

“Marriage as a Mechanism: Women’s Education and Wealth in Malawi”

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September 2012

## ABSTRACT

Research has found that in the United States women have greater economic returns to a college degree than men, because of more stable marriages and other family income. Using cross-sectional data of women aged 19-40 years in Malawi from the Malawi Longitudinal Study of Families and Health ( $n = 898$ ), we test whether higher education is associated with these same benefits in a context with lower educational attainment levels, fewer job opportunities, and different marriage patterns. We find that better educated women are more likely to have better educated spouses and higher household wealth. Though divorce is negatively associated with wealth, we do not find an association between education and divorce. This analysis provides motivation for further research on the how education is associated with outcomes for women in developing countries.

*Keywords:* Education, Gender, Marriage, Socioeconomic Status, Stability

Global trends in schooling has shown greater gender parity in both developed countries (Diprete & Buchman, 2006; Shavit, Arum, Gamoran, & Menahem, 2009) as well as in developing countries (UNICEF, 2003), including Sub-Saharan Africa (SSA) (Grant & Behrman, 2010; NSO, 2011). This occurs despite the common social practices faced by many young women in SSA and other developing countries that act as barriers to school enrollment and formal educational attainment. Parents may invest more in sons' education versus daughters' education because of greater returns to son's education or because of societal norms that serve as a pro-male bias. For example, Aslam (2009) finds that in Pakistan, although women have greater returns to their education, parents still invest more in sons' education. As well, females may face barriers in schools, such as sexual propositions and exploitation by “sugar daddies,” taxi drivers, and teachers, and discriminatory treatment by teachers (Anderson, 2009; Davidson & Kanyuka, 1992; Sperandio & Kagoda 2009; Subrahmanian 2005).

Given the theory of human capital, in which education is used as a resource to attain work and increase income (Becker, 1962), we would expect higher rates of labor force participation based on trends towards gender parity in educational attainment. Yet, we see that overall women participate in the labor force at lower rates than men. In 2009, across world regions men participated in the labor force at 78% compared to 53% of women. In SSA specifically, 80% of men were in the labor force compared to 61% (ILO, 2011). These high rates of labor force participation of women may be indicative of the economic sector in which they work. For example, the majority of women in rural Malawi report that they work in agriculture (NSO, 2011). Further, it may be necessary for women to work given the high rates of poverty. Overall, almost 60% of those in SSA earn \$1.25 or less per day, which is classified as “extreme poverty” by the Millennium Development Goals (ILO, 2011). Women also face constraints in

the labor force inhibiting returns to education, including low quality employment or exclusion from pensions (Anugwom, 2009). Moreover, as men increasingly go to urban areas to find work, women are relegated to work on their family farms (Razavi, 2003).

An alternative explanation to explain the trends toward gender parity in educational attainment are the non-labor benefits of schooling that may be greater for women than for men; for instance, with respect to the returns to education in the marriage market where more schooling often results in higher “spousal quality”. In addition, there are positive returns to schooling with respect to child health and child human capital, especially in developing country context where the household/family is an important source of child human capital formation (Behrman, Foster, Rozenzweig, & Vashishtha, 1999; Mare & Maralani 2006; World Bank, 2010). Educated, or at least literate, women are in demand by educated husbands, indicating that marriage is a specific way women benefit from education without being in the labor market (Behrman et al, 1999; Caldwell, Reddy, & Caldwell, 1982). Diprete and Buchmann (2006) argue that securing high quality marriages—rather than the labor market returns of college—is the cause of the rapid increase in college completion by women relative to men in the United States. For both men and women, college graduates’ personal income is higher than that of non-graduates. Yet, they find an association between college completion and other family income, which is linked to significant declines in poverty and substantial improvements in standard of living, which only women have benefited from. Specifically, a college degree improves a woman’s socioeconomic status through other family income; that is, more educated women marry, and stay married to, more educated spouses.

Is there a similar pattern between gender, socioeconomic status, and marriage in an environment with lower levels of educational attainment and different marriage patterns

(specifically, universal marriage, high rates of divorce and remarriage, and unique spousal preferences given the HIV epidemic difference)? In this paper, we use Malawi as a case study to address this question. Malawi is a small landlocked country in Sub-Saharan Africa divided into three regions with a population of about 13 million people (World Bank, 2010). It is ranked as the 10<sup>th</sup> poorest country in the world based on gross domestic product, earning just \$761 per person in 2009 (UNDP, 2010). We see similar trends toward gender parity that are present in the United States among younger cohorts in Malawi. Comparing those aged 15-19 years old, the median educational attainment is similar by sex at 5.4 years for men and 5.7 years for women. However, the overall median years of education are much lower: 3.5 years for men and 2.5 years for women. This reflects educational patterns of older cohorts, who did not have access to Free Primary Education, as well as the divergences between men and women in secondary and post-secondary education attendance (NSO, 2011; UNIMA, 1997).

Further, marriage patterns in Malawi are characterized by universal marriage (NSO, 2011) and high rates of divorce and remarriage (Reniers, 2003; Watkins, 2004). And though not universal, approximately 8.5 percent of men and 17 percent of women are in polygamous unions (NSO, 2011). Lastly, Malawi faces high rates of HIV, which has been shown to impact preferences of spousal characteristics (Clark, Poulin, & Kohler, 2007).

In this paper, we use data from the Malawi Longitudinal Study of Families and Health (MLSFH), which targets men and women from rural Malawi. Specifically, we explore whether marriage helps to explain the relationship between a woman's educational attainment and her household wealth by looking at marriage stability and spouse's educational attainment.

