the highest grade attained. We use data on years of schooling to define two binary indicators showing whether the child completed secondary school and whether the child attained post-secondary school. Table 1 shows children living in a migrant household are more likely to complete secondary school and attain post-secondary school. 80 percent of children living in a migrant households completed secondary school compared to 60 percent in non-migrant households. 32 percent of children living in a migrant households attained post-secondary school compared to 14 percent in non-migrant households. Likewise, children living in migrant households have higher mean schooling than children in non-migrant households (12.5 vs 10). Given that the differences are statistically significant, it suggests that there is a positive association between

having a migrant in the household and education of children. This is also corroborated by the fact that the coefficient of correlation between being in a migrant household and years of schooling of children is 0.3 (p-value=0.000). The empirical analysis sheds light on whether this relationship holds after we take into account the endogenous nature of migration behavior and control for various observable characteristics which also affect schooling.

Table 1 also presents descriptive statistics for an array of control variables. We use an indicator for female, father's years of schooling, mother's years of schooling, number of children in the household, number of schools per 1000 population, and average night light intensity as controls. While most of the control variables are taken from MRHS, number of schools, night light intensity and distance to missionary station data come from secondary data sources. Women make up 38 percent of the sample. Average age of the sample is 21.5 years. Average father's and mother's years of schooling are 8.5 and 7.7 respectively. Children living in migrant households have more educated parents than children in non-migrant households. This could be seen as an indication of family preference for education being a potential source of endogenity. Looking at the instruments, households with migrant are located in towns with higher proportion of migrants and close to missionary stations relative to households without migrant.This suggests that both proportion of migrants in the town and distance to missionary station are likely to perform well as instruments for migration.

Our main sample discussed above is restricted to only household members who still lived at home in 2009. The analysis of channel of migration, however, requires both current household members and migrant children in order to estimate the effect of being in a migrant household on the probability of own migration. Accordingly, we add migrant children of head who were aged 16 to 30 years prior to their migration into our main sample. After dropping observations with missing data, our sample for the estimation of channel of migration consists of 2796 children from 1030 households. The summary statistics show that around 6 percent of children of head aged 16 to 30 years in the sample are international migrants. Higher

proportion of migrant children completed secondary school and attained some post-secondary education prior to their migration relative to non-migrant children.

5 Empirical results

This section reports the empirical estimates on the relationships hypothesized in the conceptual framework. *While we present estimates of different models for the purpose of comparison, we mainly interpret results of bivariate probit model, which is better suited for our purpose.*We begin with documenting the baseline association between *having a migrant in the household*, and the probability of completing secondary school as in equation 3.1. Accordingly, Table 2 reports OLS results using different specifications and subsamples. Columns (1) shows that there is a positive and statistically significant relationship between being in a migrant household and completing secondary school. In column (2) we control for the sex, age, father's education, mother's education, and number of children in the household. These controls are typically regarded as being important for education outcomes. We also control for the number of schools per 1000 people in the state where the household is located, and the average night lights intensity of the local government area where the household is located. Both variables help capture some of the aggregate differences in level of development and schooling resources across areas which should also influence educational outcomes. Finally, we control for age group fixed effects to account for some of the differences across cohorts. The results show that the positive relationship holds and remains significant despite these controls.

In columns (3) and (4) we restrict the sample to male and female individuals respectively. We do this to ensure that the relationship we find is not driven by gender specific factors which we have not captured. In both cases the relationship between being in a migrant household and the probability of completing secondary school remains positive and significant. However, the relationship is more robust for male children than for females. Finally, in

column (5) we restrict the sample to only individuals neither of their parents are migrants. This is done to rule out the effect of parental absence on educational outcomes. The result again shows a strong positive effect of being in a migrant household on probability of completing secondary school.

