Age at First Migration and Educational Attainment of Young Adults in Indonesia

Meirina Ayumi Malamassam[1]*

[1] Research Center for Population, National Research and Innovation Agency, Indonesia
* Meirina Ayumi Malamassam, corresponding author. Email: meir001@brin.go.id
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Abstract

First migration is an important milestone that signals the beginning of one's migration career. Variations in the timing of the first migration signify critical contextual factors that shape individuals' life trajectories, including their educational pathways. This study aimed to examine the variations in the age at first migration of young Indonesians by their educational attainment. This study analyzed data from the migration and education modules from all waves of the Indonesian Family Life Survey. Survival analysis approaches were used to estimate the probability of first migration among the 2,075 observations during young adulthood. This study found that people with low levels of education migrate for the first time at younger ages, possibly after terminating their schooling. Meanwhile, education-related motives are critical in explaining the high migration propensity around the age of 18–19 years by the tertiary-educated group. Despite the varying intensities, the relationships between education and migration were consistent across cohorts. These findings suggest that positive and negative educational selectivity were observable in the age schedule of the first migration of young adult Indonesians.

Keywords

Age at migration; educational attainment; first migration; Indonesia; young adult

Introduction

Various events throughout life can potentially increase an individual's propensity to migrate. For young adults, in particular, the critical life stage of transitioning to adulthood can trigger spatial mobility (Bernard, 2014; Clark, 2013; Liu et al., 2017; Mulder, 1993). Migration peaks around the critical periods of leaving the parental home, pursuing higher education, entering early career jobs, and establishing families (Mulder, 1993; Plane & Heins, 2003; Wilson, 2015). However, variations in socioeconomic and cultural contexts can affect the diversity of migration age profiles between regions (Bernard et al., 2016). The shift in the usual timing of education, family, and employment transitions is also reflected in variations in the age profile of migration over time (Mulder, 1993; Vidal & Lutz, 2018).

Among all spatial movements in migration trajectories, the first adult migration is a critical milestone in one's life. The first migration signals the beginning of one's migration career and affects subsequent migration behavior (Bernard, 2017, 2022a). In particular, life course events related to educational transitions are critical drivers of the first migration of young adults. Completion of formal schooling can lead young adults to conduct their first independent migration and gain access to opportunities in other areas (Corcoran & Faggian, 2017). Alternatively, the first migration can also be attributed to discontinuation of education due to the high opportunity costs of continuing schooling (Semela & Cochrane, 2019). Young people may leave parental housing for work or marriage (Pardede & Mulder, 2022). Furthermore, pursuing higher education is a critical first adult migration motive for many young migrants (Faggian & Franklin, 2014; Liu et al., 2017; Wilson, 2015).

Indonesia is a highly populated developing country with significant gaps in human capital and economic development across regions (BPS - Statistics Indonesia, 2021), where migration is considered a critical means of human capital redistribution. Approximately half of recent migrants in Indonesia are aged between 15 and 34 (BPS - Statistics Indonesia, 2023). Moreover, the age schedule of migration peaks in the early 20s and steadily decreases until retirement age (Muhidin, 2018). The high concentration of migration during early young adulthood implies a relatively younger peak in age at migration in Indonesia compared to developed countries (Bell & Muhidin, 2009). In addition to age selectivity, educational selectivity is evident in the migration profile in Indonesia. Those with a better educational background tend to migrate more than their less educated counterparts (Bernard & Bell, 2018; Sukamdi & Mujahid, 2015). Thus, age and educational selectivity in migration critically affect population dynamics and human capital accumulation across regions.

The timing of migration, particularly the first adult move, signifies critical contextual factors such as regional opportunities and social values that shape individuals' migration behaviors (Bernard, 2022a). Despite this vital importance, there is a knowledge gap regarding understanding first adult migration in Indonesia, particularly in educational selectivity. Current knowledge of the age profile of migration cannot disclose information on the exact age at migration and the corresponding educational background, primarily due to data limitations. In addition, the age profile mainly refers to all moves and cannot precisely explain the timing of the first migration. Therefore, this study aimed to examine the age at first migration among young adults in Indonesia by focusing on its variation by educational attainment. This study addresses the following research question: How do the age schedule and probability of the first adult migration in Indonesia vary according to educational attainment? As migration can be understood as a prolonged period of human capital

investment (Heckert, 2015), the findings of this study provide critical contributions to enriching existing knowledge on the human capital development and education-migration nexus, particularly in the context of developing countries.

Literature review

Internal migration in Indonesia

Previous studies of internal migration in Indonesia have focused on three significant contexts. First, migration triggered by state intervention through a population resettlement program, widely known as transmigration, peaked between the early 1980s and the 1990s (Tirtosudarmo, 2009). Second, migration, particularly by the working-age group, is explained by income differentials and employment divergence across regions (Muhidin, 2018; Sukamdi & Mujahid, 2015; Wajdi, Adioetomo, et al., 2017). Finally, migration is influenced by cultural values or social norms in particular cultural groups (Auwalin, 2020; Tirtosudarmo, 2009).

Migration in Indonesia is primarily driven by family- and economy-related reasons (Muhidin, 2018). Education-related motives are also important, particularly among young adults. Nearly a quarter of young adult migrants move for education-related reasons (Malamassam, 2016). This type of migration is likely to be short-distance mobility in the form of intra-provincial moves. However, long-distance mobility can also be found, particularly in Java Island regions offering high-quality tertiary institutions.