## BACKGROUND

*Education in Malawi*

Schooling in Malawi includes eight grades of primary education and four grades of secondary education, plus post-secondary education. In order to move from one level to the next, students must pass standardized tests after the eighth grade of primary school and after the second year and then the last year of secondary school (NSO, 2011). Malawi began providing access to Free Primary Education (FPE) in 1994, though school fees are still required for secondary education. The government promised to “abolish all forms of fees...and take responsibility for the provision of teaching and learning materials, teachers, classrooms, furniture, teachers’ houses, sanitation facilities, and boreholes,” and to remove the requirement of school uniforms (World Bank, 2009, p. 165). However, families must still pay for school supplies, and school may interfere with family businesses, such as lost labor (Kadzamira & Rose, 2003). Despite these barriers, an additional one million students (an increase of 51 percent) enrolled in primary education in the first year under the new policy (World Bank, 2009).

Since FPE, the educational attainment of women aged 15-19 has increased. In 1992 (prior to the new policy) the median years of education for this group of women was 3.5; in 2010, it was 5.7 years. By comparison, the increase in comparable men’s educational attainment was less than one year, with a median of 4.6 years of schooling in 1992 and 5.4 in 2010 (NSO, 1993, 2011). While this seems to indicate that women have surpassed men in educational attainment, other research has shown that fewer females receive the Primary School Leaving Certificate (PSLC), the standardized test necessary to pass from primary to secondary school, and so are less represented in higher education than are males (UNIMA, 1997). However, once enrolled, females tend to have higher educational attainment than males in the same age cohorts for both primary and secondary schooling (Grant & Behrman, 2010). Looking across age cohorts reported

in DHS, the trend is slowly toward gender parity in educational attainment. In 1992, women's median educational attainment was 1.0, while men had 2.8 years; in 2010 median years of education increased to 2.5 and 3.5 years, respectively (NSO, 1993, 2011).

Regional variation is important in any study of education in rural Malawi for at least two reasons. First, there are differences in the social structure across regions. Typically, the northern region is patrilineal (inheritance and wealth passes through fathers), while the southern region is matrilineal (inheritance and wealth passes through mothers); the central region is transitioning from matrilineal to patrilineal (Mtika & Doctor, 2002). Thus, it is possible that educational attainment impacts women differently in each region. For instance, education may have a stronger impact on women in the patrilineal regions in which women have less economic power, compared to the matrilineal regions. Second, there are differences in educational attainment across regions. Children in the northern region are more likely to complete all levels of schooling compared to both the central and southern regions. Approximately 20% more children in the northern region complete primary school than in the other regions, although this gap closes to near equality when comparing the completion of upper secondary education (World Bank, 2010).

There is a clear association between level of educational attainment and wages in Malawi. While at the extremes, the average annual income for those who completed tertiary schooling is roughly 134 times greater than for those with no schooling, the difference at lower levels of education is not as great: those with a primary school education and those with a secondary school education earn approximately 1.5 and 3 times more than those without any schooling, respectively (World Bank, 2010). This may indicate the value of certain education levels is influenced by the access to attain them. Reasonably, the value of primary education may have decreased because of the large increase of students enrolling, as well as the possibly lower

quality of a primary education. In order to handle the huge increase in primary school enrollment among both males and females, there was a massive recruitment of 20,000 new teachers, 90% of whom were untrained. Furthermore, teachers were not evenly distributed across classrooms or schools, so some class sizes increased to over 100 students (World Bank, 2009). These changes suggest that the quality of education may have been compromised. Kadzamira and Rose (2003) note that the returns to primary education are questionable. Secondary education is increasingly becoming necessary for a career but not many are able to attend secondary school.

Thus, in practice the policy choice of providing primary schooling for all leads to qualification inflation, so that only those who have access to the limited secondary schooling available receive the economic benefits of education (p. 513).

This suggests that those who were already able to attain a secondary education before the policy change are more likely to benefit after the FPE policy as they are able to continue on to secondary schooling, while the PSLC becomes less valuable.

However, occupation availability may also limit income. Among women who reported working in the past 12 months, 66% of those living in rural areas reported working in agriculture in 2010. This is more than triple the next highest reported occupation, sales and services (19.3%) (NSO, 2011). This may indicate that the occupations available in rural Malawi are skewed toward agricultural work, which does not require high levels of formal education.

However, income is a limited measure that only captures the flow of money received from work or social welfare. Wealth captures assets owned by an individual (e.g., house and cattle), which better measures long-term economic well-being. Further, wealth “is used to create opportunities, secure a desired stature and standard of living, or pass class status along to one’s children” (Oliver & Shapiro, 2006, 2). One does not pass income to the next generation; one



passes wealth. While we do not contest that income impacts wealth, focusing on wealth (rather than only income) captures a more stable and powerful indicator of economic well-being—one that extends into future generations. For instance, studying how a mother’s education impacts household wealth accumulation also informs us about the life chances of her children. Further, researchers find obtaining reliable estimates of income problematic in many developing countries where household production and farming are important income generating activities, which is typically the case in rural areas (and more so in SSA than Asian countries at similar development levels (Ray, 1998)). As a result, measurement errors are a significant issue in surveys that try to assess income in these contexts (McKenzie, 2005). As a result, some researchers commonly use assets—rather than income—to indicate socioeconomic status (Bingenheimer, 2007; Filmer & Pritchett, 2001; Mtika & Doctor, 2002; Vyas & Kumaranayake, 2006). This approach is appealing also because assets are not necessarily subject to the same extent as income to short term fluctuations as a result of income volatility due variation in crop yields, weather, fertilizer access, etc. In this analysis, we will therefore use assets to measure wealth, which we discuss more in-depth later.