The results in Table 2 suggest that there is a positive correlation between being in a migrant household and the probability of finishing secondary school. However, as discussed earlier, it is also possible that there are unobserved variables which influence both the probability of being in a migrant household and the probability of finishing secondary school. In Table 3 we use two indicators of exposure to migrant networks as instruments. Specifically, column (1) uses the proportion of migrants in the district as an instrument and column (2) uses the distance to a foreign mission in 1921. The 2SLS estimates confirm that being in a migrant household does increase the probability of completing secondary school. Using distance to foreign missionary station in 1921 as instrument produces higher point estimates than using proportion of migrants in the district. Comparison of OLS and 2SLS results shows the impact of being in migrant household on probability of completing secondary school becomes stronger once we instrument for migration. The F-statistics indicate that the excluded instruments explain variation in migration of family members at conventional levels. Columns (3) and (4) in Table 3 mirror columns (1) and (2) but make use of a bivariate probit estimator due to the binary nature of both the dependent and endogenous variables. We compute marginal effect of change in household migration status to identify the magnitude of the effect. Depending on the instrument used, *living in a migrant household* increases the probability of completing secondary school by 14 to 17 percent.

The results above show that the probability of completing secondary school is higher in migrant households. However, the impact of family migration on education may extend to post-secondary schooling. In Table (4) we show that the positive relationship also holds for the probability of attending some post-secondary education. Table (4) mimics table (3) in that we use exposure to migrant networks to test the effect of being in a migrant house-

hold on the probability of attending post-secondary school. Generally, there is a positive and significant relationship between family migration and the probability of attending some post-secondary schooling. However, the results are not as robust as the ones for secondary schooling. This suggests that the impact of family migration on higher levels of education might not be as straight forward as the impact on basic education. The magnitude of the marginal effect is also much smaller in the case of post-secondary schooling. *Being in a migrant household* increases the probability of attending post-secondary school by less than 3 percent.

The above results show the overall impact of family migration on education outcomes. We now move on to exploring the role of expected own migration as an intermediate factor channelling the impact of family migration. The working hypothesis is that expected own migration could serve as the motivation for the increase in educational attainment. We test this hypothesis using a two-step approach. First, we pool the samples of migrants and non-migrants to estimate the impact of being in a migrant household on the probability of own migration as in equation 3.2. Second, we use the predicted probabilities of own migration from the previous estimation to estimate the effect of expected own migration on educational outcomes as in equation 3.3.

Table 5 presents the results of the first-stage estimation linking family migration to own migration. As expected, there is a positive relationship between the presence of a migrant family member *in a foreign country* and the probability of own migration. Since the same concern of endogeneity as in earlier estimations pervades the relationship between family migration and own migration, we apply the two instruments we used before jointly in columns (3) and (4). The impact of family migration on own migration is more robust when instruments are used.

We calculate the predicted probabilities of own migration for the sample of migrant and non-migrant individuals using coefficients presented in columns (3) and (4) in Table 5. Table 6 estimates the effect of expected own migration, which already takes account of

family migration through the aforementioned estimation, on the probability of completing secondary school. Table 7 presents the corresponding results in the case of post-secondary schooling. All results show that expected own migration exerts positive and significant effect on educational outcomes.

5.1 Robustness tests

The above analysis has found that being in a migrant household increases the probability of completing secondary school and attending some post-secondary education. In this section, we explore whether our results are robust to alternative specifications. First, we test how sensitive our results are to including household wealth in our regression. Since household resources net of subsistence needs (available for education of children) vary with household wealth, it is important to control for household wealth in our regression. Unfortunately, household wealth reported in our data is likely affected by remittances received from migrant family members. When the reported wealth is influenced by remittances, controlling for household wealth partly takes away some of the effect due to the presence of migrant family member *in a foreign country*. So, we opted to exclude household wealth from our regression in the main analysis in order to avoid underestimating the effect of having migrant family member. In this section, we extend the analysis by including household wealth in our regression.

We constructed household wealth index using principal component analysis. Variables used to construct the wealth index include whether a household owns a dwelling unit, type of dwelling, major construction material of exterior walls, existence of separate room for cooking and household members per room. We included these variables in the principal component analysis because they are less likely to be affected by remittances. Only 5 percent of the households reported that they spent remittances received from family members on building new house or rebuilding house.