The domination of the young population within the internal migration system in Indonesia is shown by the peak age of migration of approximately 15–22 years (Wajdi, Mulder, et al., 2017). Widaryoko et al. (2023) also found that the mean age at the first migration of Indonesians who started their migration trajectories in childhood and young adulthood ranged from 16 to 20 years. Moreover, those with tertiary degrees are 3.6 times more likely to move than their peers without formal education (Bernard & Bell, 2018).

There is a high level of migration in Indonesia towards areas with more advanced levels of development, such as metropolitan areas on Java Island (Malamassam, 2022; Wajdi, Adioetomo, et al., 2017). Java Island is also a critical sending region (Sukamdi & Mujahid, 2015). Moreover, there has been increasing migration toward Indonesia's eastern region, particularly among highly educated individuals (Malamassam, 2022; Sukamdi & Mujahid, 2015).

The selectivity of migration according to age and education in Indonesia emphasizes the critical role of migration in redistributing human capital. Disaggregation of human capital by migration status in Indonesia shows that the educational attainment for migrants is remarkably higher than that for nonmigrants (Harttgen & Klasen, 2009). Therefore, education has a critical effect on human development and migration.

Age at migration

The age profile of migration is typically high among infants and young children and then decreases in adolescence. Subsequently, it rises and peaks in young adulthood, gradually declines as age increases, and shows a slight rise around retirement age (Roger & Castro,

1981). As life course stages highly influence migration, their schedule correlates with the stability of the timing and intensity of transitional events in the life cycle (Plane, 1993). However, substantial variations in age at migration across countries are observed. For instance, migration patterns in developing countries are highly concentrated in the early 20s, and their intensity decreases sharply at later ages. In developed countries, migration rates peak at older ages and are dispersed across a broader age range (Bell & Muhidin, 2009).

Higher migration intensities at younger ages seem more prevalent in countries where life course transitions are more likely to occur in early adulthood (Bernard, 2014). In addition, national regulations related to life course transitions, such as compulsory education, legal minimum age of marriage, and child employment laws, can influence variations in age at migration (Bernard et al., 2016). In middle-income countries with rapid growth in the informal economy and significant socioeconomic inequality between regions, migration intensity commonly spikes during late adolescence (Yaqub, 2009).

Variations in age at migration are also evident across cohorts due to constant changes in socioeconomic contexts over time. The Baby Boomer generation, with its large cohort, often delayed its first move (Plane & Rogerson, 1991). Labor market situations, such as an oversupplied labor force and a high unemployment rate, greatly influence delays in a large cohort's migration. Older generations' migration was also linked to their lack of higher education and family formation at a younger age. In contrast, migration of younger cohorts is structured around longer years in education careers and delayed onset of family-related transitions (Vidal & Lutz, 2018).

The age schedule of migration can also be explained by the motives for migration. Education-related motives dominate migration during early young adulthood. The age structure of college-bound migration peaks at a younger age than the average peak rate of migration flows (Plane & Heins, 2003). Migration for housing-related motives peaks in the 18–21 and 30–39 age groups, while motives related to household formation seem dominant in the population aged 18 to over 30 years (Mulder, 1993).

The age schedule for the first adult migration plays an essential role in shaping an individual's migration career (Bernard, 2022b). For example, a later age at first migration is negatively associated with the number of migrations during one's lifetime (Bernard, 2017, 2022a; Bernard & Pelikh, 2019). Although the mean age of all moves is relatively similar across regions and population groups, the mean age at first migration varies considerably across countries. In Europe, Sweden and Denmark have the lowest mean age at first migration, 22 years, while Italy and Malta have the highest mean age at first migration, over 25 years (Bernard, 2022a). In China, the average age at first migration is around 23 years, but frequent movers conduct their first migration earlier, at approximately 21 years (Tian et al., 2016).

Furthermore, younger cohorts tend to migrate first at a later age. The mean age at first migration of the youngest generation is delayed by 1.66 years compared to that of the oldest cohort (Bernard, 2022a). Variations in age at first migration can indicate distinctive sociocultural contexts and behavioral attributes that underlie the onset of individual migration trajectories (Bernard, 2022a). The timing of the first migration can also influence the well-being of individuals. Those who migrate for the first time at a younger age are arguably much better off than those who move later (Hartog & Winkelmann, 2003). Additionally, moving at a younger age can benefit individuals with high educational attainment, providing substantial returns to their migration and education (Aisa et al., 2014).

Education-migration nexus

Education reflects the social context and identity contributing to migration behavior (Rao, 2010). Education potentially drives migration, as a higher level of education can bring more opportunities and incentives to migrate (Corcoran & Faggian, 2017; Liu et al., 2017). Those with higher education levels are more willing to migrate when entering an occupational career because they have a greater investment in human capital. They are also more knowledgeable and have broader access to opportunities in other regions. Thus, the higher an individual's educational attainment, the higher their propensity to migrate (Bernard & Bell, 2018). However, youth migration is also associated with lower levels of educational attainment. In particular, migration at a young age for employment-related motives is commonly linked to unconventional age schedules of education trajectories and negatively affects educational attainment (Heckert, 2015). The dominance of the informal economy, which offers opportunities for less-skilled jobs in large cities and metropolitan areas, significantly triggers low-educated migration (Ginsburg et al., 2016). Higher opportunity costs to continue schooling can influence young individuals' decisions to terminate their education and migrate to seek informal employment opportunities (Semela & Cochrane, 2019).