### *Marriage*

We argue that education may be associated with wealth through mediating factors, one of which is marriage. Broadly, research shows that spouses match cultural resources, such as education, to create commonality between spouses (“homogamy”) (DiMaggio & Mohr, 1985). This may occur because educational institutions serve as meeting places for potential partners (Mare, 1991). Further, parents may be motivated by marriage to invest in a daughter’s education, such as in India where “educated men demand educated wives” (Caldwell et al, 1982, p. 717). However, we may find that highly educated women in Malawi have fewer potential spouses with

comparable schooling. In studying the delayed age at first marriage for highly educated women in Japan, Raymo and Iwasawa (2005) posit a “marriage market mismatch hypothesis... [which] suggests that relative improvements in women's economic resources reduce the pool of attractive partners for highly educated women” (p. 803). One consequence is that women marry later, but another may be for women to “marry down” in terms of education.

Malawi presents an interesting case because of its marriage patterns and somewhat unique spousal preferences given the HIV epidemic. Marriage in Malawi is practically universal: of women and men aged 30 to 34, 99 percent and 95 percent, respectively, have been married (NSO, 2011). However, understanding the marriage market in Malawi is difficult, and interesting, for at least four reasons: 1) informal unions; 2) the high rates divorce and remarriage; 3) polygamous unions; and 4) the HIV/AIDs epidemic.

First, researchers in Malawi note that marital histories obtained from respondents are problematic because they depend on respondents’ interpretations of their marital status. For example, those who cohabit may consider themselves married (Reniers, 2003; Watkins, 2004). The Demographic and Health Surveys report “marriage” and “living together” as separate categories. Still, for both categories, women under the age of 30 are more likely than men to be in unions; whereas men are more likely to be in unions at the age of 30 and older (NSO, 2011).

Second, divorce and remarriage are salient processes in Malawi. Women aged 15-49 years old are 2.7 times more likely to report being currently divorced and 3.5 more likely to report being currently separated than are men (NSO, 2011). Reniers (2003) found that 45 percent of marriages end in divorce within 20 years. The likelihood of remarriage is also high in Malawi: more than 40 percent of women remarry within two years; 75 percent within 10 years; and approximately 90 percent within 20 years.

Third, though not universal, there is a sizable proportion of Malawians in polygamous unions: 8.5 percent of men and 17 percent of women are in polygamous unions (NSO, 2011). There is a negative association between polygamous unions and education as well as wealth quintiles for both men and women. Polygamous unions are most frequent in the northern region and least frequent in the southern region (NSO, 2011). Sub-Saharan African countries with high rates of polygamous unions differ from countries that have mainly monogamous unions in terms of higher average age gaps between spouses (3.6 years more), earlier age at first marriage for women (by about five years), and higher total fertility rates (6.8 versus 4.6) (Tertilt, 2005).

Overall, the ratio of men to women is 0.90 in Malawi. Becker (1974) argues that if the sex ratio is skewed toward fewer males, polygamous unions are more likely to occur (though the socioeconomic status of men is important; wealthier men are more likely to be in polygamous unions). However, polygamous unions also create more demand for women, making it a favorable market for women. Also as noted, age gaps between husband and wives are wider in polygamous unions, so that discussing a ratio between the same age range of men and women may not be suitable for understanding polygamous marriages. In Malawi, there are regional patterns of polygamy: it is highest in the northern region and lowest in the southern region. Women who have been divorced or widowed are also more likely to be in polygamous marriages than those who are entering their first marriage. Further, there exists an association with HIV/AIDS. Women who enter polygamous marriages are more likely to be HIV positive than their counterparts who enter into monogamous relationships (Reniers & Tfairly, 2008).

Fourth, the marriage market is also affected by the HIV/AIDS epidemic by influencing who Malawians describes as a desirable spouse. The rate of HIV infection in rural Malawi for men and women aged 15 to 49 years is 8.9% (NSO, 2011). Using interviews with young men and

women in Malawi, Clark, Poulin, and Kohler (2007) find that an older spouse and a wealthier spouse were viewed as being more likely to be HIV positive, and so, these characteristics, which are generally viewed as desirable among women cross-culturally (Buss, 1989), are actually seen as less desirable characteristics. Mishra et al (2007) confirm these ideas; data from eight sub-Saharan African countries show that the wealthy had higher incidents of HIV/AIDS than did the poor. Still, as noted, evidence shows that men are more likely to marry at older ages.

As discussed, Malawi is characterized by overall low educational attainment, universal marriage, high rates of divorce, and high rates of remarriage. These characteristics provide an interesting case to test whether the positive associations between education and socioeconomic status through the mechanism of marriage occur. To better understand the relationship between educational attainment and wealth, we ask three research questions: (1) How is women's educational attainment associated with spouse's educational attainment? (2) How is women's educational attainment associated with marital stability, as measured by divorce? and, (3) How is women's educational attainment associated with household wealth? We hypothesize, despite the differences in context, there will be similar general trends associated with increased attainment seen in Malawi. Specifically,

Hypothesis 1: The educational attainment will be positively associated with spouse's educational attainment; particularly, women with high educational attainment will more likely marry men with high educational attainment.