Table 8 reports coefficient estimates for probability of completing secondary school when

we include household wealth as an additional control. Column (1) and (2) report two stage least square results, while column (3) and (4) present results from bivariate probit regressions. Column (1) and (3) use the proportion of migrants in the district as an instrument, and column (2) and (4) use the distance to foreign missionary station in 1921. All specifications show a strong positive effect of being in a migrant household on probability of completing secondary school, echoing the result in the main analysis. The only difference compared to the baseline regression presented in Table 3 is that coefficient estimates are now reduced in size in three of the four cases. The corresponding result for probability of attending some post-secondary education is presented in Table 9. The results reveal that being in a migrant household has a statistically significant positive effect on probability of attending some post-secondary education only in regressions using proportion of migrants in the district as instrument. Therefore, it appears that most of our results survive even after controlling for household wealth.

Second, we explore robustness of our result to using different age groups. Our sample in the main analysis is children of household head aged 16 to 30 years in 2009. As mentioned earlier, we chose this age group because children in Nigeria complete secondary school from age 16 onward, and lately enrolled children could still be attending some post-secondary education until the age of 30. It could be argued that the age range of our sample may influence the estimated coefficients. In order to address this concern, we restrict our sample to a narrower age cohort. For probability of completing secondary school, we limit our sample to children of head aged 16 to 20 years. Table 10 reports results of estimating the impact of being in a migrant household on probability of completing secondary school. It can be seen that results in Table 10 remain the same as in the baseline specifications (Table 3). Similarly, we estimate the impact of being in migrant household on probability of attending some post-secondary education using children aged 20 to 25 years as shown in Table 11. We find that the coefficients on migration are statistically significant in three of the four specifications. Overall, our result on the relationship between being in a migrant household

and probability of completing secondary school is significantly robust, whereas the result for probability of attending some post-secondary education is only partially robust. Therefore, we conclude that the robustness checks further strengthen our previous findings.

6 Conclusion

The welfare implications of migration are expected to be significantly different when the impact on family members in origin countries is accounted for than when only the migrants themselves are considered. This paper has attempted to assess the impact of family migration on the education of the left behind at secondary and post-secondary levels in Nigeria. We find that being in a migrant household increases the probability of completing secondary school and attending some post-secondary education. We employed instrumental variables to show that the estimated relationship is not spurious. In terms of the channels through which the migration of family members increases educational attainment, we find suggestive evidence that the probability of own future migration could be playing a positive role.

This paper has furnished an important piece of evidence illuminating the relationship between migration and household welfare in a major African country. However, so many unanswered questions could be better investigated with more data at the household and local levels. For instance, the tentative conclusion regarding the positive impact of family migration on post-secondary education could be enunciated more clearly if the data allowed disentangling the theoretically identified competing effects of expected own migration. In this regard, there is a lot more room for future research to elucidate the many dimensions of the relationship between emigration and the education of the left behind.

Notes

[1] For example, the United States Diversity Visa programme that grants 50,000 permanent residence visas annually via lottery requires winners to have attained a minimum of 12 years for formal schooling.

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Tables

Table 1. Summary statistics of key variables.

	Number of observations	Non-migrant households	Migrant households	All households
Household variables				
Proportion of households with a migrant	2628	0	1	0.307
Number of children aged between 8 and 30 years	2628	5.018 (2.773)	4.844 (2.904)	4.965 (2.814)
Individual variables				
Proportion of female	2625	0.372	0.404	0.382
Age in years	2628	21.27 (4.205)	22.23 (4.160)	21.57 (4.213)
Years of schooling	2628	10.09 (4.494)	12.54 (3.122)	10.84 (4.273)
Proportion of children who completed secondary school	2628	0.605	0.808	0.677
Proportion of children who attained post-secondary education	2585	0.140	0.324	0.197
Father's years of schooling	2293	7.897 (6.134)	10.25 (6.121)	8.587 (6.222)
Mother's years of schooling	2537	6.931 (6.021)	9.542 (5.939)	7.731 (6.115)
District Variables				
Proportion of migrants in the district	2575	0.061	0.104	0.075
Distance to church	2628	0.326 (0.420)	0.151 (0.187)	0.272 (0.373)
Average night light intensity for the period 2011/2012	2628	23.05 (31.48)	34.06 (34.69)	26.43 (32.89)
State variable				
Number of schools per 1000 people	2628	0.491 (0.157)	0.451 (0.145)	0.479 (0.154)

Sample is children of head aged between 16 and 30 years. Standard deviations are in parenthesis

Table 2. Impact of being in a migrant household on probability of completing secondary school. OLS estimates.