Migration also influences education. Migration provides access to a broader range of higher educational opportunities for young populations with limited educational resources in their hometowns (Crivello, 2011). Education-driven migration is a critical feature in the early years of young adulthood. Moving away from home to pursue higher education is the first step in the youths' transition to residential and economic independence (Mulder, 1993). The interregional mobility of university entrants significantly impacts the high concentration of migration intensity at around 18–19 years of age (Wilson, 2015). Education-driven migration is strongly associated with youth who follow the standard schooling age schedule and those born outside major cities (Heckert, 2015).

Whether migration drives education or vice versa, returns to human capital investment in both forms are expected to improve. Moreover, age is an essential variable in examining returns to human capital investment (Sjaastad, 1962). Individuals with the same educational attainment level who migrate at different ages may obtain different levels of return to their human capital (Brezis, 2019). Those who migrate before achieving their highest educational level are more likely to earn higher returns on migration and education. Similarly, Pratomo (2017) argued that migrants with post-migration education have a higher propensity to be employed in the formal sector and be paid more than migrants without post-migration education. Therefore, knowledge of the timing of migration, particularly the first adult move, is critical for a better understanding of the contribution of migration to human capital accumulation across regions.

Data and methods

This study used data from the Indonesian Family Life Survey (IFLS) to examine young adults' first migration in Indonesia. The IFLS is a multitopic longitudinal survey conducted by RAND Corporation in collaboration with the University of Indonesia, UCLA, University of Gadjah Mada, and SurveyMETER. The survey covered 13 provinces, representing approximately 83% of the total population in its initial run in 1993. Consecutive waves were conducted in 1997, 2000, 2007, and 2014. The first wave of the IFLS observed approximately 30,000 individuals in

over 7,000 households, whereas the latest wave covered some 50,000 persons in over 16,000 households. For each subsequent wave, the IFLS attempted to interview all original household respondents in the first wave, including those who had split from their initial households. The fifth wave of the IFLS successfully recontacted approximately 76% of individuals from the first wave (Strauss et al., 2016). Data from all waves of the IFLS are publicly available from the RAND Corporation repository. The IFLS datasets can be accessed at https://www.rand.org/labor/FLS/IFLS.html.

The IFLS recorded residential mobility across village boundaries for a minimum of six months at the destination after the age of 12 years. However, this study only considers interdistrict migration. This study defines first adult migration as the first spatial movement across sub-provincial (city/regency) boundaries between the ages of 15 and 34. Therefore, those who had never moved across sub-provincial boundaries and those who first migrated at 35 years or later were considered nonmigrants. Additionally, any interdistrict migration before the age of 15 years was considered childhood migration. The sample selection for this study began by pooling all respondents aged 34 and older in each wave. Furthermore, only those with complete retrospective information on migration and education trajectories proceeded to the subsequent analysis. Based on these restrictions, 27,075 observations are identified.

For the analysis, observations were classified according to their highest educational attainment. This study followed the categorization of the Indonesian formal education system as primary (Grades 1–6), lower secondary (Grades 7–9), upper secondary (Grades 10–12), and tertiary education. Educational attainment was treated as a time-invariant variable since this study focused on the interrelationships between the timing of the first migration and the outcomes of the educational pathways. Moreover, the observations were classified into five large ethnic groups to understand the influence of cultural background on the first adult migration. The type of hometown represented the location-specific capital of the observations. This study defined the hometown as a district where the respondent lived during childhood (before the age of 15 years). Table 1 presents the summary statistics of the observations' characteristics.

Table 1: Summary Statistics of Observations, IFLS Waves 1 to 5

Variables		Proportion (%)
Migrant status	- Nonmigrants	59.8
	- Migrants	40.2
Sex	- Female	50.8
	- Male	49.2
Highest educational attainment	- Primary or below	53.5
	- Lower secondary	15.0
	- Upper secondary	21.1
	- Tertiary	10.4
Birth cohort	- Born before 1960	41.1
	- Born in the 1960s	22.8
	- Born in the 1970s	29.0
	- Born in the 1980s	7.1
Ethnic groups	- Javanese	45.5
	- Sundanese	14.8
	- Sumatran	14.7

Variables		Proportion (%)
	- East Indonesian	11.5
	- Others	13.5
Hometown in a major city	- No	77.5
	- Yes	22.5
Migrated during childhood	- No	87.3
	- Yes	12.7
		N = 27,075

Note: Author's calculations

A survival analysis approach was applied to examine the probability of migrating for the first time between the ages of 15 and 34 years. First, using Kaplan-Meier estimates, the model tested the probability of first migration starting from the year the respondents turned 15 years old and ending in the year the respondents turned 34. The analysis also incorporated a separate set of models to analyze the variation in age at first migration between generations. Furthermore, using person-years as the unit of risk exposure (first migration), this study ran a Cox proportional hazard regression model formulated as follows:

$$h(t) = h_o(t)\ exp\ (b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6)$$

Where h(t) is the expected probability of the first migration at age t, $h_0(t)$ is the baseline probability and represents the probability when all predictor variables are equal to zero. X_1, X_2, X_3, X_4, X_5, and X_6 are the predictor variables: highest educational attainment, sex, hometown type, childhood migration, ethnic group, and birth cohort, respectively.