Hypothesis 2: Increased attainment will be associated with a decreased likelihood of reporting ever being divorced.

Hypothesis 3a: More educated women will have more wealth than less educated women.

Hypothesis 3b: The association of education and wealth will be in part through spouses'

educational attainment and marriage stability, as these may predict wealth.

## METHOD

To test our hypotheses, we use data from the Malawi Longitudinal Study of Families and Health (MLSFH), a longitudinal face-to-face survey first fielded in 1998. Surveys were conducted in rural areas of Malawi's three regions: Rumphi (northern region), Mchinji (central region), and Balaka (southern region). The original sample in 1998 randomly sampled from a roster of households from a total of 124 villages across the three districts for a final sample of 1,541 ever-married women and 1,198 men (99.4% of women and 89% of men completed a survey). While attrition typically occurred because of death, migration, and divorce, this sample actually increased in size for three reasons: (1) new spouses were added to the sample in each round; (2) in 2004 young adults (aged 15-29) were added to the sample (998 completed the survey for 72% response rate); and (3) biological parents of adult sample members were added to the sample in 2008 using household rosters from the 2006 wave of MLSFH data. If these parents lived in an MLSFH-surveyed village, they were automatically added to the sample (Freeman and Anglewicz 2012) (587 completed a survey for a response rate of 65%).

Additionally, data were collected in 2007 for those who had migrated out of their original villages. Using the MLSFH sample, Anglewicz (2012) noted that 807 individuals (17.8% of the 2006 sample) had relocated at least once between 1998 and 2006, and 718 individuals (402 female) had permanently migrated within Malawi. Anglewicz was able to interview 401 migrants. Due to differences between migrants and non-migrants in regards to educational attainment, marriage patterns, and HIV status, the inclusion of these migrants addresses an important potential bias in this research. Migrant women identified work and marriage as reasons

for migration: 16.7% of women who migrated did so because they were either offered work or were looking for work; 6.2% of women migrated because of first marriage, and 13.9% migrated because of remarriage. Anglewicz found that remarriage was connected to HIV status: migrants were also more likely to be HIV positive than non-migrants, and HIV positive persons are more likely to separate or divorce, leading to migration. By including migrants, our sample is less likely to be biased towards lower-educated, never married, and HIV negative women.

### *Sample and Summary Characteristics*

For this analysis we focus on women who are old enough to have finished their secondary schooling before and after the free primary education policy and to have married and divorced. Thus, we restrict the sample to ever married women aged 19 to 40 years during the 2007 migrant study or during the 2008 wave of MLSFH. We limit the sample further to those who entered the study as a part of the original sample in 1998 or the adolescent sample in 2004 in order to ensure a random sample and who were not missing current marital status. The resulting analysis sample for this paper consists of 898 women, all of whom were interviewed in either 2008 as part of the MLSFH or during 2007 as part of the MLSFH migration follow-up. Key variables are missing for up to approximately 10% of the data, which we address by using best subset imputation for univariate and bivariate analysis and multiple imputation for multivariate analysis (for more information, see Allison, 2002).

[Table 1 here]

Table 1 summarizes the characteristics of our sample, comparing the migrant women interviewed in 2007 with those women interviewed in the 2008 wave. As stated previously, educational attainment is the independent variable of primary interest. Focusing on the highest and lowest schooling categories indicates that there are almost twice as many women with no

schooling (20.8%) as there are women with secondary education (10.2%). There are also statistically significant differences between the migrant and non-migrant women for educational attainment. Migrant women are more highly educated compared to non-migrants; 70% of migrant women have at least some upper-primary education versus only 51% of non-migrant women. This is expected given the selective nature of migration (e.g., Anglewicz, 2012).

Because the FPE policy in 1994 impacted access to education differently among various cohorts of women, we use birth cohort to answer our research questions concerning age at first marriage and educational attainment of spouse. Women are roughly equal across birth year cohorts, with a higher percentage of women represented in the oldest two categories (53.7%) compared to those in the youngest two. The mean age of the sample is 29.8 years old.

We use number of co-wives and number of living children to indicate other household residents. While a higher number of living children suggests more dependents, it may also indicate an increased labor force. The presence of co-wives could mean that the husband's wages are divided among two or more families. Approximately 29% of the sample report being in a polygamous union. The majority of these women have only one co-wife. The mean number of living children is 3.5 children for all women.

We also include HIV status in our models. HIV has a positive association with wealth; in Malawi, the rates of positive HIV status increases as wealth increases. Of those in the lowest wealth quintile, 7.5% of Malawians report being HIV positive, whereas 15.3% of those in the highest wealth quintile report being HIV positive (NSO, 2011). HIV status also may impact divorce rates (Reniers, 2003). In our sample, 9.4% have a positive HIV status.

As noted, the region in which respondents live is associated with educational attainment and social structure. For these reasons, region is used in all regression models in this paper. A

chi-square test (not shown in Table 1) finds statistically significant differences of education across region at  $p < 0.001$ . Women in the southern region are almost twice as likely as women in the central region to have no schooling. In contrast, women in the northern region are four times more likely than women in the central region and about six times more likely than women in the southern region to have completed some secondary education. There are also regional differences in terms of migration: there were more migrants than non-migrants interviewed as part of the 2008 survey in the northern region (41% and 30%, respectively) and less migrants in the central region (24% and 36%, respectively).