	(1)	(2)	(3)	(4)	(5)
Child is in a migrant household	0.203	0.116	0.141	0.074	0.117
	(0.045)***	(0.040)***	(0.043)***	(0.043)*	(0.040)***
Controls included	No	Yes	Yes	Yes	Yes
R^2	0.04	0.25	0.29	0.19	0.25
N	2,628	2,216	1,389	827	2,214

Notes: Sample in columns (1) and (2) is children of head aged between 16 and 30 years.

Sample in column (3) is restricted to male children.

Sample in column (4) is restricted to female children.

Sample in column (5) is restricted to children whose parents were both not migrants.

Controls include sex, age, age group fixed effect, father's education, mother's education, number of children, number of schools per 1000 population and local average night light intensity.

Standard errors clustered at district level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 3. Impact of being in a migrant household on probability of completing secondary school. 2SLS and bivariate probit estimates.

	2SLS	2SLS	Bivariate probit	Bivariate probit
Child is in a migrant household	0.747	1.496	1.347	1.421
	(0.216)***	(0.522)***	(0.195)***	(0.224)***
Marginal effect			0.167	0.168
			(0.033)***	(0.030)***
Instrument	A	B	A	B
P-value of endogeneity test	0.01	0.00		
F-statistic of excluded instrument	26.8	13.8		
N	2,165	2,216	2,165	2,216

Notes: Instrumental variable A: proportion of migrant in the district. Instrumental variable B: distance to foreign missionary station in 1921.

All regressions include sex, age, age group fixed effect, father's education, mother's education, number of children,

number of schools per 1000 population and local average night light intensity as controls.

Sample is children of head aged between 16 and 30 years.

standard errors clustered at district level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 4. Impact of being in a migrant household on probability of attending post-secondary school.

	OLS	2SLS	2SLS	Bivariate probit	Bivariate probit
Child is in a migrant household	0.145	0.474	0.250	1.672	1.133
	(0.032)***	(0.127)***	(0.157)	(0.173)***	(0.539)**
Marginal effect				0.009	0.028
				(0.006)***	(0.009)***
Instruments		A	B	A	B
N	2,180	2,129	2,180	2,129	2,180

Notes: Instrumental variable A: proportion of migrant in the district. Instrumental variable B: distance to foreign missionary station in 1921.

All regressions include sex, age, age group fixed effect, father's education, mother's education, number of children,

number of schools per 1000 population and local average night light intensity as controls.

Sample is children of head aged between 16 and 30 years.

standard errors clustered at district level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 5. Impact of being in a migrant household on probability of own future migration.

	OLS	Probit	2SLS	Bivariate probit
Child is in a migrant household	0.031	0.252	0.215	1.114
	(0.018)*	(0.130)*	(0.085)***	(0.364)*
Instruments			C	C
N	2,796	2,796	2,745	2,745

Notes: Instrumental variable set C: proportion of migrant in the district + distance to foreign missionary station in 1921.

All regressions include sex, age, age group fixed effects, years of schooling, father's education, mother's education, number of children, number of schools per 1000 population, and local average night lights intensity as controls.

Sample is children of head (both household members and migrants) aged between 16 and 30 years.

Standard errors clustered at district level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 6. Impact of own future migration on probability of completing secondary school

	OLS	Probit	OLS	Probit
probability of own future migration	0.398	1.604	0.303	1.416
	(0.135)***	(0.522)***	(0.031)***	(0.245)***
R^2	0.25		0.43	
N	2,216	2,216	2,216	2,216

Notes: Columns (1) and (2) use predicted probability of own future migration from 2SLS model as the main regressor.