Higher educational attainment arguably increases migration propensity (Bernard & Bell, 2018). Life course transitions during young adulthood have been suggested to have a more pronounced effect on female age patterns of migration (Bernard, 2014). In addition, those whose hometowns are outside of major cities are more likely to migrate at a younger age (Heckert, 2015). Previous childhood migration may increase the likelihood of migration into adulthood (Bernard & Vidal, 2020). Due to their social and cultural norms, different ethnic groups vary in their attitudes and preferences toward migration (Tirtosudarmo, 2009). Finally, birth cohorts represent structural changes over time in the country, including changes in the government system, economic development, and interregional connectivity (Vidal & Lutz, 2018). An additional Cox regression model was created by adding an interaction term between educational attainment and birth cohort to examine the effect of contextual changes over time on migration propensity across educational backgrounds.

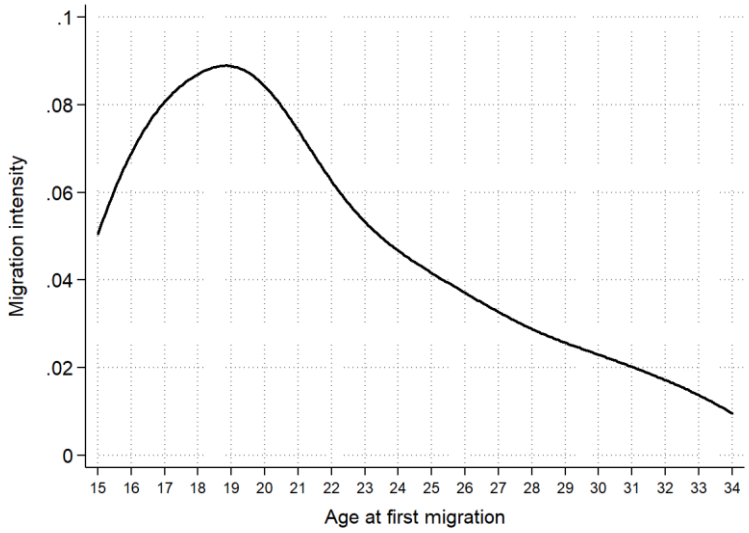
Although the IFLS attempted to follow all original households for subsequent waves, it had limitations in tracking migrants who moved beyond the coverage area of its first wave. This situation resulted in a panel attrition rate of approximately 11% in subsequent waves. As attrition is closely linked to out-migration, it may not have occurred randomly. Thus, the characteristics of the unobservable respondents are inevitably related to migration selectivity; that is, they are concentrated among highly educated and younger individuals. However, the characteristics of the observable and unobservable migrants are relatively similar. Thus, attrition bias should not have affected the consistency of findings in this study.

Findings

Age at first migration of young adult Indonesians

Figure 1 shows that the peak intensity of the first migration occurred between the ages of 18 and 19. However, the mean age at first adult migration of young Indonesians (21.4 years) was relatively similar to the peak age at migration of all moves in Indonesia that occurred in the early 20s (Bell & Muhidin, 2009; Muhidin, 2018). Overall, the age schedule of the first adult migration of young Indonesians was also younger than the classical migration schedule, regardless of their move order, which generally peaks at approximately 20–24 years (Rogers & Castro, 1981). The substantial difference between the age at first migration and the age at migration of all moves signifies a wide variation in the migration careers of young Indonesians.

Figure 1: Age Schedule of the First Migration of Young Adult Indonesians



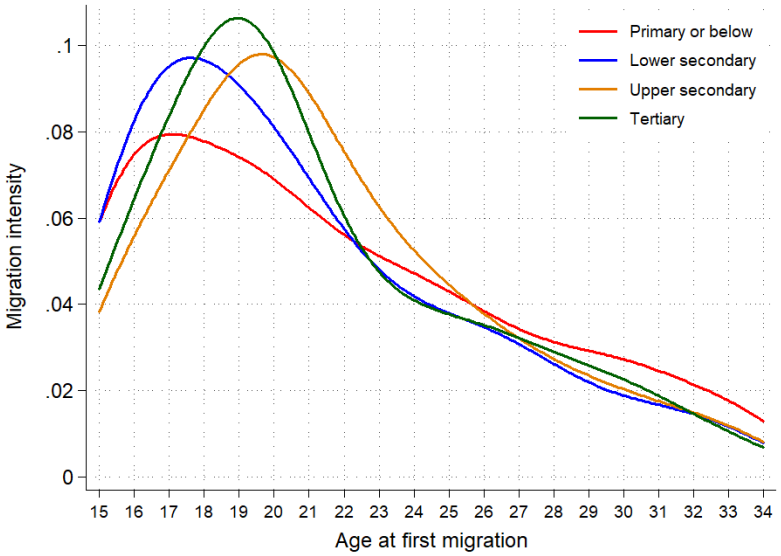
Note: Author's calculations based on interdistrict migration data within the age range of 15–34 years. Data were normalized to the sum to unity and smoothed using kernel density estimation.

The timing of the first adult migration can be attributed to the transition to adulthood in Indonesia's socioeconomic contexts. For example, one in five Indonesian women aged 20–24 were married before age 18 (BPS - Statistics Indonesia, 2017). Also, the minimum age for admission to employment in Indonesia is 15 years (International Labour Organization [ILO], 2014). The escalation of first migration at a relatively young age can also indicate significant educational and employment opportunity gaps within a country (Yaqub, 2009).