### *Outcome Variables*

To investigate our research hypotheses described earlier, we use three outcome measures: most recent husband's educational attainment, reporting ever being divorced, and an asset-based wealth index. Because we argue that education impacts wealth through marriage in terms of when and whom one marries, we will also use each of these dependent variables in subsequent models as covariates. For instance, to predict wealth, the spouse's educational attainment and ever being divorced are covariates. Table 2 shows the bivariate relationships of these outcome measures with the respondent's educational attainment.

[Table 2 about here]

First, we look at how the educational attainment of the respondent is associated with the spouse. For those women who report that they are not currently married, we use data on the most recent spouse's educational attainment. The cross-tabulation of educational attainment of the spouse and of the respondent in Table 2 shows that there is generally a pattern of respondents marrying spouses with similar or higher educational attainment. Among women with an upper-primary education, 81% marry men with at least some upper-primary education. Of those with



spouses with at least some secondary education, approximately 78% have a secondary education, more than twice than that of women with an upper-primary education. A chi-square test shows that this relationship is significant at  $p < 0.001$ . While these women are most likely to marry someone with similar education, roughly 22% marry someone with less education.

Table 2 also shows the percentage of those who divorce by educational attainment. About 18% of women with at least some secondary education divorced, compared to 27% of women with no school or 30% of women with some lower-primary education. Given the informal unions that Malawians report, we also look to see if there is a bivariate association between education and report ever being divorced or separated. While patterns are similar to ever being divorced, this association is not statistically significant at  $p < 0.05$ .

To study education's impact on wealth, we use an asset-based wealth index created using principle component analysis (PCA) (for more information, see Filmer & Pritchett, 2001; Vyas & Kumaranayake, 2006). The assets used are roofing and housing material, number of cows, goats, pigs, and poultry, and whether the household owns a bed, sofa, table and chairs, glass lamp, television, radio, cell phone, mosquito net, solar panel, bicycle, motorcycle, oxcart, pit latrine, or sanplat latrine. It does not include land rights or property that may produce rents, for which we do not have reliable data. It is difficult to conceptualize the index in terms of "real assets". Instead, we interpret it as an abstract scale that represents wealth relative to our sample. We standardize the wealth index so that the mean is zero, which reflects the average wealth score relative to our sample, and the standard deviation is one. The index ranges from roughly -1.72 to 3.86. Table 2 shows there are statistically significant differences in wealth across education categories. The negative mean wealth index values for those with lower primary education or less show lower than average wealth, while the positive values for those with at least upper-

primary education show higher than average wealth, indicating a positive relationship between education and wealth. However, the higher standard deviation of those with secondary education indicates substantial variability in accumulated wealth, possibly reflecting macro forces, such as poor occupational opportunities. Post-hoc tests confirm that differences between those with at least upper-primary education with those below are statistically significant.

## RESULTS

### *Educational Attainment of Spouse*

We use logistic regression to predict the likelihood of marrying a spouse with at least some upper-primary schooling. Of our sample, 44% of spouses have an upper-primary schooling education and 24% have a secondary education. Qualitatively, these categories are different from no schooling and lower-primary schooling only. The World Bank (2010) found that upper-primary schooling is associated with a 58.8% increase in earnings compared to lower-primary schooling. Model I includes only educational attainment categories and variables of residence. Model II adds birth cohort and positive HIV status.

An association between respondent's and husband's educational attainment categories is established at the bivariate level in Table 2. Women with at least some upper-primary schooling are more likely to be married to men with at least some upper-primary schooling education than to less educated men. Results from logistic regression models in Table 3 further support this finding. Each model shows the odds ratio predicting whether the most recent spouse completed at least some upper-primary schooling is statistically significant. The likelihood of having a "well-educated" husband is greatest among respondents with secondary education: these women are about five times more likely than those with no schooling to marry well-educated men

controlling for district, urbanicity, migrant status, and birth year cohort. A similar pattern to a lesser extent emerges among women with upper primary and lower primary educations, suggesting a monotonic association: these women are 2.9 and 1.6 times more likely, respectively, to marry someone with higher education than women with no schooling. Results from Table 3 support our second hypothesis—respondent’s educational attainment is a strong predictor of spouse’s education: higher-educated women will be more likely to marry well-educated men. An analysis using ordered logistic regression (note shown here) with all four categories representing spouse’s education shows a similar pattern as the logistic regression.

[Table 3 here]

Region remains an important factor: those living in the northern region are more than six times more likely than those in central region to marry someone with higher education holding all other covariates constant. Again, there are stark regional differences in educational attainment: the northern region has higher educational attainment for both men and women. The high odds ratio may be indicative of a greater pool of potential spouses with higher education.

### *Marital Stability*

To answer our second research question concerning marriage stability, we create a dummy variable for whether the respondent reported a divorce in her martial history. We use this as the dependent variable in logistic regressions in Table 4. Model I includes only respondent’s education and residence variables. Model II adds birth cohort and positive HIV status. Given that we found a difference in rates of divorce between women with at least some upper-primary education to those without, we recreate these models with a dichotomous education variable representing respondents with at least some upper primary education in Models III and IV.

[Table 4]

Our second hypothesis that increased education is associated with marital stability (measured by divorce) is not supported by the results reported in Table 4. There is no statistically significant association between a respondent's education category and ever being divorced. In Table 2 there is a difference in rates of divorce for women who have at least an upper primary education and those with less education. However, using a dichotomous variable to represent this divide does not show statistically significant results at the 0.05 level in Models III and IV.