Columns (3) and (4) use predicted probability of own future migration from bivariate probit model as the main regressor.

All regressions include sex, age, age group fixed effect, father's education, mother's education, number of children,

number of schools per 1000 population and local average night light intensity as controls.

Sample is children of head (both household members and migrants) aged between 16 and 30 years.

standard errors clustered at district level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 7. Impact of own future migration on probability of attending post-secondary school

	OLS	Probit	OLS	Probit
probability of own future migration	0.496	2.193	0.193	1.107
	(0.111)***	(0.414)***	(0.0209)***	(0.100)***
R^2	0.30		0.38	
N	2,180	2,180	2,180	2,180

Notes: Columns (1) and (2) use predicted probability of own future migration from 2SLS model as the main regressor.

Columns (3) and (4) use predicted probability of own future migration from bivariate probit model as the main regressor.

All regressions include sex, age, age group fixed effect, father's education, mother's education, number of children,

number of schools per 1000 population and local average night light intensity as controls.

Sample is children of head (both household members and migrants) aged between 16 and 30 years.

standard errors clustered at district level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 8. Impact of being in a migrant household on probability of completing secondary school using household wealth index as additional control.

	2SLS	2SLS	Bivariate probit	Bivariate probit
Child is in a migrant household	0.701	2.088	1.093	0.978
	(0.312)***	(1.078)*	(0.308)***	(0.344)***
Instrument	A	B	A	B
N	2,094	2,141	2,094	2,141

Instrumental variable A: proportion of migrants in the district. Instrumental variable B: distance to foreign missionary station in 1921.

All regressions include sex, age, age group fixed effect, father's education, mother's education, number of children,

number of schools per 1000 population, local average night light intensity, and wealth index as controls.

Sample is children of head (both household members and migrants) aged between 16 and 30 years.

standard errors clustered at district level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 9. Impact of being in a migrant household on probability of attending post-secondary school using household wealth index as additional control.

	2SLS	2SLS	Bivariate probit	Bivariate probit
Child is in a migrant household	0.536	0.057	1.586	-0.089
	(0.187)***	(0.308)	(0.177)***	(1.564)
Instrument	A	B	A	B
N	2,058	2,105	2,058	2,105

Instrumental variable A: proportion of migrants in the district. Instrumental variable B: distance to foreign missionary station in 1921.

All regressions include sex, age, age group fixed effect, father's education, mother's education, number of children,

number of schools per 1000 population, local average night light intensity, and wealth index as controls.

Sample is children of head (both household members and migrants) aged between 16 and 30 years.

standard errors clustered at district level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 10. Impact of being in a migrant household on probability of completing secondary school of children aged 16 to 20.

	2SLS	2SLS	Bivariate probit	Bivariate probit
Child is in a migrant household	1.119	1.200	1.356	1.059
	(0.315)***	(0.465)***	(0.212)***	(0.405)***
Instrument	A	B	A	B
N	1,098	1,122	1,098	1,122

Instrumental variable A: proportion of migrants in the district. Instrumental variable B: distance to foreign missionary station in 1921.

All regressions include sex, age, age group fixed effect, father's education, mother's education, number of children,

number of schools per 1000 population and local average night light intensity as controls.

Sample is children of head (both household members and migrants) aged between 16 and 30 years.

standard errors clustered at district level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.

Table 11. Impact of being in a migrant household on probability of attending post-secondary school of children aged 20 to 25.

	2SLS	2SLS	Bivariate probit	Bivariate probit
Child is in a migrant household	0.842	0.501	1.887	1.136
	(0.249)***	(0.207)***	(0.147)***	(0.818)
Instrument	A	B	A	B
N	818	839	818	839

Instrumental variable A: proportion of migrants in the district. Instrumental variable B: distance to foreign missionary station in 1921.

All regressions include sex, age, age group fixed effect, father's education, mother's education, number of children,

number of schools per 1000 population and local average night light intensity as controls.

Sample is children of head (both household members and migrants) aged between 16 and 30 years.

standard errors clustered at district level.

* Significant at 10%; ** Significant at 5%; *** Significant at 1%.