Further examination shows that the patterns of first migration intensity differ for each education level (Figure 2). The age schedule for the first migration by tertiary-educated individuals peaked sharply between 18 and 19 years. Moreover, the migration intensified in the lower and upper secondary school groups, peaking at 17–18 and 19–20 years, respectively. The primary educated group displayed a flatter age profile than the lower and upper secondary education groups and moderately peaked around 17 years. For the lower and upper secondary groups, the peak ages at the first migration exhibited a one to three-year gap

between school termination and the first migration. This gap is likely associated with other transitions to adulthood, such as entering the labor force or family formation.

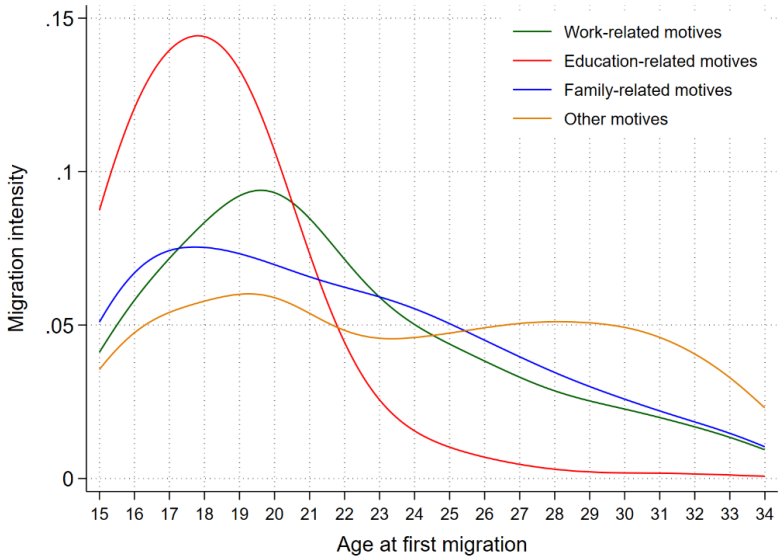
Figure 2: Age Schedule of the First Migration by Highest Educational Attainment



Note: Author's calculations based on interdistrict migration data within the age range of 15–34 years. Data were normalized to the sum to unity and smoothed using kernel density estimation.

Those who pursue higher education after completing upper secondary school enter tertiary institutions around 18 or 19 years. Figure 3 shows further evidence of the importance of education-related motives for the first migration around this age. Tertiary-educated individuals' peak age at first migration showed evidence of education-related transitions that trigger migration for a substantial proportion of observations in this group. It is plausible that their first migration enabled them to attain their highest educational levels. This situation implies a stronger association between the initiation of migration and educational transition compared to other domains of life course trajectories.

Figure 3: Age Schedule of the First Migration by Main Motive of Migration

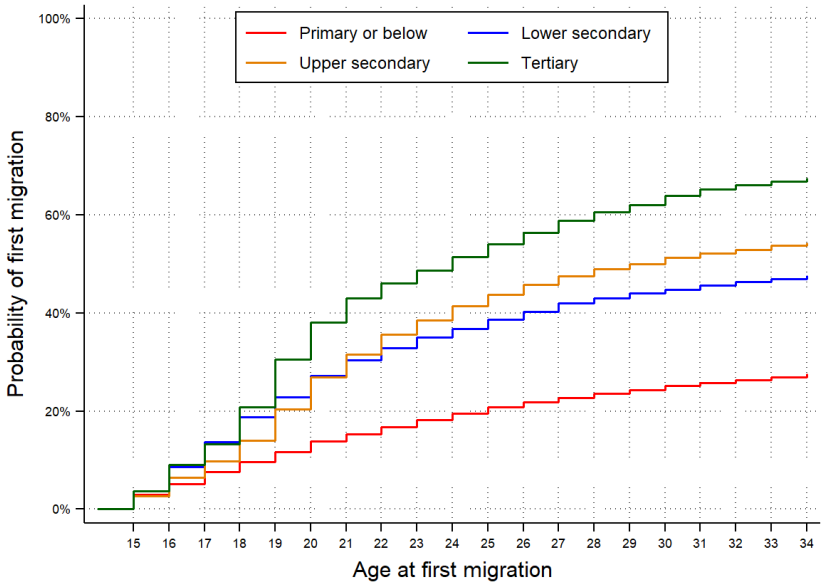


Note: Author's calculations based on interdistrict migration data within the age range of 15–34 years. Data were normalized to the sum to unity and smoothed using kernel density estimation.

First migration probability by educational attainment

This study found that, at age 34, nearly 7 out of 10 individuals with tertiary education migrated at least once, while about half of those with upper secondary education had migrated (Figure 4). More than 40% and 20% of the lower secondary and primary education groups, respectively, migrated. At the beginning of young adulthood, the probability of the first migration was similar at every education level. However, the migration probability at the lowest educational level remained low until the end of the observation period. The probability of first migration in the lower secondary school group was noticeably high between the ages of 16 and 19. Over half of the first adult migrations were predicted to occur within the first five years of the observation period. As the completion of lower secondary school was around 15–16 years, this group's high probability of migration at an earlier age was closely related to the discontinuation of their formal schooling career. However, it is unlikely that the disruption of the schooling career directly triggers a migration event. Instead, factors related to entry into the labor force and early marriage underlie the first migration event.