Beyond education, we see that migrant status, birth cohort, and HIV status are associated with divorce. The youngest cohort is half as likely to divorce compared to the oldest birth cohort. This may be because older cohorts have had more time to divorce than their younger counterparts. For example, if we assume a constant rate of divorce of 1% per year, someone who has been "exposed" to marriage for five years has a 4% chance of divorce compared to 18% for someone with twenty years of exposure. Migrants are also approximately 87% more likely to divorce, holding region and education constant. This is unsurprising given that Anglewicz (2012) reports that that 13.9% migrated because of remarriage. However, once holding birth cohort and HIV status constant, this association is no longer statistically significant. Women with a positive HIV status are more than three times more likely to have been divorced ( $p < 0.01$ ), which is also expected given previous research (e.g., Reniers, 2003).

#### *Asset-Based Wealth*

To address the third research question, we employ ordinary least squares regression (OLS) to predict wealth index scores. Again, Model I includes only educational attainment and variables of residence. Model II includes variables concerning spouse's educational attainment and ever being divorced, which we hypothesized will attenuate the association of respondent's education on wealth. Model III adds all other covariates: birth cohort, positive HIV status, the

number of cowives, and the number of living children. Because we do not have data on the amount of household wealth that currently non-married women had in their last union, this analysis includes only currently married women ( $n = 790$ ). Our third hypothesis—that higher educational attainment is associated with higher levels of wealth—is supported by results from Ordinary Least Squares (OLS) regression models summarized in Table 5. We highlight three important factors in wealth attainment supported by this analysis: educational attainment of the respondent, educational attainment of the respondent's current spouse, and divorce.

[Table 5 about here]

First, increased educational attainment among respondents is associated with increased wealth. In Model I, all levels of educational attainment are statistically significant predictors of wealth controlling for residence. This association persists significantly after including covariates in Model II (for those with secondary education) and Model III (for all levels). As would be expected, higher levels have a larger impact: in Model III holding other non-education covariates constant, having a secondary education increases wealth by 0.94 points, compared to women with no schooling, which is three times larger than the impact of a lower primary education (0.24). Still, the first part of our third hypothesis—that is, better educated women will have higher household wealth—is supported by results from Table 5.

The second part of our third hypothesis—that is, controlling for spouse's educational attainment and ever being divorced attenuates the impact of respondent's educational attainment on wealth is partially supported by evidence from Model II and Model III. As noted previously from Table 3, increases in women's educational attainment predict increased educational attainment of the spouse. Table 5 shows that the educational attainment of the spouse is a statistically significant predictor of wealth index scores. In Model II, we see that when

controlling for region, husband's education, and ever being divorced, only secondary schooling remains statistically significant. Further, the magnitude of the association decreases: in Model I a secondary education is associated with an increase in wealth by 0.91 points, whereas in Model II it is associated with increase in wealth by 0.73 points. We do not see a statistically significant association between divorce and wealth in Model II. However, when we include birth cohort, number of children, and number of cowives in Model III, these associations change. Husband's education continues to be positively associated with wealth and increases in magnitude. A husband with at least some secondary education is associated with an increase in wealth by 0.62 points, and a husband with some upper primary schooling has an increase of 0.43 points. Again, while ever divorcing serves as an economic shock—wealth decreases by 0.15 points—this is only statistically significant at  $p < 0.05$  when we control for other variables. While we see an association between respondent and her spouse's education, which in turn is associated with wealth, divorce is not significantly associated with education from the results shown in Table 4.

Across all models we see that living in the northern region and being a migrant is positively associated with wealth. Migrants have an increase in wealth of about 0.24 points controlling for all other covariates. There is an increase of 0.34 points for those living in the northern region compared to the central region controlling for all other variables. Also, we see in Model III that the two youngest birth cohorts are significantly associated with less wealth. This is not unexpected as they have had less time to accumulate wealth. There is also a slight increase in wealth with each child (0.06). This could indicate that wealthier families have more living children, or that more living children contribute to family wealth because they are able to work.

## DISCUSSION

This research indicates the importance of educational attainment for understanding of outcomes for women in rural Malawi. As noted, Malawi has overall low education attainment and high rates of marriage, divorce, and remarriage, which is different than the United States and other contexts where most of the existing research on the returns to education in the marriage market has been focused. Our results show evidence of educational matching in marriage: women in our sample with higher amounts of schooling were more likely to marry spouses with more schooling, and greater schooling was positively associated with wealth. Despite the differences in context, this positive association is similar to extant research from the United States (e.g., Mare, 1991; Diprete & Buchmann, 2006).

However, our findings regarding marital stability were unexpected. We did not find a statistically significant association between educational attainment and ever being divorced. Divorce serves as an economic shock as evidenced by multivariate regression on the wealth index shown in Table 5. However, we do not find a statistically significant association between educational attainment and ever being divorced in the multivariate analysis shown in Table 4. This differs from the findings of Diprete and Buchmann (2006), in which education was positively associated with SES partially through marital stability. Because of Malawi's marriage patterns, we may find that divorcing does not serve as great of a shock, or rather, one more easily recovered from because of high rates of remarriage.

Throughout our paper we discuss the importance of region with regards to educational attainment. Generally, educational attainment for women is highest in the northern region and lowest in the south (e.g., World Bank 2010). This pattern is reflected in our findings as well. However, we do not find statistically significance of any interaction terms between educational attainment and region, which indicates that education does not work differently across regions.