Figure 4: Probability of Age at First Migration by Highest Educational Attainment



Note: Author's calculations

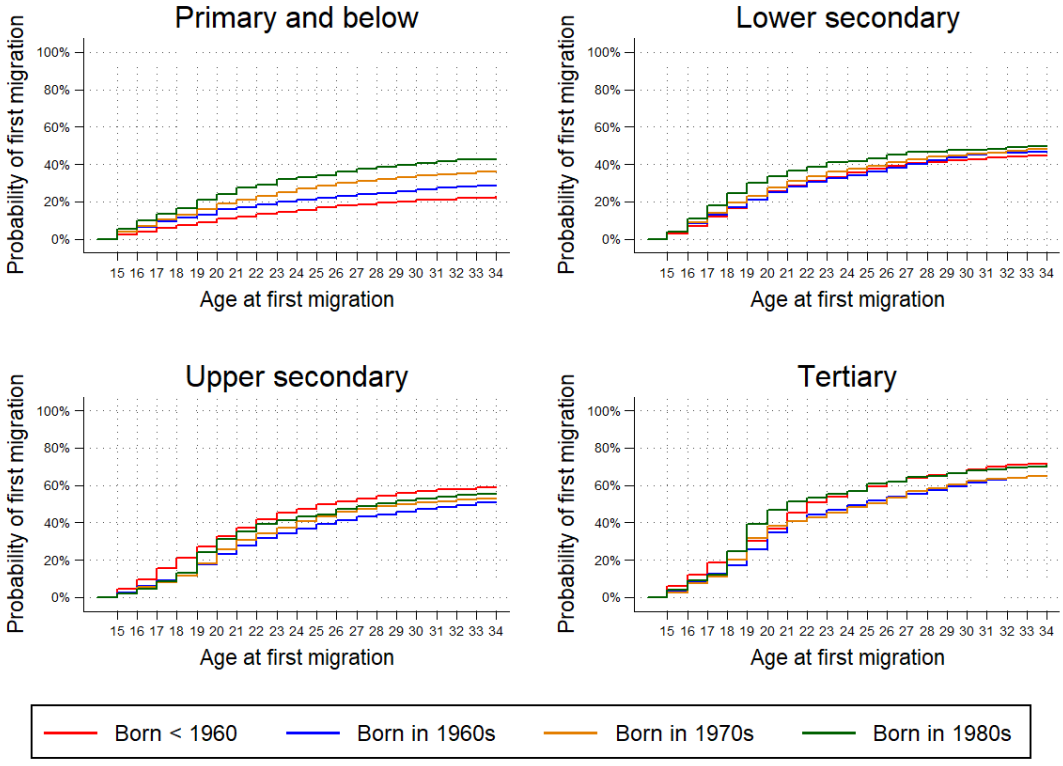
For the upper secondary level, the highest likelihood of first migration was between 18 and 20 years. The first migration for this group can act as a direct follow-up from completing upper secondary school. The low migration propensity in the early years of young adulthood indicated how school progression hinders migration at a younger age. As upper secondary schooling was beyond the scope of compulsory education until recently, educational attainment at this level was considered exceptional, particularly for populations living in less developed regions (Jones & Pratomo, 2018). This qualification enables many workers to access job opportunities elsewhere that require middle-level technical skills (Suryadarma & Jones, 2013). Therefore, migration can serve as an alternative to human capital investment and improve returns to education.

The tertiary-level educated group showed a high probability of first migration between 18 and 20 years of age. This situation signified the prominent role of continuing higher education as a trigger for the first adult migration among those who attended universities. This finding

supports the increasing empirical evidence suggesting the importance of entry into higher education in explaining youth migration in developing countries (Crivello, 2011; Heckert, 2015). University-bound migration contributes to the spatial movement toward large cities and metropolitan areas, where many high-ranked universities are situated.

To understand the period effects on age variations at first migration by education, Figure 5 illustrates the probability of first migration by educational attainment and birth cohorts. The cumulative probability of first migration for those with primary education increased markedly from 20% in the oldest cohort to 40% in the youngest cohort. The primary education group's high propensity showed evidence of negative educational selectivity for first migration for younger generations. Migration rates for the lower secondary school group at 15–17 years were significantly higher for the youngest cohort. Moreover, a less apparent gap in the probability of first migration across cohorts was observed between the lower and upper secondary groups. Low-educated individuals were commonly associated with a low migration propensity due to their limited human capital, which may hinder their ability to overcome obstacles during migration. The changing nature of labor markets in Indonesia, with the rapid expansion of informal sectors in major cities in recent years (Jones et al., 2016), is related to increased low-educated migration. The informal sectors usually recruit younger workers, as working-age regulations do not restrict them.

Figure 5: Probability of Age at First Migration by Highest Educational Attainment and Birth Cohort



Note: Author's calculations

The tertiary education group consistently shows the highest cumulative propensity for first migration. In addition, the propensity of the tertiary group was noticeably higher before the age of 20. A fifth of the tertiary-educated born before 1960 migrated by age 17. This situation implies that during earlier years, the first migration could be attributed to continuing tertiary

education and enrollment in upper secondary education. Low migration propensities at earlier ages in younger cohorts may indicate improvements in the secondary education system.

Higher migration propensities were found between 18 and 19 years for the tertiary education group in younger cohorts. This situation indicates the continued importance of tertiary educational opportunities. Although the tertiary education system in Indonesia has grown rapidly over the years, this study found that the probability of first migration of the youngest cohort was significantly higher than that of its older counterparts around the age of entering tertiary education. Furthermore, a low probability of first migration after completing tertiary education (after the age of 20) was observed in all cohorts. In Indonesia, the age of completing tertiary degrees varies, depending on the type of degree. About two-thirds of tertiary-educated respondents in this study had bachelor's degrees (minimum study time 3–4 years), and the rest had diploma degrees (minimum study time 1–3 years).

Two additional Cox proportional hazard regression models were used to examine the determinants of the first migration between 15 and 34 years (Table 2). The first model found that all predictor variables were statistically significant in explaining the probability of the first migration. Educational attainment was the most important predictor of the propensity to migrate during young adulthood. The first migration probabilities of lower and upper secondary groups were 1.7 and 2 times higher than that of the primary-educated group. In addition, at each observed age, the probability of the first migration in the tertiary education group was nearly three times higher than in the lowest education group. These results align with the findings of previous studies that found that the odds of migration within Indonesia progressively increased with each level of educational attainment (Bernard & Bell, 2018; Muhidin, 2018; Wajdi, Mulder, et al., 2017).

Table 2: Results of Cox Regression for First Migration during Young Adulthood

Variables	Model 1		Model 2	
	Hazard ratio	**95% confidence interval**	**Hazard ratio**	**95% confidence interval**
Highest educational attainment (ref. primary or below)				
- Lower secondary	1.788***	1.690, 1.892	2.217***	2.003, 2.453
- Upper secondary	2.019***	1.916, 2.128	3.168***	2.874, 3.492
- Tertiary	2.781***	2.619, 2.952	4.409***	3.940, 4.934
Female	0.853***	0.821, 0.886	0.854***	0.821, 0.889
Hometown in a major city	0.957*	0.914, 1.001	0.966	0.921, 1.013
Birth cohort *(ref. born before 1960)*				
- Born in the 1960s	1.135***	1.077, 1.196	1.344***	1.239, 1.457
- Born in the 1970s	1.274***	1.213, 1.338	1.825***	1.684, 1.978
- Born in the 1980s	1.429***	1.329, 1.536	2.302***	1.985, 2.672
Migrated during childhood	1.901***	1.811, 1.995	1.919***	1.819, 2.025
Ethnic groups *(ref. Javanese ethnic group)*				
- Sundanese	0.951*	0.899, 1.006	0.935**	0.882, 0.992
- Sumatran	1.123***	1.066, 1.184	1.126***	1.065, 1.191
- East Indonesian	0.801***	0.749, 0.857	0.786***	0.734, 0.843
- Other	0.746***	0.701, 0.795	0.731***	0.684, 0.780

Variables	Model 1		Model 2	
	Hazard ratio	95% confidence interval	Hazard ratio	95% confidence interval
Interaction of birth cohort with educational attainment ***(ref. born before 1960 # highest educational attainment of primary or below)***				
- Born before 1960 # lower secondary			2.217***	2.003, 2.453
- Born before 1960 # upper secondary			3.168***	2.874, 3.492
- Born before 1960 # tertiary			4.409***	3.940, 4.934
- Born in the 1960s # primary or below			1.344***	1.239, 1.457
- Born in the 1960s # lower secondary			2.396***	2.135, 2.690
- Born in the 1960s # upper secondary			2.643***	2.414, 2.894
- Born in the 1960s # tertiary			3.915***	3.527, 4.345
- Born in the 1970s # primary or below			1.825***	1.684, 1.978
- Born in the 1970s # lower secondary			2.650***	2.423, 2.898
- Born in the 1970s # upper secondary			2.949***	2.738, 3.175
- Born in the 1970s # tertiary			3.891***	3.544, 4.273
- Born in the 1980s # primary or below			2.303***	1.984, 2.672
- Born in the 1980s # lower secondary			2.867***	2.461, 3.341
- Born in the 1980s # upper secondary			3.130***	2.769, 3.538
- Born in the 1980s # tertiary			4.843***	4.187, 5.600

Note: Author's calculations. Number of observations = 27,075
, **, * indicate significance at the 90%, 95%, and 99% levels, respectively*

The results of the first model indicated that young female Indonesians were less likely to be migrants than male Indonesians. Those born or grew up in major cities were less likely to first migrate during young adulthood. Furthermore, younger cohorts showed higher migration propensities than older generations. Migration experiences during childhood increased the migration propensity of young adults to nearly twice that of those without childhood migration. Bernard and Vidal (2020) argued that migration is a learned behavior and that past moves during childhood positively affect subsequent adult moves. Regarding cultural background, young Sumatrans had the highest propensity to conduct first adult migration among all ethnic groups. For some ethnic groups in Sumatra, such as Minang and Batak, migration is viewed as a rite of passage to seek knowledge or earn a living elsewhere (Tirtosudarmo, 2009).

The second model, which includes interaction terms between the birth cohort and educational attainment, displayed the growing effect of education on the rate of first migration. With the addition of interaction terms, the propensities of first adult migration by the lower and upper secondary groups were 2.2 and 3.2 times higher than that of the primary education group. In addition, the probability of the first adult migration in the tertiary education group was 4.4 times higher than in the primary education group.