For example, a secondary education in the northern region has a similar association in regards to spouse's education, divorce, and wealth to a secondary education in the southern region.

Still, this research cannot fully ascertain the impact of women's education on asset-based wealth for women in Malawi because of the bidirectional associations between education and wealth. As Oliver and Shapiro (2006) argue one important aspect of wealth attainment that could not be studied using this data is that of inheritance. Wealth and inheritance would allow parents to further invest in children's education past "free" primary education. This would provide the opportunity to meet more highly educated potential spouses (Mare, 1991) as well as to afford to buy the household goods and materials from which our wealth index was created. From this analysis, we do find that associations tend to be stronger for females who have completed any secondary schooling. This is further motivation to research causality in who benefits the most from education. Because we find that the strongest associations occur for those who have completed any grades of secondary schooling, it may be that women who are able to afford secondary schooling (an indicator of wealth) are the ones who benefit the most. Thus, it may be parents' wealth, not educational attainment, is what drives the identified outcomes.

Despite these limitations, we believe that our research is an important step in understanding the association between women's education and wealth for women in Malawi. We find educational sorting in marriage, but no association between education and divorce. Still, divorce is shown to be statistically significant with wealth when controlling for other variables. Further inquiry of younger cohorts of women, who have had the opportunity of free primary schooling, will help researchers' understanding of wealth accumulation. MLSFH collects longitudinal data, which allows for future research on these women. Seeing how they age, marry, and possibly go through divorce will help flesh out these associations.



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## TABLES

Table 1: *Summary Statistics for Full Sample (n = 898), 2008 Wave (n = 793), and Migrant Sample (n = 105)*

Variable	Full Sample			2008 Wave			Migrant Sample			Range
	%	<i>M</i>	<i>SD</i>	%	<i>M</i>	<i>SD</i>	%	<i>M</i>	<i>SD</i>	
Educational Attainment <sup>ab</sup>										1-4
No Schooling	20.8			21.9			12.4			
Lower primary	26.3			27.4			18.1			
Upper primary	42.7			41.4			52.4			
Secondary	10.2			9.3			17.1			
Region <sup>c</sup>										1-3
Central	34.6			36.1			23.8			
South	34.3			34.2			35.2			
North	31.1			29.8			41.0			
Age (years)		29.8	6.2		29.9	6.2		28.7	6.0	19-40
Birth cohort										1-4
1984-1989	23.8			23.3			27.6			
1979-1983	22.5			22.8			20.0			
1974-1978	25.3			25.0			27.6			
1966-1973	28.4			28.9			24.8			
Marital status										1-4
Currently married	88.0			88.8			81.9			
Separated	1.6			1.6			1.0			
Divorced	6.2			5.9			8.6			
Widowed	4.2			3.7			8.6			
Number of Cowives		0.3	0.5		0.3	0.5		0.4	0.6	0-3
<i>In polygamous unions</i> <sup>d</sup>		1.1	0.4		1.1	0.3		1.0	0.4	1-3
Number of living children	3.5		1.9	3.5		1.9	3.3		2.0	0-10
Positive HIV Status <sup>ef</sup>	9.4			8.2			18.1			0-1

*Note:* Missing data were imputed using best subset imputation.

<sup>a</sup>Lower primary is grades 1-4; upper primary is grades 5-8; secondary is grades 9-12. <sup>b</sup>Chi-square tests show significant differences between migrant and 2008 wave samples at  $p < 0.01$ . <sup>c</sup>Chi-square tests show significant differences between migrant and 2008 wave samples at  $p < 0.05$ .

<sup>d</sup>There were 253 women in polygamous unions. <sup>e</sup>HIV status reported for most recent wave. If value was missing in latest wave, it was imputed from 2004 and 2006 status. The reported rate of positive HIV status in the MLSFH remained stable from 2004-2006 at 7 percent (Obare et al, 2009). <sup>f</sup>ANOVA tests show significant differences between migrant and 2008 wave samples at  $p < 0.001$ .

Table 2: Outcome variables by Respondent's Educational Attainment ( $n = 898$ )

	Respondent's Educational Attainment			
	No schooling ( $n = 187$ )	Lower Primary ( $n = 236$ )	Upper Primary ( $n = 383$ )	Secondary ( $n = 92$ )
Spouse's education (%)				
No schooling	28.34	13.56	4.96	3.26 <sup>***</sup>
Lower primary	33.16	28.39	13.58	3.26
Upper primary	34.22	50.85	51.44	15.22
Secondary	4.28	7.20	30.03	78.26
Ever divorced (%)	26.74	29.66	20.89	18.48 <sup>*</sup>
Ever divorced or separated (%)	30.48	31.36	23.24	21.74
Wealth Index mean <sup>ab</sup>	-0.48	-0.21	0.16	0.88 <sup>***</sup>
Standard deviation	1.38	1.72	1.75	2.36

*Note:* Missing data were imputed using best subset imputation. Chi-square tests for differences for husband's education and ever divorced. ANOVA tests for differences in wealth index scores.

<sup>a</sup>Only reported for currently married women (No schooling  $n = 158$ ; Lower Primary  $n = 207$ ; Upper Primary  $n = 327$ ; Secondary  $n = 75$ ). <sup>b</sup>Post-hoc tests (Bonferroni, Scheffe, and Sidak tests) show there are statistically significant differences between categories at all levels. Lower-primary schooling are significantly different from no schooling at  $p < 0.05$ . Upper-primary schooling and secondary education levels are different from the categories below it at  $p < 0.001$ . Statistical significance is indicated by  $*p < 0.05$ ;  $**p < 0.01$ ;  $***p < 0.001$ .