A closer examination of the interaction terms (Table 2) indicated changes in the relative importance of educational attainment across birth cohorts. The effect of education on the rate of first migration was substantially decreased for younger cohorts. Differences between educational groups were pronounced for those born before 1960. The cohorts born before 1960 with upper secondary and tertiary education exhibited higher hazard ratios than those born in the 1960s and 1970s. However, the overlapping confidence intervals indicated that the

differences in their predicted probabilities were not statistically significant. In addition, for the youngest cohort, the likelihood of the first adult migration for the tertiary education group was significantly higher than for the other educational groups. Furthermore, there were no significant differences in the probability of first migration between the youngest generation's lower and upper secondary school groups, as their confidence intervals overlap.

Discussion

In primary and secondary education groups, migration events at a younger age indicate that school termination precedes the first adult migration. However, the moderate peaks in their age at first migration suggest that the migration event may not directly relate to the cessation of educational careers. The termination of a formal schooling career is more likely to directly influence early initiation in other domains of life-course trajectories, such as career- and family-related events. The advent of these trajectories triggers the first migration. Although migration at an earlier age arguably positively influences migrants' career outcomes and economic well-being (Aisa et al., 2014; Hartog & Winkelmann, 2003), this may not be the case for low-educated migrants who are generally employed in precarious informal sectors. Their migration can serve as a strategy for accumulating economic gains by taking advantage of working opportunities that require low skill levels.

Additionally, the cumulative propensity for migration of low-education groups at younger ages tends to increase over time. This situation indicates persistent challenges of continuing higher education and implies negative education selectivity in youth migration in recent years. This pattern may also suggest that, in recent years, those with a low level of human capital have overcome migration barriers such as financial costs and geographical distance.

The first migration of young adults can also be triggered by continuing education. This relationship is highly pronounced within the age schedule for tertiary education migration, which peaks around the typical age for entering tertiary education. Tertiary student migration is a response to limited access to higher education institutions in areas of origin. It can also be influenced by individual aspirations, family norms, and community culture (Crivello, 2011). While education-related motives are not prominent within the migration structure in Indonesia (Muhidin, 2018), this study shows the importance of pursuing education in explaining the high migration propensity around the ages of 18–19 years. As Wilson (2015) suggested, further education may not be a significant driver of internal migration across all ages; however, it has a notable impact on migration systems due to its high concentration in a particular age range. As post-migration education arguably provides more advantages to migrants' career trajectories, such as higher earnings (Brezis, 2019; Pratomo, 2017), younger age at first migration can enable improved returns to migration and education.

First migration events at later ages in the tertiary-educated group imply the occurrence of the first adult migration after completion of formal education. However, this migration pattern is less pronounced among cohorts. As migration by tertiary graduates is more likely to be influenced by the prospects of skilled job opportunities elsewhere (Liu et al., 2017), this situation could signal a persistent pattern of less centralized employment opportunities in knowledge-based sectors, particularly for local tertiary graduates. Moreover, migration by tertiary graduates is more apparent in subsequent moves by former tertiary student migrants (Winters, 2011). This situation may also reflect a tendency of native graduates to remain in their areas of origin. Although higher education offers many opportunities and incentives to

move, location-specific capital in communities of origin may be a decisive retention factor for nonmigrant tertiary graduates. Local graduates may prefer to stay in their areas of origin because the human and social capital they have acquired may only be beneficial in these places (Winters, 2011). Furthermore, as Indonesia's evolving economy resulted in a growing need for middle- and high-level technical workers in the 1980s and early 1990s (Suryadarma & Jones, 2013), younger skilled people might have had more options and chosen to remain in their home regions.

Assuming that the educational attainment of individuals involves a set of different educational transitions, including school completion and termination, this study found that an individual's educational attainment can explain the timing of their first migration. The relationship between migration and education varies depending on the age at first migration and the highest educational attainment. Age and education can reflect the socioeconomic background and local context of the youths that contribute to the initiation of their migration trajectories.

Conclusion

This study examines the timing of the first migration of young Indonesians. Generally, the peak age at first migration is 18–19 years. The peak intensity of the age of first migration at a relatively young age implies that transition to adulthood events, such as family formation and labor market entry, also occur at earlier ages. This situation also indicates interregional inequality in accessing economic opportunities. This study confirms that highly educated individuals are more likely to migrate during young adulthood.

Furthermore, exploring the probability of first migration provides a clearer understanding of the relationship between educational attainment and migration trajectories. Lower-educated individuals tend to migrate for the first time at a younger age, likely after terminating their schooling. Additionally, for a substantial proportion of highly educated migrants, their first adult migration can be attributed to continuing tertiary education. For some highly educated individuals, their first adult migration occurs after schooling completion. Various relationships between education and migration are consistently observed across generations, although their intensities vary.

This study enriches the existing knowledge on the interrelationships between education and migration by providing a more nuanced understanding of the onset of migration trajectories of young adults in Indonesia. By focusing on the distinctive ways young people negotiate their migration and education pathways, the findings suggest that positive and negative educational selectivity are observable in the age schedule of first migration. These findings are critical for designing social policies that address the implications of educational opportunities for the distribution of human capital between regions. The age of first migration can be viewed as a reflection of the socioeconomic context and human capital accumulation that contribute to the initiation of the migration pathway. Further research should examine the migration careers of young adults to gain a thorough understanding of the relationship between education and migration.

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