Table 3: *Logistic Regression Predicting Upper-Primary or Secondary Education of Spouse (n = 898)*

Covariates	Model 1		Model 2	
	OR	Robust SE	OR	Robust SE
Educational Attainment <sup>a</sup>				
Lower primary	1.70 <sup>*</sup>	0.36	1.58	0.36
Upper primary	3.01 <sup>***</sup>	0.68	2.92	0.71
Secondary	5.56 <sup>***</sup>	2.54	4.98	2.36
Migrant	1.44	0.46	1.31	0.43
Urban <sup>a</sup>	2.61	2.26	2.72	2.29
Region <sup>c</sup>				
North	5.91 <sup>***</sup>	1.72	6.31 <sup>***</sup>	1.89
South	0.88	0.15	0.82	0.15
Birth Year Cohort <sup>d</sup>				
1984-1989			1.62	0.40
1979-1983			1.57	0.38
1974-1978			1.59 <sup>*</sup>	0.36
Positive HIV Status			2.34 <sup>**</sup>	0.69
$\chi^2$	129.15 <sup>***</sup>		136.34 <sup>***</sup>	
Pseudo- $R^2$	0.02		0.18	

Note: OR = Odds ratio. Robust standard errors were used with respect to heteroscedasticity.

Multiple imputation (5 imputations) was used to impute for missing data.

<sup>a</sup>No schooling as reference category. <sup>b</sup>17 women in the migrant sample (2%) lived in an urban area. <sup>c</sup>Central as reference category. <sup>d</sup>1966-1973 birth cohort as reference category.

Statistical significance is indicated by \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .



Table 4: Odds Ratios from Logistic Regression Predicting Ever Being Divorced ( $n = 898$ )

Covariates	Model 1		Model 2		Model 3		Model 4	
	OR	Robust SE	OR	Robust SE	OR	Robust SE	OR	Robust SE
Educational Attainment <sup>a</sup>								
Lower primary	1.23	0.27	1.39	0.32				
Upper primary	0.82	0.19	1.03	0.26				
Secondary	0.73	0.26	0.92	0.34				
Upper primary and above					0.71	0.13	0.82	0.16
Migrant	1.87*	0.47	1.62	0.44	1.88*	0.47	1.63	0.44
Urban <sup>b</sup>	0.24	0.19	0.28	0.21	0.23	0.19	0.27	0.21
Region <sup>c</sup>								
North	0.90	0.20	0.82	0.19	0.89	0.20	0.82	0.18
South	1.32	0.25	1.34	0.26	1.28	0.24	1.28	0.25
Birth Year Cohort <sup>d</sup>								
1984-1989			0.54*	0.14			0.57*	0.14
1979-1983			0.92	0.20			0.96	0.21
1974-1978			0.74	0.16			0.75	0.16
Positive HIV Status			3.29**	0.83			3.28***	0.83
$\chi^2$	18.75**		50.61***		18.06**		49.82***	
Pseudo-R <sup>2</sup>	0.02		0.16		0.02		0.04	

Note: Robust standard errors were used with respect to heteroscedasticity. Multiple imputation (5 imputations) was used to impute for missing data.

<sup>a</sup>No schooling as reference category. <sup>b</sup>17 women in the migrant sample (2%) lived in an urban area. <sup>c</sup>Central as reference category.

<sup>d</sup>1966-1973 birth cohort as reference category.

Statistical significance is indicated by \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

Table 5: OLS Regression Predicting Asset-Based Wealth for Married Females ( $n = 790$ )

Covariates	Model 1		Model 2		Model 3	
	<i>B</i>	Robust SE	<i>B</i>	Robust SE	<i>B</i>	Robust SE
Respondent's Education <sup>a</sup>						
Lower primary	0.18*	0.09	0.13	0.09	0.24**	0.09
Upper primary	0.29**	0.09	0.17	0.1	0.33**	0.1
Secondary	0.91***	0.17	0.73***	0.18	0.94***	0.18
Migrant	0.23*	0.1	0.21*	0.1	0.24*	0.09
Urban <sup>b</sup>	0.39	0.28	0.32	0.28	0.22	0.29
Region <sup>c</sup>						
North	0.53***	0.1	0.44***	0.1	0.34***	0.10
South	-0.18*	0.07	-0.17*	0.07	-0.11	0.07
Spouse's Education						
Lower primary			0.13	0.1	0.18	0.09
Upper primary			0.39***	0.09	0.43***	0.09
Secondary			0.49***	0.12	0.62***	0.12
Ever divorced			-0.09	0.08	-0.15*	0.08
Birth Year Cohort <sup>d</sup>						
1984-1989					-0.38**	0.12
1979-1983					-0.19**	0.11
1974-1978					0.00	0.10
Positive HIV Status					-0.07	0.13
Number of cowives					0.09	0.07
Number of children living					0.06*	0.03
R <sup>2</sup>	0.22		0.24		0.28	
<i>F</i>	31.34***		23.19***		20.96***	

Note: Robust standard errors were used with respect to heteroscedasticity. Multiple imputation (5 imputations) was used to impute for missing data.

<sup>a</sup>No schooling as reference category. <sup>b</sup>17 women in the migrant sample (2%) lived in an urban area. <sup>c</sup>Central as reference category. <sup>d</sup>1966-1973 birth cohort as reference category.

Statistical significance is indicated by \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .