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# Disability and Poverty: Landmine Amputees in Cambodia

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**Abstract**

This paper examines the impacts of disability on poverty in rural Cambodia. I combine a natural experiment and spatial blocking. First, I focus on amputation among adults due to landmines, which is free from measurement errors and the onset of which is an exogenous shock. Second, I conduct an original survey stratified by disability status within villages, where people have shared the same local vulnerability to landmine accidents. This research design enables a matching analysis within small geographic areas, treating demographic factors, such as household formation and fertility, as endogenous. Amputation greatly reduces consumption and income, but not subjective well-being (i.e., adaptation), increasing poverty and augmenting its magnitude, especially among the poorest of the poor. Disability triggers a vicious circle of low labor productivity, low earnings, and low accumulation of productive assets and social capital. This productivity-cum-asset channel also leads to adverse intergenerational effects on child schooling and labor.

**Keywords:** Disability-poverty nexus; Natural experiment; Spatial blocking; Cambodia
**JEL codes**: I12, I32, O15, O17.

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# 1. Introduction

Following a significant decrease in poverty over the last 25 years, the remaining poverty in the world is tough to alleviate (Ravallion, 2015). Today's poor are increasingly concentrated not only in 'hard' places with conflicts, under post-conflict conditions, and in failed states (de Janvry and Sadoulet, 2016), but also within populations with structural disadvantages, such as chronic health problems, ethnic minority status, and geographical remoteness. To fight enduring poverty, it is critical to better understand whether, how, and why such structural disadvantages cause poverty. This paper explores these questions regarding disability.[1] Although the literature on the disability-poverty nexus has been growing (e.g., Barron and Ncube, 2011; Filmer, 2008; Kett et al., 2009; Mitra et al., 2013),[2] systematic empirical studies are scarce.[3]

Since using an experimental approach – randomizing the assignment of disability – is infeasible, researchers need to tackle the following empirical challenges associated with disability in observational data; the disability-poverty literature has done little, however.[4]

1) *Incomplete measurement*: Measurement errors in self-reported impairments and functional/ activity limitations have been controversial in developed countries (Bound, 1991; Haveman and Wolfe, 2000; Jones, 2008; Kreider, 1999; Kreider and Pepper, 2007; Stern, 1989). With a paucity of data in developing countries, researchers commonly rely on self-reported measures without addressing measurement problems (e.g., WHO and World Bank, 2011).[5]
2) *Small size and geographical dispersion of the disabled population*: The small sample size of persons with disabilities in national surveys severely restricts statistical analysis (Hoogeveen, 2005). This problem becomes magnified when different types of disabilities are considered separately. Many extant studies employ a vague aggregate measure of any form of disability; it is even common for studies to combine physical and mental disabilities. Moreover, persons

[1] The global estimate of the prevalence of some form of disability among adults in 2004 is 15.6 to 19.4%, which corresponds to 785-975 million persons at age 15 or above in 2010; of these, around 110 (2.2%) to 190 (3.8%) million experienced significant disabilities (WHO and World Bank, 2011).
[2] Disability has received increasing attention as a development issue (Braithwaite and Mont, 2009; DFID, 2000; Groce et al., 2011b; WHO and World Bank, 2011; Yeo and Moore, 2003).
[3] In their broad literature review, Groce et al. (2011a) find 27 papers with any quantitative evidence on the links across disability, poverty, and health in low- and middle-income countries. See Elwan (1999) for an earlier review.
[4] Lechner and Vazquez-Alvarez (2011) discuss these problems, except for geographical dispersion, in identifying disability's impacts on labor outcomes in developed countries.
[5] The United Nations Statistical Commission established the Washington Group on Disability Statistics in 2001 to facilitate the measurement of disability and the comparison of disability data across countries (Miller et al., 2011). The Washington Group questions cover six functional domains or basic actions: seeing, hearing, mobility, cognition, self-care, and communication.

with disabilities are not concentrated in certain locations; rather, they tend to be geographically dispersed throughout the country.

3) *Endogeneity of the onset of disability*: Poverty can increase the risk of disability through, for example, malnutrition (Maulik and Darmstadt, 2007), poor health/living conditions, and unsafe environments (Lustig and Strauser, 2007) (i.e., reverse causality). Any unobserved factors correlated with both disability and poverty can be confounders (i.e., omitted variable bias). Almost all previous works rely on regression methods for identification.
4) *The limited number of observed covariates prior to disability onset*: Disability can affect demographic factors, such as household formation and fertility, depending on the timing of its onset over individuals' life stages. If disability affects whether individuals become heads of households, then all household-level factors are its outcomes. As a result, observed covariates prior to disability onset tend to be limited. This problem has not been addressed in extant works, even though it can invalidate the exogeneity assumption conditional on observed covariates in their regression analyses. The timing of disability onset rarely receives attention, probably because this critical information is not available and/or self-reported disability is too vague to specify its onset.

I design a quasi-experimental study conducted in Cambodia that addresses all of these problems. I focus on limb amputation among adults due to landmines for the following reasons. First, amputation is free from measurement errors. Thus, the first measurement problem vanishes. Second, focusing on a specific type of disability – limb amputation – almost eliminates the aggregation problem in disability measures associated with the second small-size problem. Third, the onset of amputation caused by landmine accidents is an exogenous shock among people. By using landmine explosion as a tragic *natural experiment*, the assignment of the treatment (amputation) comes closer to being random than amputation caused by other reasons, such as disease. This mitigates the third endogeneity problem. As a result, the fourth covariate problem also reduces. This is because even with limited observed covariates, the unconfoundedness assumption, which holds that conditional on observed covariates, the treatment assignment is independent of the potential outcomes (Imbens and Rubin, 2015; Rosenbaum, 2002), could be plausible. Fourth, amputations due to landmines are a serious problem in post-conflict countries. Cambodia is often considered as the country with the highest prevalence of amputees in the world. Exploiting this natural experiment is not possible with national survey data, such as

Demographic and Health Surveys (DHS) and Cambodian Socio-Economic Surveys (CSES), however, because they contain no information about amputees.

Landmine victimization is not truly random, because it is determined by people's vulnerability to landmine accidents. Since landmine explosions occur at unknown point locations, local landmine contamination is the strongest determinant of vulnerability. As landmine contamination reduces, landmine accidents decrease, which is a goal of demining. Thus, ideally, researchers could construct a comparison group – adults with no disability – within small enough geographic areas, such as villages, where having shared the same *local* vulnerability to landmine explosion over time, one experienced an accident and others did not. The treatment-control comparison within small geographic areas has been an effective empirical strategy in quasi-experimental studies (e.g., Abbott and Klaiber, 2013; Billings et al., 2014; Black, 1999; Keele et al., 2015; Lavy, 2010; Muehlenbachs et al., 2015; Turner et al., 2014). This *spatial blocking* is usually infeasible with national survey data, however, because due to the second distribution problem (small size and geographical dispersion), small geographic areas where both persons with and without disabilities are sampled are not common (i.e., limited common support).[6]

To circumvent these limitations in the available data, I conducted an original survey in heavily mined areas in rural Cambodia. In the same village where each disabled person resides, I randomly sampled the non-disabled. In combination with landmine explosion as a natural experiment, this research design is similar to a blocked randomization in experimental studies (Imai et al., 2008). I employ complete spatial blocking (stratification) by village in the random sampling of my survey to mimic a blocked experiment.

To control for individual heterogeneity determining (or at least correlated with) vulnerability and poverty (and other outcomes), I match each landmine amputee with another adult in the comparison group within villages. Treating demographic factors as endogenous, observed pre-treatment covariates are limited (the fourth covariate problem). Using landmine explosion as a natural experiment reduces this problem, as discussed above. The *within-village matching* which captures the village heterogeneity that strongly determines vulnerability to landmines and poverty, also effectively reduces this problem. [7]

[6] This is so even if researchers employ an aggregate disability measure, such as any form of disability. Indeed, extant works rarely control for small geographic area fixed effects.

[7] Lack of valid instruments for landmine victimization precludes an instrumental variable analysis. Instrumenting individual landmine victimization by local vulnerability to landmine accidents, for example, requires the assumption

The paper greatly extends the disability-poverty literature in three ways. First, addressing the aforementioned empirical challenges makes the internal validity of my work much stronger than previous works. I show that amputation (mainly male leg amputees) greatly reduces consumption and income, but not subjective well-being,[8] increasing poverty and augmenting its magnitude.[9]

Second, the paper examines mechanisms underlying disability-driven poverty. Previous studies have not addressed this important question, probably because their definition of disability is too vague or broad to specify mechanisms. Amputation lowers labor productivity. Although augmenting household labor endowment, productive capital, and social capital can potentially compensate for amputees' reduced labor productivity, disability may instead adversely affect labor endowment through demographic decisions and hamper asset accumulation. I find evidence for the *productivity* and *asset channels*, but not the *demography channel*.

Third, the paper examines intergenerational disability effects. Extant works consider only the association between child disability and education (e.g., Filmer, 2008; Lamichhane and Kawakatsu, 2015; Rischewski et al., 2008), and none of them examine child labor. Adult disability may reduce investments in child education due to low earnings. With limited productive assets as well as safety nets, child labor may be an important (even unique) option to compensate for reduced labor productivity. I find that disability adversely affects both child schooling and labor through the productivity-cum-asset channel.

The paper also contributes to three strands of the economics literature. The first is impacts of adult health on economic outcomes. A common strategy in labor and health economics is to consider health shocks due to accidents (e.g., Dano, 2005; García-Gómez et al., 2013; Halla and Zweimüller, 2013; Lindeboom et al., 2016). The paper is the first application of this strategy to disability in developing areas. I employ it in a sharp way by focusing on specific accidents (landmine) and disabilities (limb amputation), which bolsters the identification.[10]

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that local vulnerability does not directly affect outcomes. Since landmine contamination and demining should affect regional development (as shown in Mozambique by Chiovelli et al., 2017), this exclusion restriction is not plausible.

8 Recent studies (e.g., Mitra et al., 2013; Trani et al., 2015) examine disability impacts on multidimensional poverty (Alkire and Foster, 2011). I separately examine the outcomes that constitute a multidimensional poverty index, such as subjective well-being.

9 My matching analysis is close to two biomedical matched case-control studies on disability impacts on poverty: physical disability (musculoskeletal impairment) in Rwanda (Rischewski et al., 2008) and visual impairment due to cataracts in Kenya, the Philippines, and Bangladesh (Kuper et al., 2008).

10 A small number of studies in developed countries examine disability impacts on labor market outcomes using propensity score matching (Lechner and Vazquez-Alvarez, 2011; Polidano and Vu, 2015).

The second is about conflict and disability. Although disability is a serious problem in post-conflict countries like Cambodia, it has received little attention in the conflict literature (see Blattman and Miguel, 2010 for a review). No previous studies on the disability-poverty nexus have explicitly examined conflict-driven disabilities. The paper fills this gap.

The third is about subjective well-being.[11] The adaptation hypothesis of well-being suggests that people return to baseline levels of subjective well-being following a change in life circumstances (Diener et al., 2006; Lucas, 2007). Empirical evidence for adaptation to disability is found in developed countries (e.g., Oswald and Powdthavee, 2008; Smith et al., 2005). I find similar patterns among Cambodian amputees.

The rest of the paper is organized as follows. Section 2 discusses the empirical design. Section 3 conducts the main analysis on welfare and poverty. Section 4 explores mechanisms. Section 5 examines intergeneration effects. Section 6 conducts robustness checks. The last section offers policy implications and lessons for empirical analyses on disability and poverty.

## 2. Empirical Design

### *2.1. Study Area and Data*

The Cambodian conflict (1970-1998) generated thousands of amputees, mainly due to landmines (Roberts and Williams, 1995; Roberts, 2011).[12] Public social protection for amputees is limited, and nongovernmental organizations (NGOs) have been playing a major role. My project evaluates NGO-run vocational training programs for persons with physical disabilities in the Banteay Meanchey Province, which shares an international border with Thailand.[13] With a very incomplete administrative record of disabilities, local NGO staff visited villages to find eligible disabled adults with limb amputation or paralysis.

I conducted a household survey in May-November 2010 as part of the baseline survey. I employed a spatially blocked (stratified) sampling. In each village, I stratified households by disability status: those to which disabled adults eligible for the program belong and those with no disabled members. The survey team randomly sampled three (third, sixth, and ninth) neighboring

[11] A strong relationship has been found between subjective well-being and physical/mental health in developed countries; in particular, stigma results in reduced life satisfaction (Link and Phelan, 2001). Many studies have documented stigma associated with chronic health conditions (see Van Brakel, 2006 for a review).

[12] The Cambodian conflict consists of three periods: the Vietnam War (1970-1975), the Khmer Rouge's rule (1975-1979), and the Vietnamese rule and peace process (1979-1998) (Chandler, 2007).

[13] Banteay Meanchey is one of the most heavily mined provinces in the country. According to the Cambodian DHS (National Institute of Statistics et al., 2011), 2.5% of individuals in the province were physically impaired and over 26% of disabilities were caused by landmine or conflict.

households by random walk. The original sample covers 238 households with one disabled adult member and 456 households with no disabled members in 152 villages.[14]

### *2.2. Analysis Sample*

To exploit landmine explosion as a natural experiment, I focus on 125 landmine amputees (110 males and 15 females) in the original sample. Like many physical disabilities, limb paralysis caused mainly by polio and limb amputation due to reasons unrelated to conflicts, such as disease, can be related to unobserved maternal and infant health conditions correlated with poverty. Limb amputation caused by war/armed conflict can be related to people's behaviors, especially among combatants. In contrast, landmine/UXO accidents are an exogenous shock. Importantly, limb amputation is free from measurement errors.

I trim the landmine amputee sample as follows. First, I focus on economically active cohorts – working-age adults at age 20-59 (6 older males are dropped). Second, I exclude landmine accidents that occurred before age 15 (14 cases). This makes educational attainment a pre-treatment factor, because the remaining amputees enrolled in secondary school, if any, prior to disability onset.[15] Third, I exclude 15 amputees who experienced accidents before they moved to the current village. This is because my identification strategy relies on within-village comparison, as discussed shortly.[16] I keep 10 amputees who migrated to the current village prior to the onset of disability. That is, I focus on limb amputation among working-age adults that was caused by landmine accidents in the current village after they completed their education.[17]

Treated adults are the remaining 87 landmine amputees (78 males and 9 females; 76 leg amputees). Among the treated adults, 79% are male leg amputees,[18] 85% are a head of household, 89% have lived in the current village since birth, and 70% were combatants when they experienced landmine accidents (Online Table A-1). All treated adults but one were living in the current village, not in the wilderness, at the onset of disability. Although the gender gap is nil in migration, household headship and combatant experience are much more common among males.

[14] Among the 238 disabled adults, 25% are females, 67% are leg amputees, 13% are hand amputees, and 22% have limb paralysis (Online Table A-1). Multiple amputation and the combination of amputation and paralysis exist, though they are uncommon. Most amputees do not have prosthetics.
[15] Primary education consists of 6 years from age 6, and junior secondary education consists of 3 years from age 12.
[16] I also drop 3 amputees with missing values in the main outcome measures.
[17] In this sample the earliest accident occurred in 1980, after the breakdown of the Pol Pot regime in 1979.
[18] Ten have multiple amputation: eight male double-leg amputees, one female double-hand amputee, and one male one-hand-one-leg amputee. The combination of amputation and paralysis is nonexistent in the analysis sample.

People's vulnerability to landmine accidents is determined by their location and behaviors. To fully control for local vulnerability to accidents, I construct a comparison group within villages: working-age adults with no disability in the same village, excluding those who belong to households with a member with disability. Only villages with both treated and controlled adults exist are kept to ensure common support. The resulting adult analysis sample consists of 87 treated and 529 controlled (256 controlled males) in 72 villages across 36 communes in 8 districts. Landmine amputees are geographically dispersed: Out of 72 villages, 59 contain one treated adult and the remaining 13 contain two or three. The comparison group within villages is admittedly small. I address this problem below. Households to which treated and controlled adults in the adult analysis sample belong are the treated and controlled households, which constitute the household analysis sample (296 households).

### *2.3. Pre-Treatment Covariates*

As some individuals experienced landmine accidents before they married and/or had children, disability could affect their demographic decisions. Thus, many demographic factors are not pre-treatment covariates. In my data, observed pre-treatment covariates are restricted to sex, age, and education.[19] Male amputees are much more common than female amputees, as discussed above. Age and education are also strong correlates of amputation, as follows. As mine clearance in the region progressed and security improved over time, landmine vulnerability decreased. Among the 87 amputees, the majority of accidents occurred during the conflict period in the 1980s and 1990s, when the landmine victims were from age 15 to their mid-30s (mean: 25.7), and accidents decreased in the 2000s (Online Figure A-1). Accordingly, the majority were in their mid-30s to mid-50s (especially 40s) at the time of the survey (mean: 44.5, i.e., 18.8 years after disability onset). These patterns suggest an inverted U-shaped relationship between amputation and current age, which is confirmed by their nonparametric relationship (Online Figure A-2). This inverted U-shaped relationship holds only among males with no secondary education, suggesting that secondary education is correlated with activities that make males vulnerable to landmine accidents or behaviors against landmine risk.[20] The means of pre-

[19] Ex-combatant status is also a pre-treatment factor, because following the onset of amputation, most combatants are likely to have been discharged and amputees are unlikely to have enlisted; my data lack this information among nondisabled adults, however. Migration is an endogenous decision that can be affected by disability. I discuss unobserved ex-combatant status and sample selection due to migration as potential threats to identification below.
[20] These relationships of amputees with sex, age, and education sustain in regression analyses (Online Table A-2).

treatment covariates between the treatment and control groups are compared in Table 1.[21] Treated adults (amputees) are more likely to be male, older, and less educated at the secondary level than controlled adults. The treatment distribution of age is much less dispersed than the control (Figure 1), because amputees are concentrated in their 40s.

### *2.4. Matching Design*

I match treated and controlled adults (*adult matching*) within villages. This *within-village matching* (WVM) fully controls for landmine contamination in the neighborhood of the village, the strongest determinant of the local vulnerability to landmine accidents, as well as village heterogeneity affecting the outcomes examined below. Specifically, this design achieves exact matching on the variables (72 village dummies) deemed most crucial to balance. I also use three strong individual-level correlates of disability as matching variables: sex, age, and secondary education. These basic demographic factors should be also correlated with the various outcomes examined below and various unobserved covariates correlated with the outcomes. I employ exact matching on sex. Variations in secondary education within villages are too limited for exact matching. I conduct nearest-neighbor matching on age and secondary education, following Abadie and Imbens (2006, 2011).[22] Specifically, for each treatment unit, I select one match with the same gender and the closest distance in age and secondary education, measured by the Mahalanobis metric in the same village, with replacement. The unconfoundedness assumption is that between two male (female) adults in the same village who are close to each other in age and education, the onset of amputation caused by landmine accidents is as good as randomized. I discuss potential threats to this identification assumption in the robustness check below.

Although all covariates except for age are well balanced in the matched sample, the normalized difference in age is still considerable (Table 1). Compared to the analysis sample, the age distribution of matched controlled adults is much closer to that of treated adults (Figure 1), though the former is still more dispersed than the latter.[23] With the small comparison group within villages, the remaining imbalance of age is unavoidable. To mitigate this imbalance, I

[21] The table reports the normalized difference of the means which is the difference in means scaled by the square root of the average of the two within-group variances (Imbens and Rubin, 2015). Distinct from the t-test, the normalized difference is independent from sample size. As a rule of thumb, a normalized difference exceeding one quarter in magnitude questions the robustness of estimates using linear regression methods.
[22] Employing two separate metrics in this way – exact matching and nearest-neighbor matching – is recommended by Ho et al. (2007).
[23] According to the Kolmogorv-Smirnov test, the equality of distributions is rejected at the 10% significance level.

conduct adult matching within communes. Although this *within-commune matching* (WCM) controls the vulnerability to landmine accidents within larger geographic areas than WVM, the comparison group becomes larger.[24] In the corresponding matched sample, all covariates are well balanced (Table 1), and the age distributions are very similar between treated and controlled adults (the p-value of the Kolmogorv-Smirnov test is 0.68) (Figure 1). These two matching designs (WVM vs. WCM) have different drawbacks (Abbott and Klaiber, 2013 discuss similar tradeoffs). If they yield similar estimates, it buttresses the robustness of the results, while if their estimates are different, smaller estimates can be at least considered conservative.

### *2.5. Estimand, Inference, Outcomes, and Outliers*

I estimate average treatment effects on the treated (ATT), which reveals how the mean outcome among the treated (disabled) would differ versus the mean outcome if all treated units were not treated. I use the nearest-neighbor estimator developed by Abadie and Imbens (2006, 2011), which is not biased with only one continuous matching variable (age).[25]

I apply multiple inference correction for outcome variable groups defined below to avoid over-rejections by adjusting p-values (Anderson, 2008; Romano et al., 2010). I use the Benjamini-Hochberg step-up method (Benjamini and Hochberg, 1995) to control the false discovery rate (FDR), the expected proportion of rejections that are type I errors.

Outcomes are measured at the level of either adult or household. For adult outcomes such as employment, the treatment and control, respectively, mean treated and controlled adults. To analyze household outcomes such as poverty, matching needs to be done also among adults, because matching households (*household matching*) ignores the endogeneity of household formation. For household outcomes, the treatment and control, respectively, mean that adults belong to treated and controlled households. In general, estimated treatment effects on household outcomes partly capture impacts on the formation of the household at which outcomes are measured. This does not mean that the estimated effects on household outcomes are biased, but that household formation can be a mechanism underlying them, which is examined in Section 4.

[24] As an alternative WCM design, I employ exact matching on secondary education, as well as sex (age is the sole matching variable in the nearest-neighbor matching). A small number of treated observations with no common support are dropped. This alternative design trades off the balance in age and education. All estimation results in this alternative design (not shown) are very similar to those reported below. This mitigates a concern about the behavior of the Mahalanobis distance with a rare binary variable that could result in poor balance (Gu and Rosenbaum, 1993).

[25] The inference is based on homoscedastic standard errors. Estimating heteroscedasticity-robust standard errors, following Abadie and Imbens (2006), requires rematching within treatment units and within control units, which is infeasible, because most villages contain only one treatment unit.

Attention should be given to outliers in the main outcomes, such as consumption. I consider the natural logs of original values, which are more robust to outliers than the original values. I also employ normalized ranks – subtracting ($N$+1)/2, where $N$ is the number of observations, from each rank so that the average value becomes equal to zero.[26] Although rank-based statistics do not have a direct interpretation as a meaningful treatment effect, in practice, they enable powerful tests because of their insensitivity to thick-tailed or skewed distributions (Imbens and Rubin, 2015). In particular, if the estimated treatment effect on a log measure is significant but that on the rank is not, the robustness of the former estimate is questionable.[27]

## 3. Main Analysis

I consider two standard welfare measures: consumption and income per capita.[28] Online Appendix A discusses the construction of these two and poverty lines.[29] Among controlled households, mean annual consumption and income per capita (unweighted by household size) are \$270 and \$262, respectively;[30] 74% and 52% have consumption less than the poverty line and the extreme poverty line, respectively, while the incidence of income poverty is similar.

The distributions of the log of annual consumption and income per capita by treatment (disability) are depicted in Figure 2. First, income is more dispersed than consumption. Thus, concerns for outliers in income are greater than outliers in consumption. Second, the treatment distribution is first-order stochastically dominated by the control distribution for both consumption and income, and the treatment-control difference in income is larger than that in consumption. Third, the treatment-control difference is large especially among households whose consumption/income is far below poverty line. Thus, regardless of the level of poverty lines, the Foster-Geer-Thorbecke (FGT) index $P_\alpha$ (Foster et al., 1984) should be greater among

[26] For ranks with a tie, equal observations are assigned to the average rank.
[27] In the case where the two sets of estimation results for related outcomes (e.g., consumption vs. income) and based on different empirical designs (e.g., WVM vs. WCM) are different, the comparison of log and rank measures enables me to assess whether different results are driven by outliers.
[28] If disability affects household size, the estimated impacts of disability on per-capita welfare measures captures the mix of impacts on household consumption/income and household size. The analysis below shows that disability does not significantly affect household size.
[29] The rural poverty line and the rural extreme poverty line, respectively, are \$341.35 and \$225.29 per capita per annum (1US\$ = 4,185 Riel in 2010) (World Bank, 2014). The poverty line, but not the extreme poverty line, for consumption is adjusted to circumvent the measurement problem in the consumption data, as discussed in Online Appendix A. I do not adjust poverty lines to incorporate the potential extra cost of disability for a given income (e.g., Jones and O'Donnell, 1995; Zaidi and Burchardt, 2005). With incomplete cost data, I use gross income.
[30] Earned income (near 80% of total income) consists of farm income (58%) and nonfarm income (mainly unskilled wage labor). Cropping (mostly rice) accounts for over 70% of farm income; the rest consists mostly of livestock raising, fishing, and forest product gathering. About two thirds conduct cropping and 46% earn nonfarm income.

treated households than controlled households; this should be especially so with higher weights for greater poverty gaps (larger $\alpha$).[31] Fourth, when matched controlled households are considered, the treatment-control difference in consumption decreases in both WVM and WCM. Although the treatment-control difference in income also decreases in WVM, the converse holds true in WCM. According to the matched control distribution, the treatment-control difference in income (WVM) is larger than it is in consumption. Thus, the comparison of $P_\alpha$ between treated and matched controlled households is mostly robust to the level of the poverty line; as an exception, it is sensitive to the level of the poverty line, but not the extreme poverty line, for consumption.

Table 2 reports matching estimates.[32] Whereas the results for consumption and consumption poverty are similar between WVM and WCM, all the WCM estimates for income and income poverty are somewhat larger in magnitude and statistically stronger than the WVM estimates (which is consistent with the distributions). I focus on the latter conservative estimates for income. Whereas having an adult household member with disability lowers consumption and income by 16% and 35%, respectively (column 1), the results for the corresponding ranks are very similar (column 2). Whereas each rank result supports the robustness of the estimate for the amount, the comparison of the rank results suggests that the larger estimate for income than consumption can be driven by outliers.[33]

Poverty is measured by the incidence of poverty, the normalized poverty gap, and the square of the normalized poverty gap, which correspond to $P_0$, $P_1$, and $P_2$, respectively. The estimated impacts on these measures are relatively similar to each other for both consumption and income (columns 3-5). These results are reassuring, because all of the poverty measures are robust to outliers among the nonpoor. Although the result for $P_0$ is not statistically significant, disability significantly increases $P_1$ and $P_2$, and the latter impact is greater than the former in

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[31] FGT index is given by $P_\alpha = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z-y_i}{z}\right)^\alpha$, where $y_i$ is individual $i$'s consumption or income, $n$ is population size, $q$ is poor population, $z$ is poverty line, and $\alpha$ is parameter. $(z - y_i)/z$ is normalized poverty gap. Whereas $P_0$ (head count ratio) does not capture the magnitude of poverty, $P_1$ captures the depth of poverty with no weights on the poverty gap and $P_2$ captures the severity of poverty with higher weights for larger gaps.

[32] All the tables reporting adult-matching estimates for household outcomes show the means of the outcome variables among controlled households as control means; as an exception, for normalized ranks, the mean among controlled adults is reported, because the control mean is directly determined by the number of observations.

[33] These estimates for gross income can overestimate those for net income, because the richer households are, the more likely they are to use purchased inputs for production. At the same time, the measurement problem in the consumption data discussed in Online Appendix A can cause bias in the estimates for consumption. In particular, if amputees are less mobile and spend less for transportation than adults with no disabilities, the estimated negative impacts on consumption can be biased downward in magnitude.

terms of the percentage increase from the control mean. The estimation results for extreme poverty are similar, except for the $P_0$ for consumption, which is statistically significant (columns 6-8). In all three measures, the impacts on extreme poverty are greater than those on poverty. Thus, although disability does not strongly increase the incidence of poverty, it increases the incidence of extreme consumption poverty and augments the magnitude of poverty, especially among the poorest of the poor. These results should be qualitatively robust to the level of poverty lines, except for consumption poverty, as discussed above. I conduct multiple hypothesis tests for consumption and income groups of eight variables (columns 1-8) in each matching design. All significant results based on individual p-values are robust to the multiple inference.

The survey asked questions about subjective well-being to the heads of households, but not adults with disability, unless the head is disabled. In the adult analysis sample, however, most amputees (especially male amputees) are the household head. Disability alters neither happiness nor life satisfaction in a significant way in WVM/WCM (columns 9 and 10). These results are consistent with the adaptation hypothesis of well-being (Diener et al., 2006; Lucas, 2007). Distinct from welfare and poverty, about 19 years after the onset of disability, on average, people return to baseline levels of subjective well-being.

## 4. Mechanisms

This section explores potential mechanisms underlying disability-driven poverty: demography, asset, and productivity. Since amputation permanently alters labor productivity and demographic and asset accumulation decisions are made through time, these three channels can work over time starting from the onset of disability. I examine whether disability affects the outcomes for each channel measured at the time of the survey. The following caveats are noted.

First, the analysis does not necessarily show whether disability affects household formation – household headship and marriage – among adults who made these decisions following disability onset, because some adults made these decisions prior to its onset; the analysis captures impacts on their current status, which could be altered (e.g., through divorce).

Second, current labor outcomes depend on current labor endowment and assets, which are cumulative outcomes of demographic and investment decisions made over time. The analysis does not capture disability impacts on labor productivity for given labor endowment and productive assets; instead, estimated impacts on labor outcomes can be driven by the demography and asset channels (e.g., low productivity due to small productive capital). To examine the productivity channel, I thus focus mainly on adult nonfarm work, which consists mostly of casual wage labor without using productive capital.[34]

### *4.1. Demography*

The results for the demography channel are reported in Table 3 (columns 1-4). About two thirds of controlled adults are married and 34% are household heads. According to the conservative WCM estimates, disability does not significantly alter headship or marital status.[35] Thus, household formation is not a significant endogenous factor underlying the disability impacts on household outcomes. Disability affects neither household size nor the number of working-age adults. This indicates that disability does not affect other decisions determining household labor endowment, such as migration and co-habitation.

### *4.2. Assets*

The asset channel can apply to human, physical, and social capital. Education is a pre-treatment factor, and treated adults are less educated than controlled adults, as discussed above. The results for physical and social capital are reported in Table 3 (columns 5-10).[36] The WVM estimates are somewhat larger than the WCM estimates for all outcomes except for land area, and I focus mostly on the latter conservative estimates.[37] Although disability does not significantly affect the possession of land, it decreases land size by about 0.7 ha (over 40% of the control mean) and nonland assets by almost 70%;[38] the rank results are qualitatively the same and similar between land and nonland assets.[39] Disability also lowers social capital.[40] All of these results are robust to the multiple inference for the six asset variables (columns 5-10).

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[34] With my data, it is infeasible to distinguish labor productivity and discrimination in labor markets (e.g., Baldwin, 1994; Baldwin et al., 1994; Madden, 2004).

[35] Although the WVM estimate for headship is considerable and statistically significant, it is not robust to multiple hypothesis testing (for four demographic variables in columns 1-4). This estimate for headship is likely to be biased, because it is strongly correlated with age, which is not well balanced in the WVM sample, as discussed above. Additional evidence for this bias is provided below.

[36] The distributions of land, nonland assets, and social capital are discussed in Online Appendix B. Nonland assets consist of consumer durable goods, transportation capital, agricultural equipment, and livestock. Social capital is measured by an additive standardized index constructed from five z-scores (Kling et al., 2007). The five indices are the number of close friends, the number of people who could offer help in the case of small/large shocks, the number of social events attended in the past six months, and the number of gatherings for food or drinks in the past one month. Like subjective well-being, household heads were asked these questions.

[37] The rank results for nonland assets suggest that the WVM estimate being larger than the WCM estimate is not mainly driven by outliers.

[38] The log dependent variable takes 0 if the original value is zero.

[39] Disability does not significantly affect the possession and rank of consumer durable goods, transportation capital, agricultural equipment, and livestock (Online Table A-3 panel A).

[40] The estimated effects on the individual five indices of social capital are consistent (Online Table A-3 panel B).

### *4.3. Productivity*

The results for adult labor outcomes are reported in Table 4.[41] All results are similar between WVM and WCM. Disability decreases nonfarm employment by about .15 in probability (about a 60% reduction from the control mean) and earnings by about 90%; the rank results are qualitatively the same (panel A columns 1-3). In contrast, disability does not significantly alter the nonfarm labor supply in the past seven days and the past one month; the magnitude of the negative point estimate for the former measure is considerable compared to the control mean, however (column 4 and 5). Along with this result, the greater disability impacts on nonfarm earnings than participation indicate lower wage/earnings per labor supplied among employed/self-employed treated adults than controlled adults, i.e., the low productivity of nonfarm labor among amputees. All these results are robust to the multiple hypothesis testing for the five nonfarm work variables (columns 1-5).

The survey collected time use data during the last 24 hours for all household members at age 10 or above. Consistent with the labor supply results, disability does not alter nonfarm work in a statistically significant way, though the negative point estimate is considerable (panel B). Disability decreases participation in and the time allocated for farming, and thus any work, and increases the time allocated for household chores. Most of these results are robust to the multiple hypothesis testing for the eight time use variables. This provides suggestive evidence for the low productivity of farm labor among amputees.[42]

### *4.4. Synthesis*

These results suggest the following productivity-cum-asset channel: Low human capital (education) leads to landmine accidents and amputation, which reduces labor productivity and thus earnings (both farm and nonfarm), thereby hampering the accumulation of productive capital (both land and nonland) as well as social capital over time; with limited productive assets, the labor productivity and earnings stay low. The onset of disability triggers this vicious circle.

## 5. Intergenerational Effects

[41] An indicator for nonfarm employment takes 1 if an individual worked for wage labor in the past six months or for nonfarm family business in the past 12 months; annual earnings consist of annual wage income plus annual net earnings from nonfarm family business, divided by the number of household members who work for the business. Two adults earn negative net earnings, and they are dropped for the log outcome. The distributions of adult nonfarm earnings are discussed in Online Appendix B.

[42] I also examine household sectoral incomes (Online Appendix C). Albeit statistically weak, the results show that disability decreases participation in and income earned from farm (mostly cropping) and nonfarm work in similar ways. Safety nets against disability, mostly in the form of private transfers, are shown to be limited.

This section examines whether adult amputation affects child schooling and labor. With the potential endogeneity of fertility, child mortality, and migration, child outcomes need to be measured at the level of the parent who makes fertility decisions or the household within which child mortality occurs and child migration decisions are made. Household-level outcomes cover all children in households, and parent-level outcomes focus on adults' own children. Specifically, I use the household/parent means of the following child outcomes: 1) enrollment in any school (age 6-19); 2) primary school completion and secondary school enrollment or attainment (age 12-19); and 3) time use for study and work during the last 24 hours (age 10-19). Matching needs to be done at the level of adult, not household or child. The nonsignificant demography channel found above suggests that treatment effects on these outcomes should not be driven by household formation. Child outcomes are available among a subset of households/parents with children and are based on children who belong to households at the time of the survey.

Among 87 treated adults in the analysis sample, those who belong to households with children at each of the three cohorts defined above are treated adults, and the corresponding controlled adults who belong to households with children at the same cohort are defined in the same way as above. The adult analysis sample for each child cohort is a subsample of the whole adult analysis sample, and the characteristics of treated adults in the former sample are similar to those in the latter (Online Table A-5 columns 2-4). Adult matching within villages/communes is done in the same way as above.[43] Adverse disability impacts on both child schooling and labor are found (Table 5 panel A). First, disability decreases all three schooling outcomes and the proportion of time spent for studying. Second, disability increases the proportion of children who work (by 15%) and the mean proportion of time spent for work (by over 30% from the control mean). Although almost all estimation results are similar between WVM and WCM, the former results should be more reliable, because that estimation fully controls for school-supply factors.[44]

The construction of the parent analysis sample for each child cohort is analogous. The treatment and control mean a parent (mostly fathers) with disability and no disability, respectively. The parent analysis sample is a subsample of the corresponding adult analysis

[43] The covariate balance in the original/matched adult analysis sample for each child cohort (Online Table A-6) is similar to that of the whole adult analysis sample.

[44] The multiple inference results for the seven variables (columns 1-7) are stronger in WVM than WCM. When nonfarm work, farming, and household chore are analyzed separately, the estimated effects are not statistically significant (Online Table A-7 panel A).

sample constructed for household-level child outcomes.[45] Overall, covariates in the parent analysis sample are relatively more balanced than those in the adult analysis sample (Online Table A-8 vs. Table 1). I focus on WVM, in which all covariates are well balanced in the matched parent sample (Table A-8).[46] Since most treated adults in the adult analysis sample for household-level child outcomes are treated parents, the results for parent-level outcomes are expected to be similar to those for household-level outcomes. Although this is the case for schooling, the estimates for time use for work are small with no statistical significance at conventional levels (Table 5 panel B). I return to this weak finding about child labor later.

I conjecture that the intergenerational effects of disability are driven by the productivity-cum-asset channel (Online Appendix D examines an alternative channel). This is because low earnings lead to reduced investments in child education, and because with lack of advantage in labor endowment and low productive assets, child labor can compensate for the reduced labor productivity of the disabled. Then, repeating the mechanism analyses in the last section for the adult/parent analysis sample for each child cohort is expected to show results similar to those in the whole adult analysis sample. This is confirmed in Online Tables A-9 and A-10.[47]

# 6. Robustness Check

## *6.1. Unconfoundedness*

The unconfoundedness assumption based on the small set of observed pre-treatment covariates could be negated by unobserved individual heterogeneity correlated with both landmine victimization and potential outcomes (and uncorrelated with the matching variables). It is infeasible to assess the plausibility of unconfoundedness by estimating the treatment effects on pseudo-outcomes that are known to be unaffected, such as pre-treatment outcomes (Imbens, 2015; Imbens and Rubin, 2015). I employ more indirect approaches.

I first assess the relative randomness of the treatment assignment – landmine explosion. Although landmine victimization is not random in principle, it might be close to random in

[45] The characteristics of treated adults in the parent analysis sample for each child cohort are similar to those in the whole adult analysis sample (Table A-5 columns 5-7).
[46] The distributions of parent age are similar between the treatment and control groups. This is because having children within a selected cohort effectively serves as another matching variable. Covariates between treated parents and treated adults in the adult analysis sample for each child cohort are similar (Tables A-6 and A-8).
[47] For brevity, Table A-10 reports only the WVM estimates; the WCM estimates are similar. For comparison, panel A of Tables A-9 and A-10 replicates the results reported in Tables 3 and 4, respectively. The following two exceptions in the parent-level analysis for each child cohort are noted. First, adult nonfarm employment/earnings and work participation according to time use are statistically nonsignificant (Table A-10 panel C). Second, disability decreases adult labor endowment (Table A-9 panel C). I will return to these results below.

practice; then, this natural experiment might be close to a blocked experiment I tried to mimic. Specifically, if landmine victimization is close to random among people who have shared the same local vulnerability to landmine accidents, the random sampling stratified by disability status within villages in my survey mimics the random assignment of treatment status. Since the survey randomly sampled neighboring households, but not adults, the randomization was mimicked among households, but not adults. The assignment of treatment status among adults within villages depends on the number of controlled adults, which is not random, and the number of controlled adults per treated adult varies across villages.[48]

In the blocked experiment, the treatment effect is given by a regression estimate with strata fixed effects (FE) controlled for. Thus, if landmine victimization is close to random *and* the matching estimate is unbiased, the matching estimate should be *close* to the FE estimate for *all* household outcomes in household-level regressions based on the household analysis sample; in contrast, the matching estimate should be *different* from the FE estimate for *all* adult outcomes in adult-level regressions based on the adult analysis sample.[49] This test for all outcomes at each of these two levels is very tight. Although these patterns can occur if both matching and FE estimates are biased in the same way – with the same magnitude for household outcomes –, this is unlikely to occur across the many different outcomes at both the household and adult levels.

The results show that whereas all FE estimates for household outcomes are close to the corresponding matching estimates in both WVM and WCM (Online Table A-14),[50] most FE estimates for adult outcomes are considerably different from the matching estimates (Online Table A-15).[51] This suggests that landmine victimization is close to random. It is not truly random, however, because covariates in the household analysis sample are not well balanced (as

[48] If the number of controlled adults per treated adult were the same across villages, the assignment of treatment status among adults would be equally proportional to that among households across villages.
[49] The comparison of the matching estimate and the FE estimate for child outcomes depends on how the household/parent analysis sample for each child cohort diverges from the original household/adult analysis sample.
[50] Inference for the FE estimates is based on robust standard errors. Since the number of observations in the household-level analysis is about one half of those of the adult-level analysis, to compare the rank estimates between these two analyses, the point estimates of the former need to be roughly doubled.
[51] First, the FE estimates for adult nonfarm employment/earnings are small in magnitude, with no statistical significance. This is so when pre-treatment covariates are controlled for. Second, the estimates for household headship, marital status, and time use (farm and household chores), which are strongly correlated with omitted sex and age, are strongly biased. With sex and age controlled for, the results become similar to the matching estimates. Similar results are found for male adults (not shown). These results support my interpretation that due to the remaining imbalance of age, the WVM estimate for household headship is biased (Section 4.1). The results for child outcomes are mixed. Whereas the FE estimates for schooling are relatively similar to the matching estimates, those for time use are small in magnitude, with no statistical significance (Online Table A-16).

discussed in Online Appendix E). The adult analysis sample is far from a blocked randomization, as shown in Table 1. Matching is needed to achieve balanced covariate distributions.[52]

Next, I assess how robust the matching estimates are to potential confounders. Potential confounders include individual preferences and behaviors against landmine risk. In particular, 70% of amputees were combatants at the onset of disability. My data lack information about risk preference.[53] I conjecture that ex-combatants are no less capable than civilians, on average. Similarly, risk taking may be positively correlated with people's ability. Then, the estimated impacts of disability can be biased downward in magnitude, and thus they are qualitatively robust. I provide two pieces of evidence for this conjecture regarding combatant status. First, among landmine amputees in the analysis sample, ex-combatants are more likely than others to have secondary education (Online Table A-17). Second, according to the Cambodian Population Census, secondary education is more common among combatants than among civilians for both males and females at age 20-59 in Banteay Meanchey (33% vs. 27% among males, 27% vs. 11% among females in 1998; 56% vs. 38% among males, 35% vs. 21% among females in 2008).[54]

### *6.2. Adult Migration and Mortality*

My sample covers adults who lived in the current village at the time of the survey. Migration differentiated by disability could cause selection bias with an unknown direction.[55] I repeat all analyses for non-migrant adults. This subsample analysis based on endogenous migration decisions involves selection bias. Still, since most amputees are non-migrants (89%), if the results for this subsample are similar to the original ones, it provides suggestive evidence for their robustness to systematic migration. This subsample is a valid analysis sample to study non-migrant amputees as a study population. Analysis samples are constructed in the same way as above by restricting the sample, using non-migration status since birth as an additional constraint. The results reported in Online Tables A-18-A-22 (panel C) are similar to the original ones (replicated in panel A). Online Appendix F conducts other subsample analyses.

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[52] Since the random sampling was done within villages, but not communes, landmine victimization should be closer to random within villages than communes; thus, WVM is a default matching design.
[53] Even if the survey had measured risk preference, it would have been an outcome of disability. What is needed to address unobserved heterogeneity in preference is risk preference prior to the onset of disability.
[54] All these differences are statistically significant at a 1% significance level. I thank Katsuo Kogure for his help in obtaining these census figures.
[55] On one hand, disability can decrease migration to seek better labor-market opportunities, i.e., disability hampers mobility. On the other hand, disability can increase migration to seek help offered by others outside villages, i.e., disability leads to migration as a coping strategy.

My sample covers amputees who survived landmine accidents. These survivors may be stronger than individuals who were killed in accidents and those who were disabled and died later. This positive mortality selection is a common problem in the literature on impacts of early-life health on later outcomes (Currie and Vogl, 2013). Such selection could cause downward bias in the magnitude of my estimates; thus, they should be qualitatively robust.

### *6.3. Fertility, Child Mortality, and Migration*

The analyses of child outcomes among households/parents with children at the time of the survey involve additional potential selection bias due to fertility, child mortality, and migration. First, the mortality selection bias for adults also applies to children: Children in the sample may be stronger than children who did not survive. Second, adults belonging to households with children and parents who have children may be stronger than those with no children. Both selections may be stronger among adults with disability than adults with no disabilities, because the former adults had children and those children could survive under adverse conditions associated with disability. This can also cause downward bias in the estimated impacts on child outcomes. Third, the migration patterns of children differentiated by adult disability could cause selection bias with an unknown direction.[56] To check the significance of these potential selection biases, I examine whether disability affects the presence and number of children in each cohort in the household or of parents measured at the time of the survey. Almost no significant results are found (Online Table A-23).[57] This suggests that selection bias caused by fertility, child mortality, and migration is unlikely to be significant on the net.

## 7. Conclusion

This paper has reported a quasi-experimental study on the impacts of disability on poverty in rural Cambodia. I combined a natural experiment and spatial blocking by focusing on limb amputation among adults due to landmines and conducting an original survey stratified by disability status within villages. This research design enabled a matching analysis within small geographic areas, treating demographic factors, such as household formation and fertility, as

[56] On one hand, adult disability can decrease child migration for better educational opportunities and/or to maintain child labor endowment, i.e., disability hampers child mobility. On the other hand, disability can increase child migration to seek better child-labor opportunities and/or help offered by others outside villages, i.e., disability leads to child migration as a coping strategy.

[57] Although disability increases the likelihood of being a parent of at least one child at age 12-19 and the number of children at age 12-19, only the former result in WVM is significant in the multiple inference for six variables (columns 1-6). The schooling results for this cohort are very similar between the household- and parent-level outcomes, however (Table 5). Disability also does not affect the presence of a child at age 5 or below (not shown).

endogenous. Amputation (mainly male leg amputees) greatly reduces consumption and income, but not subjective well-being (i.e., adaptation), increasing poverty and augmenting its magnitude, especially among the poorest of the poor. This is because the onset of disability triggers a vicious circle of low labor productivity, low earnings, and low accumulation of productive assets as well as social capital, along with low human capital. This productivity-cum-asset channel leads to adverse intergenerational effects of disability on child schooling and labor. Although potential bias due to the violation of unconfoundedness and mortality selection cannot be ruled out, such bias is likely to be downward in magnitude and thus the results may be conservative.

These findings suggest the following policy implications. First, at the onset of disability, timely public safety-net programs are needed to preclude it from triggering the productivity-cum-asset channel. Second, efforts to alleviate poverty among those in this vicious circle need to tackle this channel. For example, labor market programs promoting skilled nonfarm work not strongly constrained by amputation might be promising. Third, education programs can be targeted toward children of persons with disabilities.

The following general lessons for empirical studies on disability and poverty can be derived. First, to deal with the endogeneity of disability, it is critical to structure the problem in a way that its onset is as close to random as possible. This requires exploiting natural experiments. This can be possible by focusing on specific disabilities, the onset of which is an exogenous shock, such as verifiable conflict-related physical disabilities. Albeit having a narrow scope, this approach has significant potential to address a major social problem in post-conflict countries. Second, spatial blocking is effective if the treatment assignment is strongly determined by common local factors, such as landmine accidents in post-conflict countries. Third, it is important to use an appropriate unit of analysis and pre-treatment covariates that consider the potential endogeneity of demographic factors.

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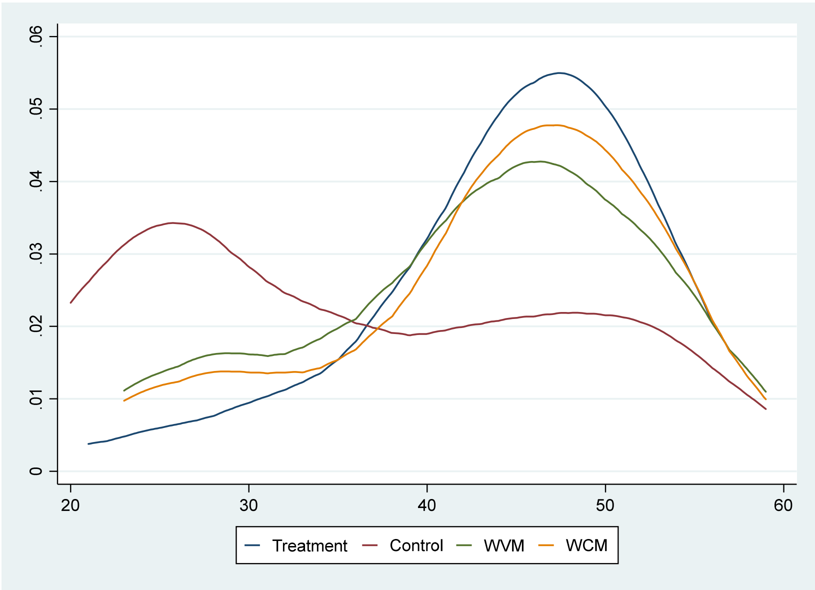
## Table 1. Covariate balance

| | Treatment mean | Adult analysis sample | | | Within-village matching (WVM) | | | Within-commune matching (WCM) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Control mean | Normalized diff. | p-value | Control mean | Normalized diff. | p-value | Control mean | Normalized diff. | p-value |
| Female | 0.103 | 0.516 | -0.574 | 0.000 | 0.118 | -0.032 | 0.768 | 0.134 | -0.067 | 0.541 |
| Age | 44.540 | 35.887 | 0.526 | 0.000 | 42.388 | 0.176 | 0.100 | 43.341 | 0.101 | 0.351 |
| Primary education | 0.471 | 0.408 | 0.089 | 0.276 | 0.400 | 0.101 | 0.349 | 0.439 | 0.045 | 0.676 |
| Secondary education | 0.092 | 0.221 | -0.247 | 0.000 | 0.094 | -0.005 | 0.961 | 0.098 | -0.013 | 0.902 |
| No. observations | 87 | 529 | | | 85 | | | 82 | | |

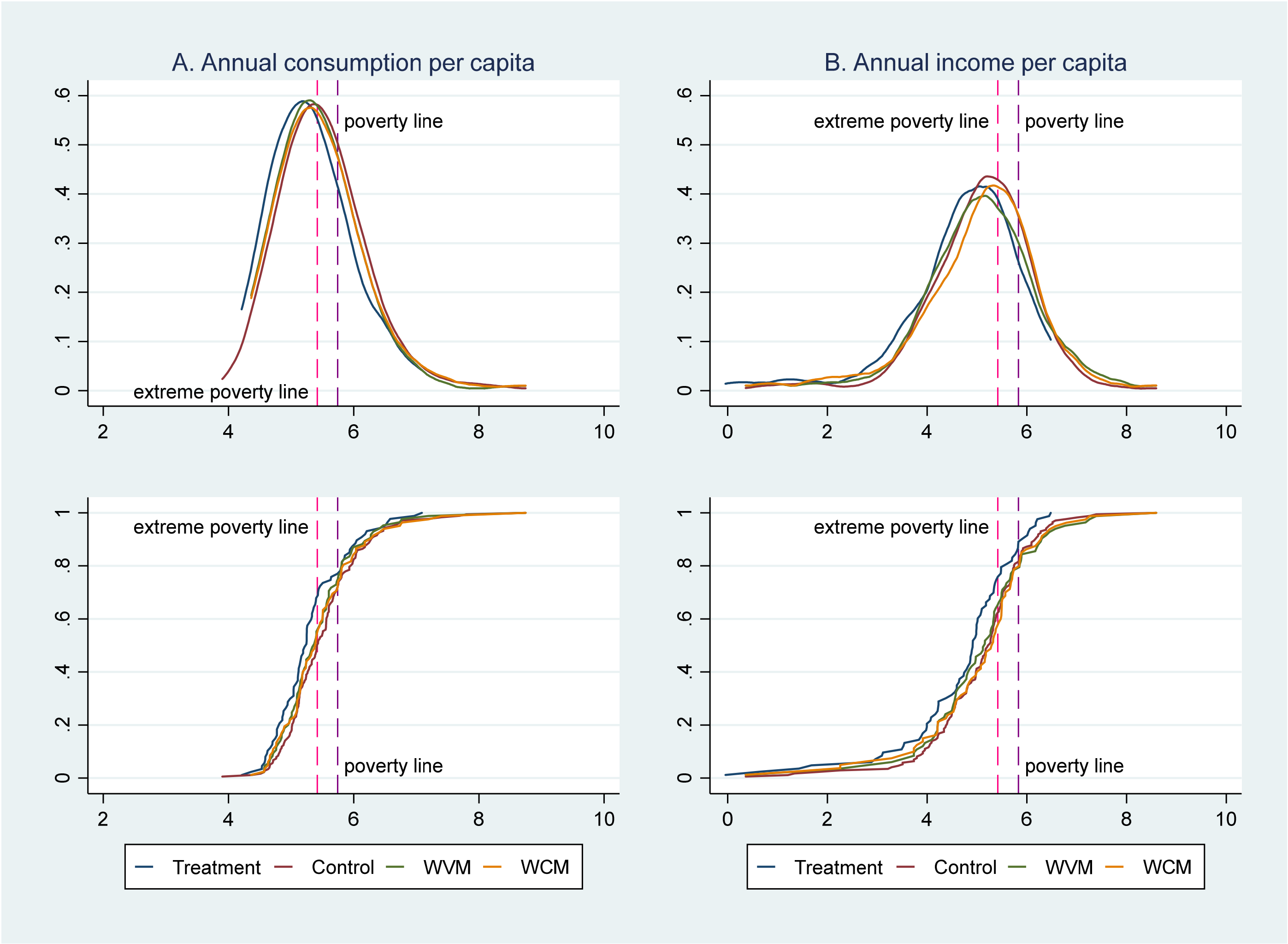
*Notes:* Normalized difference is the difference in means scaled by the square root of the average of the two within-group variances. p-values for the t-statistic for the test of equal means are shown. All covariates except for age are dummies. Matching is done among adults within either villages (WVM) or communes (WCM) (see the text for matching designs).

## Figure 1. Distribution: adult age




*Notes:* These are the kernel density estimates. The sample is the adult analysis sample. The bandwidth for the Epanechnikov kernel is 0.4. Matching is done among adults within either villages (WVM) or communes (WCM) (see the text for matching designs).

## Figure 2. Distribution: consumption and income




*Notes:* The top panels show kernel density estimates, and the bottom panels show cumulative distribution functions (log USD). The sample is the household analysis sample. The bandwidth for the Epanechnikov kernel is 0.4 in the top panels. The poverty lines for consumption and income are $312.33 and $341.35 per capita per annum, and the extreme poverty lines are $225.29 per capita per annum (see Online Appendix A for their construction). Matching is done among adults within either villages (WVM) or communes (WCM) (see the text for matching designs).

## Table 2. Welfare and poverty

| Group: | Annual consumption/income per capita | | | | | | | | Subjective well-being | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Amount | | Poverty | | | Extreme poverty | | | Happiness | Life satisfaction |
| | | | $P_0$ | $P_1$ | $P_2$ | $P_0$ | $P_1$ | $P_2$ | | |
| | (log USD) | (rank) | (0/1) | (0-1) | (0-1) | (0/1) | (0-1) | (0-1) | (1-5) | (1-5) |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| **A. Consumption and subjective well-being** | | | | | | | | | | |
| Within-village matching (WVM) | -0.164** | -54.28** | 0.0647 | 0.0769** | 0.0523** | 0.171** | 0.0642** | 0.0310* | -0.0172 | -0.195 |
| | (0.0741) | (25.41) | (0.0633) | (0.0353) | (0.0238) | (0.0710) | (0.0303) | (0.0167) | (0.0914) | (0.131) |
| *MHT (p-value)* | *0.046* | *0.046* | *0.307* | *0.046* | *0.046* | *0.046* | *0.046* | *0.072* | *0.850* | *0.272* |
| | | | 8.8% | 27.5% | 39.6% | 32.8% | 44.7% | 57.0% | -0.5% | -5.8% |
| Within-commune matching (WCM) | -0.186** | -56.37** | 0.0941 | 0.0766** | 0.0468* | 0.176** | 0.0566* | 0.0249 | 0.0268 | -0.165 |
| | (0.0816) | (26.94) | (0.0662) | (0.0373) | (0.0247) | (0.0765) | (0.0314) | (0.0173) | (0.0939) | (0.129) |
| *MHT (p-value)* | *0.080* | *0.080* | *0.155* | *0.080* | *0.093* | *0.080* | *0.095* | *0.155* | *0.775* | *0.401* |
| Control mean | 269.9 | 6.882 | 0.735 | 0.279 | 0.132 | 0.520 | 0.144 | 0.0543 | 3.234 | 3.397 |
| No. observations | 601 | 601 | 601 | 601 | 601 | 601 | 601 | 601 | 616 | 616 |
| **B. Income** | | | | | | | | | | |
| WVM | -0.349*** | -55.82** | 0.0783 | 0.0887* | 0.0935** | 0.0964 | 0.106** | 0.0888** | | |
| | (0.129) | (25.12) | (0.0620) | (0.0462) | (0.0398) | (0.0726) | (0.0442) | (0.0355) | | |
| *MHT (p-value)* | *0.038* | *0.042* | *0.207* | *0.073* | *0.038* | *0.207* | *0.038* | *0.038* | | |
| | | | 10.0% | 21.6% | 35.9% | 16.2% | 40.8% | 58.4% | | |
| WCM | -0.401*** | -74.63*** | 0.0964 | 0.128** | 0.123*** | 0.171** | 0.139*** | 0.106*** | | |
| | (0.145) | (28.40) | (0.0700) | (0.0525) | (0.0455) | (0.0805) | (0.0504) | (0.0408) | | |
| *MHT (p-value)* | *0.016* | *0.016* | *0.169* | *0.019* | *0.016* | *0.039* | *0.016* | *0.016* | | |
| Control mean | 261.6 | 8.870 | 0.783 | 0.411 | 0.261 | 0.596 | 0.261 | 0.152 | | |
| No. observations | 584 | 584 | 584 | 584 | 584 | 584 | 584 | 584 | | |

*Notes:* The sample is the adult analysis sample. The dependent variables for $P_0$, $P_1$, and $P_2$ are the incidence of poverty, the normalized poverty gap, and the square of the normalized poverty gap. Five-scale indices are used for happiness – 1 (very unhappy) through 5 (very happy) – and life satisfaction – 1 (very uncomfortable) through 5 (very comfortable). Matching is done among adults within either villages (WVM) or communes (WCM) (see the text for matching designs). ATT estimates for having an adult household member with disability are reported. Standard errors are shown in parentheses, below which adjusted p-values for multiple hypothesis testing (MHT) for each variable group defined for each matching design in each panel are shown in italics. The WVM estimates divided by the control means are shown in percentage. The control mean of normalized rank is the mean among adults belonging to households with no members with disability. The control mean of all other outcomes is the mean among households with no members with disability. The control mean of the original variable is shown in column (1). *p<0.1, **p<0.05, ***p<0.01

## Table 3. Demography and assets

| Group: | Demography | | | | Assets | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Hhld head | Married | Hhld size | Age 20-59 | Crop land | | | Nonland assets | | Soc. capital |
| | (0/1) | (0/1) | | | (0/1) | (ha) | (rank) | (log USD) | (rank) | (z-score) |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Within-village matching (WVM) | 0.103** | -0.0230 | -0.276 | -0.115 | -0.144** | -0.676*** | -65.31*** | -0.786** | -70.65*** | -0.192** |
| | (0.0480) | (0.0568) | (0.287) | (0.182) | (0.0672) | (0.209) | (21.86) | (0.336) | (26.55) | (0.0760) |
| *MHT (p-value)* | *0.125* | *0.686* | *0.674* | *0.686* | *0.033* | *0.007* | *0.008* | *0.023* | *0.016* | *0.017* |
| Within-commune matching (WCM) | 0.0766 | -0.0536 | -0.437 | -0.230 | -0.0977 | -0.739*** | -62.85** | -0.694** | -58.82** | -0.154* |
| | (0.0511) | (0.0588) | (0.296) | (0.201) | (0.0765) | (0.248) | (24.76) | (0.297) | (23.85) | (0.0874) |
| *MHT (p-value)* | *0.280* | *0.361* | *0.280* | *0.337* | *0.201* | *0.018* | *0.027* | *0.029* | *0.027* | *0.093* |
| Control mean | 0.335 | 0.656 | 4.799 | 2.560 | 0.681 | 1.640 | 10.36 | 662.4 | 9.282 | 0.0714 |
| No. observations | 616 | 616 | 616 | 616 | 611 | 611 | 611 | 610 | 610 | 616 |

*Notes:* The sample is the adult analysis sample. The dependent variable takes 0 if the orginal value is 0 in column (8). Matching is done among adults within either villages (WVM) or communes (WCM) (see the text for matching designs). ATT estimates for an adult with disability are reported in columns (1) and (2) and those for having an adult household member with disability are reported in columns (3)-(10). Standard errors are shown in parentheses, below which adjusted p-values for multiple hypothesis testing (MHT) for each variable group defined for each matching design are shown in italics. In columns (1) and (2), the control mean of the dependent variable is the mean among adults with no disability. In columns (3)-(10), the control mean of normalized rank is the mean among adults belonging to households with no members with disability; the control mean of all other outcomes is the mean among households with no members with disability. The control mean of the original variable is shown in column (8). *p<0.1, **p<0.05, ***p<0.01

# Table 4. Productivity

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **A. Adult nonfarm work** | | | | | |
| | Employment | Earnings | | Labor supply | |
| | | | | per week | per month |
| | (0/1) | (log USD) | (rank) | (hours) | (days) |
| Within-village matching (WVM) | -0.144** | -0.873** | -45.71** | -2.517 | -0.879 |
| | (0.0661) | (0.392) | (20.76) | (3.596) | (1.811) |
| *MHT (p-value)* | *0.050* | *0.050* | *0.050* | *0.605* | *0.627* |
| | -58.0% | | | -17.8% | -11.9% |
| Within-commune matching (WCM) | -0.149** | -0.919** | -48.11** | -2.793 | -1.552 |
| | (0.0676) | (0.395) | (21.05) | (3.473) | (1.820) |
| *MHT (p-value)* | *0.045* | *0.045* | *0.045* | *0.421* | *0.421* |
| Control mean | 0.248 | 105.7 | 2.240 | 14.14 | 7.391 |
| No. observations | 616 | 613 | 615 | 616 | 616 |
| **B. Adult time use** | | | | | |
| | Any work | Nonfarm | Farm | Hhld chore | |
| **B1. Time allocated (0/1)** | | | | | |
| WVM | -0.103** | -0.0690 | -0.121* | 0.0345 | |
| | (0.0416) | (0.0750) | (0.0720) | (0.0535) | |
| *MHT (p-value)* | *0.052* | *0.409* | *0.150* | *0.520* | |
| | -10.9% | -14.5% | -32.7% | 8.9% | |
| WCM | -0.103** | -0.0651 | -0.134* | 0.0881 | |
| | (0.0482) | (0.0816) | (0.0742) | (0.0552) | |
| *MHT (p-value)* | *0.072* | *0.425* | *0.113* | *0.147* | |
| Control mean | 0.953 | 0.476 | 0.369 | 0.388 | |
| No. observations | 616 | 616 | 616 | 616 | |
| **B2. Proportion of time allocated (0-1)** | | | | | |
| WVM | -0.0597*** | -0.0274 | -0.0493** | 0.0170** | |
| | (0.0192) | (0.0254) | (0.0216) | (0.00863) | |
| *MHT (p-value)* | *0.015* | *0.373* | *0.060* | *0.097* | |
| | -18.9% | -17.7% | -48.4% | 28.9% | |
| WCM | -0.0559*** | -0.0285 | -0.0485** | 0.0212** | |
| | (0.0215) | (0.0290) | (0.0231) | (0.00954) | |
| *MHT (p-value)* | *0.072* | *0.371* | *0.072* | *0.072* | |
| Control mean | 0.316 | 0.155 | 0.102 | 0.0588 | |
| No. observations | 616 | 616 | 616 | 616 | |

*Notes:* The sample is the adult analysis sample. Nonfarm earnings are annual earnings. The dependent variable takes 0 if the original value is 0 in column (2) of panel A. Matching is done among adults within either villages (WVM) or communes (WCM) (see the text for matching designs). ATT estimates for an adult with disability are reported. Standard errors are shown in parentheses, below which adjusted p-values for multiple hypothesis testing (MHT) for each variable group defined for each matching design in each panel are shown in italics. The WVM estimates divided by control means are shown in percentage. The control mean of the dependent variable is the mean among adults with no disability. The control mean of the original variable is shown in column (2) of panel A. *p<0.1, **p<0.05, ***p<0.01

## Table 5. Intergenerational effects

| | Age 6-19 | Age 12-19 | | Age 10-19 | | | |
|---|---|---|---|---|---|---|---|
| | School enrollment | Primary complete | Secondary schooling | Time allocated for: Study | Any work | Proportion of time allocated for: Study | Any work |
| | (0-1) | (0-1) | (0-1) | (0-1) | (0-1) | (0-1) | (0-1) |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| **A. Household-level outcomes** | | | | | | | |
| Within-village matching (WVM) | -0.143** | -0.267*** | -0.177** | -0.118 | 0.151* | -0.0471** | 0.0485* |
| | (0.0627) | (0.0723) | (0.0747) | (0.0737) | (0.0903) | (0.0240) | (0.0264) |
| *MHT (p-value)* | *0.052* | *0.002* | *0.052* | *0.109* | *0.109* | *0.087* | *0.092* |
| | -20.4% | -47.4% | -51.5% | -22.5% | 26.4% | -33.1% | 34.0% |
| Within-commune matching (WCM) | -0.124* | -0.267*** | -0.125* | -0.0992 | 0.151* | -0.0396 | 0.0415 |
| | (0.0704) | (0.0804) | (0.0751) | (0.0877) | (0.0902) | (0.0264) | (0.0282) |
| *MHT (p-value)* | *0.164* | *0.006* | *0.164* | *0.258* | *0.164* | *0.164* | *0.164* |
| Control mean | 0.702 | 0.563 | 0.345 | 0.525 | 0.571 | 0.142 | 0.143 |
| No. observations | 391 | 282 | 282 | 343 | 343 | 343 | 343 |
| **B. Parent-level outcomes** | | | | | | | |
| WVM | -0.124* | -0.248*** | -0.133 | -0.102 | 0.0615 | -0.0392 | 0.0289 |
| | (0.0648) | (0.0801) | (0.0825) | (0.0816) | (0.0908) | (0.0262) | (0.0273) |
| *MHT (p-value)* | *0.195* | *0.014* | *0.236* | *0.294* | *0.498* | *0.236* | *0.338* |
| | -18.0% | -43.7% | -40.7% | -18.0% | 10.7% | -25.6% | 20.5% |
| Control mean | 0.690 | 0.567 | 0.326 | 0.567 | 0.576 | 0.153 | 0.141 |
| No. observations | 246 | 161 | 161 | 206 | 206 | 206 | 206 |

*Notes:* The sample is the adult analysis samples for the child cohort in panel A and the parent analysis samples for the child cohort in panel B. Dependent variables are household means among children in panel A and parent means among children in panel B. Secondary schooling means secondary school enrollment or attainment (incompletion or completion). Matching is done among adults within either villages (WVM) or communes (WCM) in panel A and among parents within villages (WVM) in panel B (see the text for matching designs). ATT estimates for having an adult household member with disability are reported in panel A and those for a parent with disability are reported in panel B. Standard errors are shown in parentheses, below which adjusted p-values for multiple hypothesis testing (MHT) for each variable group defined for each matching design in each panel are shown in italics. The WVM estimates divided by control means are shown in percentage. The control mean of the dependent variable is the mean among households with no members with disability in panel A and the mean among parents with no disability in panel B. *p<0.1, **p<0.05, ***p<0.01

# For Online Publication

# Disability and Poverty: Landmine Amputees in Cambodia

**Yoshito Takasaki**

March 8, 2019

## Contents

## Appendix A: Consumption, Income, and Poverty Lines

This appendix provides the description of the construction of consumption, income, and poverty lines. Starting with the 2004 Cambodian Socio-Economic Surveys (CSES), the questionnaire was standardized and applied to the 2007-2009 CSES with several improvements. Consumption aggregate and poverty lines were updated based on the 2009 CSES. The consumption aggregate was calculated from all food consumed at home or outside (20), monthly value of the home (2), housing services (electricity, water, etc.) (10), transportation and communication (2), purchase value of selected durable goods (16), personal goods (3), spending on recreation and entertainment (3), education expenditures (7 x member), health-related expenditures (1 x member), and others (including goods received in kind) (3), where the number of questions is shown in parentheses (see World Bank, 2014 for details). Rural poverty line and rural extreme poverty line, respectively, are $341.35 and $225.29 per capita per annum (1US$ = 4,185 Riel in 2010).

Based on the 2004 CSES, I designed a questionnaire for the baseline survey of our evaluation project, which started in 2007. Since then, I maintained my original questionnaire for consistency. The questions about nonfood expenditure in my survey do not cover three items – transportation, communication, and personal care – because the 2004 CSES collected information about these three items using a diary, which my survey did not employ for a logistical reason. The questions about food consumption and income in my survey are the same as those in the 2009 CSES. As a result, consumption in my data is underestimated compared to the 2009 CSES.

To circumvent this measurement problem, based on the share of these three items in nonfood expenditure in the 2009 CSES (World Bank, 2014), I use 75% of nonfood allowances and the corresponding poverty line ($312.33 per capita per annum, i.e., 91.5% of the original poverty line). I use the same extreme (food) poverty line as that in the 2009 CSES.

## Reference

World Bank, 2014. Where have all the poor gone? Cambodia poverty assessment 2013. World Bank Country Study 4545 World Bank, Washington, DC.

## Appendix B: Distributions of Household Assets and Adult Nonfarm Earnings

### *1. Household Assets*

The distributions of crop land, log of nonland assets (among those with positive holdings), and social capital in the household analysis sample are depicted in Figure A-3. The following observations are noted. First, the distributions of land and nonland assets are much more dispersed than those of consumption and income (Figure 2). Second, for land and nonland assets, the treatment distribution is less dispersed than the control distribution. Third, for all these three assets, the control distributions are relatively similar between with-village matching (WVM) and within-commune matching (WCM). Fourth, for crop land and social capital, the matched control distributions are also similar to the original control distribution. Fifth, for nonland assets, when matched controlled households are considered, the treatment-control difference increases, especially for small holders. Sixth, for all these three assets, the treatment distribution is first-order stochastically dominated by the three control distributions.

### *2. Adult Nonfarm Earnings*

The distributions of the log of annual nonfarm earnings among adults with positive earnings are depicted in Figure A-4. The following observations are noted. First, the treatment distribution is less dispersed than the control distribution; in particular, the latter has a much thicker upper tail. Second, the matched control distributions are similar between WVM and WCM and less dispersed than the original control distribution. The comparison of the three control distributions mirrors that for adult age (Figure 1). Third, when matched controlled adults are considered, the treatment-control difference increases, especially at the middle income level. The treatment distribution is first-order stochastically dominated by the matched control distributions.

## Appendix C: Household Sectoral Incomes and Safety Nets

This appendix examines household sectoral incomes and safety nets. The results are reported in Table A-4. According to WVM, disability decreases total earned income by 67% (column 1). It decreases participation in and income earned from cropping and nonfarm work at similar degrees (0.13 in probability, or 20%-29% reduction from the control mean, and about 60%, respectively; the log result for nonfarm income is statistically significant at almost a 10%

significance level); all the corresponding rank results are qualitatively the same (columns 3 and 7). Consistent with the total income results (Table 2 panel B), all WCM estimates except for participation in cropping are somewhat larger in magnitude and statistically stronger than the corresponding WVM estimates. Consistent with adult labor outcomes (Table 4 panel A), the disability impacts on household nonfarm earned income are greater than participation. Qualitatively, the same pattern holds for cropping. Although the estimated disability impacts on farm income are similar to those on crop income, almost none of them are statistically significant at conventional levels and disability does not affect participation in farming (column 2); nor does disability affect participation in or income earned from livestock, fishing, and forest product gathering (columns 4-6). These results indicate that adverse disability impacts on farm work come mostly from cropping.

About 30% of controlled households have unearned income, mostly in the form of private transfers. Although the estimated disability impacts on receipt and the amount of unearned income are positive and considerable in magnitude, no estimates are statistically significant at conventional levels (column 8). The estimated impact on the amount is about one tenth the negative impact on total earned income in magnitude ($13 vs. $136 in WVM). These results indicate that safety nets against disability are limited.

I conduct multiple hypothesis testing for three variable groups: income group (two variables: earned and unearned income, columns 1 and 8), earned income group (two variables: farm and nonfarm income, columns 2 and 7), and farm income group (four variables: cropping, livestock, fishing, and forest product gathering, columns 3-6). The adjusted p-values are smaller than 0.1 for earned income in WVM and WCM and nonfarm income in WCM; they are close to 0.1 for farm income in WCM. The multiple inference results for cropping are weak, however.

## Appendix D: Child Composition

This appendix examines child composition as a potential mechanism underlying the disability impacts on child outcomes found in Section 5. Since the sex and age of children are correlated with their schooling and labor, if disability alters the composition of children among households/parents through fertility, child mortality, and/or migration, disability can affect child outcomes through child composition. Disability decreases the proportion of female children in all three cohorts and the mean age for the 12-19 cohort among households (Table A-11 panel A).[1] The age results suggest that compared to controlled adults, treated adults had children somewhat later in life; treated adults might have married later.[2] Although my data do not allow me to provide any concrete reasons for the sex imbalance, it might be due to distinct child mortality/migration in the gender sphere. These findings provide suggestive evidence for the endogeneity of fertility, child mortality, and/or migration. Appendix E provides additional evidence for the endogeneity of demographic factors.

To see how child sex and age are correlated with child outcomes, I conduct a child-level regression analysis with village fixed effects (FE). Children in the household analysis sample for each child cohort constitute a child analysis sample. Treated children are those who belong to treated households and controlled children are those who belong to controlled households.[3] Compared to controlled children, treated children are more likely to be male in all three cohorts, be younger among those in the 12-19 cohort, and belong to households with less educated heads in all three cohorts (Table A-12). These patterns are consistent with the disability impacts on child composition discussed above and the covariate balance in the household analysis sample discussed in Appendix E. Covariates are sex, age, and age squared of child and primary/secondary education of household head. For time-use outcomes, dummies for day of the week of interviews are additionally controlled for. Village fixed effects control for school-supply factors. Inference is based on robust standard errors. The FE estimates for age are statistically significant for child schooling and labor (proportion of time allocated), and sex is significant only for secondary schooling (Table A-13 panel A).

By combining these two sets of estimates, I assess the magnitude of the disability impacts on child outcomes through child composition. Specifically, I calculate 1) the product of the adult-matching estimates of the effects of disability on sex (Table A-11 panel A) and the FE estimates of the effects of sex on schooling/labor in the child-level analysis (Table A-13 panel

[1] According to multiple hypothesis tests for the six variables (columns 1-6), the sex results are significant only in WVM (Table A-11 panel A). Although disability decreases the proportion of female children for the 6-19 cohort and the mean age for the 12-19 cohort among parents, the multiple inference results are nonsignificant (panel B).

[2] This is consistent with the negative disability impacts on adult labor endowment among parents found above (Table A-9 panels E-G). Since age of household heads/parents is balanced between the treated and matched controlled households/parents (Tables A-12 and A-8), the imbalance in child age should not be due to their age difference.

[3] Corresponding to the parent-level analysis, I also conduct an alternative child-level analysis, such that treated children are those whose parent has disability and controlled children are those whose parent has no disability. The estimation results (not shown) are similar.

A); and 2) the product of the adult-matching estimates of the effects of disability on age (Table A-11 panel A) and the FE estimates of the marginal effects of age on schooling/labor at the control mean age, calculated from the results of the child-level analysis (Table A-13 panel A).

The results reported in panel B of Table A-13 show that the largest effects through sex and age, respectively, are -0.015 for secondary schooling (WVM) and -0.044 for primary-school completion (WCM),[4] which are much smaller than the corresponding adult-matching estimates, -0.18 and -0.27, respectively (Table 5 panel A). Hence, child composition explains a small proportion (about 16% at most) of the estimated disability impacts on child outcomes. Even though this is a very crude analysis, it provides evidence for the limited significance of the child composition channel.

## Appendix E: Restrictive Matching Designs

This appendix assesses the significance of the potential endogeneity of demographic factors. In the matching analysis, I used an appropriate unit of matching – adult matching for household outcomes as well as adult outcomes, and constructed outcome measures at an appropriate level – household-/parent-level child outcomes for adult matching. I compare the adult-matching estimates reported in Tables 2, 3, and 5 with those based on restrictive matching designs that treat demographic factors as exogenous.

### *1. Household Matching*

For household outcomes, I employ household matching while ignoring the potential endogeneity of household formation. Specifically, I match each treated household with one controlled household in the same village in the household analysis sample. Matching variables are the attributes of household heads corresponding to those used for adult matching: their sex, age, and secondary education.[5] Exact matching on sex is infeasible, because female heads are

[4] These are calculated as follows: -0.144 (WVM, Table A-11 column 3) * 0.105 (Table A-13 panel A column 3) = -0.015; -0.949 (WCM, Table A-11 column 4) * (0.595 + 2*(-0.0172)*15.953) (Table A-13 panel A column 2; 15.953 is the control mean) = -0.044.

[5] Compared to their counterparts in controlled households, the heads of treated households are more likely to be male and less educated and their age is much less dispersed, though there is no significant difference in the mean age (Table A-24 and Figure A-5). This is simply because most amputees (especially males) are a head of household and their ages are concentrated in the 40s, as discussed in the text. The covariate balance in the household analysis sample for each child cohort is similar (Table A-25). Overall, covariates (heads' attributes) in the household analysis sample are relatively more balanced than covariates (adults' attributes) in the adult/parent analysis samples (Table A-24 vs. Table 1 and Table A-8).

uncommon in the comparison group. All covariates (heads' attributes) are well balanced in the matched household sample (Table A-24). Table A-24 also shows the balance of household heads' attributes in the matched household sample through the within-village adult matching (i.e., the household-level data of the matched adult sample). All covariates are well balanced, which is consistent with the nonsignificant demography channel. The distribution of age of household heads is similar between the treated and matched controlled groups – in the within-village household and adult matching (Figure A-5). The covariate balance for the matched household analysis sample for each child cohort – in the within-village household and adult matching – is similar (Table A-25).

The estimation results are reported in Tables A-18-A-20 (panel B) and Table A-22 (panel B). Since the number of observations in the household matching is about one half of that in the adult matching, to compare the rank estimates between these two analyses, the point estimates of the former need to be roughly doubled. Household-matching estimates are similar to adult-matching estimates for most household outcomes, including household-level child outcomes.[6] These results are consistent with lack of evidence for the endogeneity of household formation (household headship/marriage) discussed in the text.

## 2. *Child Matching*

For child outcomes, I also employ *child matching* in the child analysis sample for three child cohorts (age 6-19, 10-19, and 12-19) constructed in Appendix D. This design ignores the potential endogeneity of fertility, child mortality, and migration. I match each treated child with one controlled child in the same village. Matching variables are sex and age of the child and secondary education of the household head. I employ nearest-neighbor matching on these three variables; I do not employ exact matching on sex, because doing so significantly reduces the matched observations (limited common support within each cohort). Almost all covariates are balanced in the matched child sample for each child cohort (Table A-12). As an exception, according to the t-test, the sex imbalance is significant for cohorts 6-19 and 10-19.

The estimation results are reported in Table A-22 (panel B). Although the child-matching estimates for schooling are similar to those for the corresponding adult-/parent-matching results,

[6] Exceptions are as follows. First, the estimates for nonland assets (amount and rank) and social capital are considerably larger than the adult-matching estimates (Table A-20 panel B). Second, the household-matching estimate for life satisfaction is statistically significant (Table A-18 panel B), though the difference from the adult-matching result is small.

those for time use are small with no statistical significance; in particular, those for work are much smaller. Since time use is not significantly correlated with sex (Table A-13 panel A), this child labor result is unlikely to be due to the sex imbalance between the treatment groups. These results are consistent with the endogeneity of fertility, child mortality, and/or migration discussed in the text.

## Appendix F: Subsample Analysis

This appendix conducts a subsample analysis by adult sex, disability type, and timing of disability onset.[7] Since it is infeasible to compare subsamples with small size, I repeat analyses for the corresponding majority groups – males, single-leg amputees, and onset during the conflict period (1998 or before). Analysis samples are constructed in the same way as above, by restricting the sample using each of these constraints. The results are reported in Tables A-18-A-22.

First, the estimation results in the male subsample are very similar to those in the whole sample (panel D),[8] providing no evidence for a significant gender difference.

Second, the results for household income (log and rank) and income poverty (but not consumption) among single-leg amputees (Table A-19 panel E) are weaker than the original ones, providing indirect evidence for the stronger impacts of hand or multiple amputations. The results for the intergenerational effects are somewhat stronger than the original ones (Table A-22 panel E). In particular, distinct from the original results, the estimate for time allocation for work is considerable and statistically significant also among parents. This bolsters the adverse disability effects on child labor. Child labor might better compensate for the reduced labor productivity among single-leg amputees.

Third, the results for adult nonfarm employment and earnings (log and rank) among amputees who experienced landmine accidents during the conflict period (Table A-21 panel F) are weaker than the original ones. This provides indirect evidence for the stronger productivity channel among amputees who experienced more recent accidents. Amputees may need time or

[7] I do not conduct a heterogeneity analysis for child outcomes by child sex, because with the small number of matched observations for each sex, the estimates would not be reliable. The significant disability impacts on child sex found above (Table A-11) suggest that the analysis might involve potential selection bias.

[8] As an exception, the results for the incidence of consumption poverty become statistically stronger (Table A-18 panel D). Interpreting this result requires caution, however, because it may not be robust to the level of the poverty line, as discussed in the text.

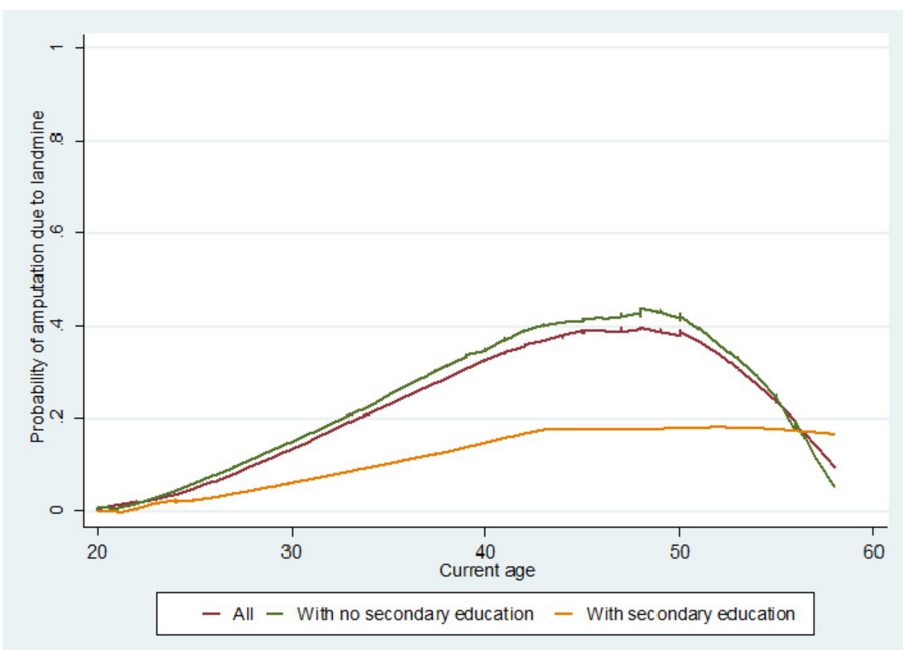
experience to adjust to reduced productivity.[9] At the same time, despite the relatively weak disability impacts on the productivity channel among those with enough time for adjustment, amputation persistently affects asset accumulation and child human capital investment measured at the time of the survey. This suggests that the current labor measures underestimate the productivity constraints that amputees faced when they made these investment decisions.

[9] Most of those recent victims are young (Figure A-1). This, however, does not explain qualitatively the same results found among parents (weaker results for nonfarm employment and earnings, Table A-10 panel C), because not only parents, but also adults belonging to households with children, are older than adults in the original sample, on average (Tables A-8 and A-6 vs. Table 1).

**Figure A-1. Age and onset of amputation**

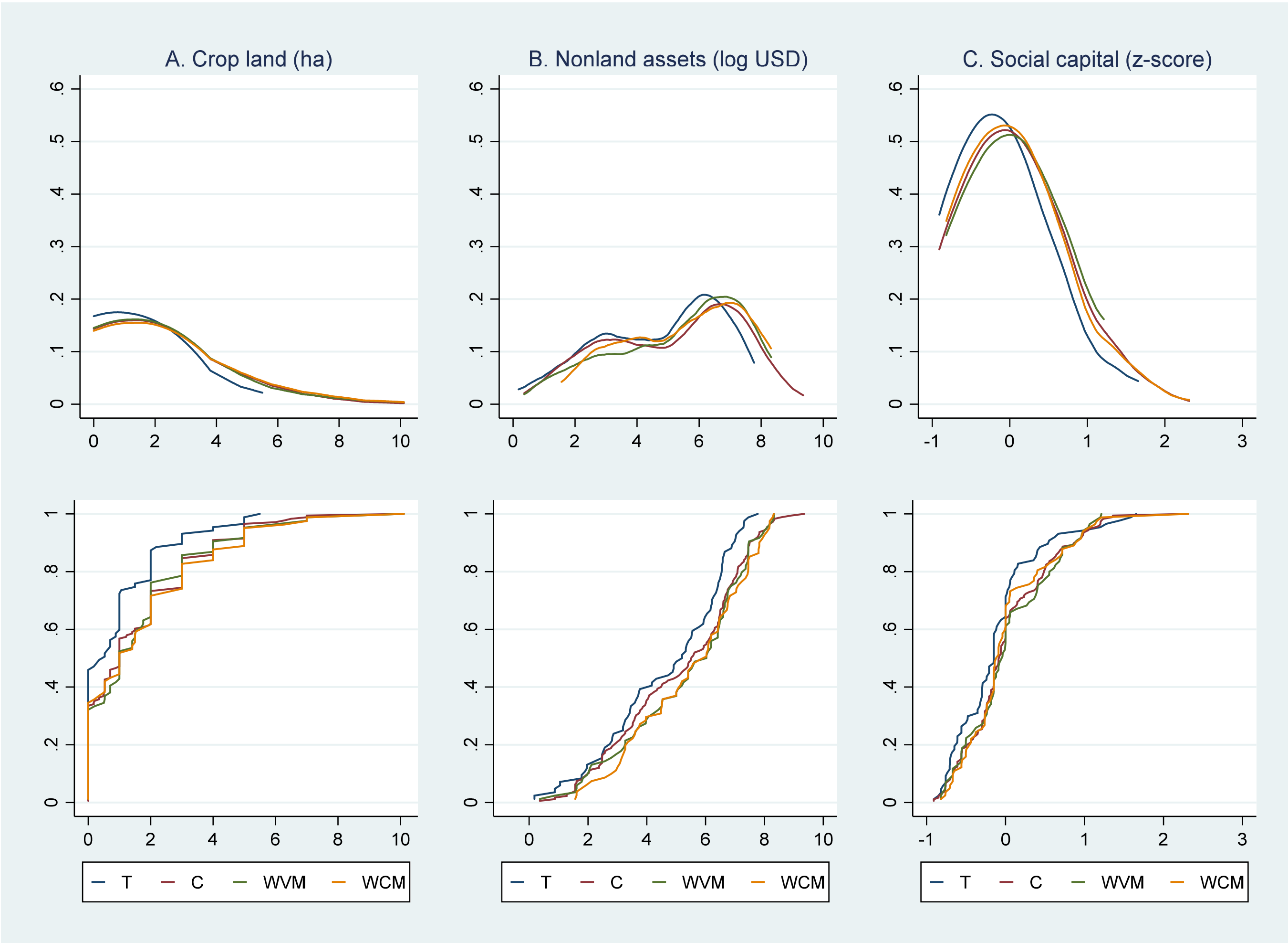

*Notes:* The sample is amputees in the adult analysis sample. Lowess smoothers are shown.

**Figure A-2. Amputation over age**



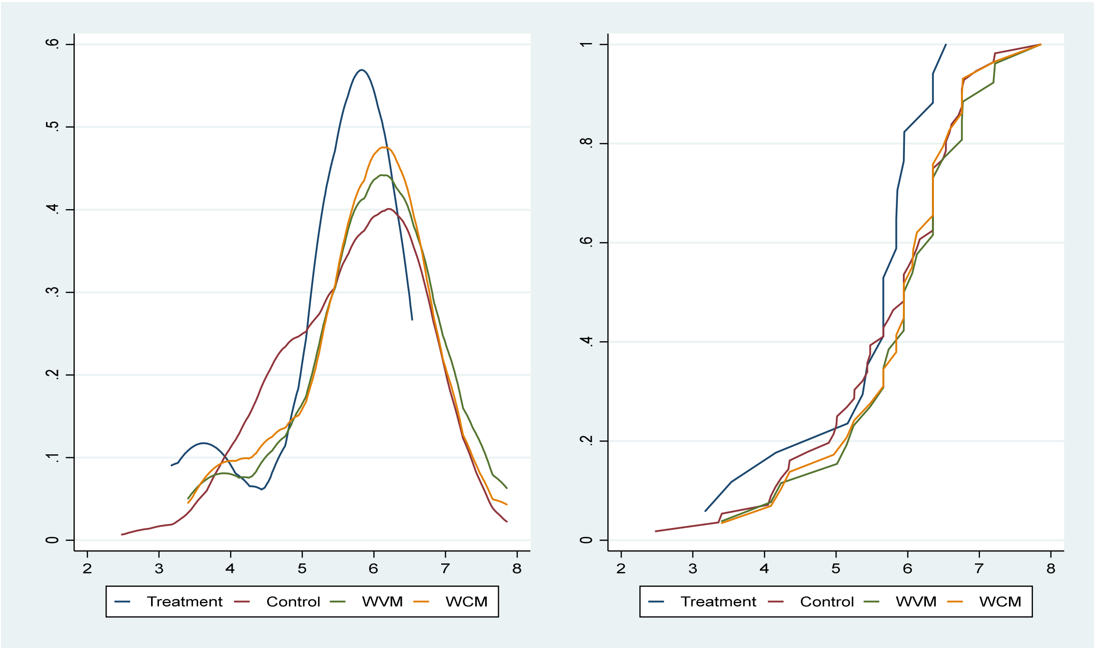

*Notes:* The sample is the male adult analysis sample. Lowess smoothers are shown.

**Figure A-3. Distribution: assets**




*Notes:* The top panels show the kernel density estimates and the bottom panels show cumulative distribution functions. The sample is the household analysis sample in panels A and C and households with positive nonland assets in the household analysis sample in panel B. The bandwidth for the Epanechnikov kernel is 1.4, 0.7, and 0.5 in top panels A, B, and C, respectively. Matching is done among adults within either villages (WVM) or communes (WCM) (see the text for matching designs). T: Treatment, C: Control

# Figure A-4. Distribution: adult nonfarm earnings




*Notes:* The left panel shows kernel density estimates, and the right panel shows cumulative distribution functions (log USD). The sample is adults with positive anual nonfarm earnings in the adult analysis sample. The bandwidth for the Epanechnikov kernel is 0.4 in the left panel. Matching is done among adults within either villages (WVM) or communes (WCM) (see the text for matching designs).

## Table A-1. Attributes of adults with disability

| | Original sample | | | Analysis sample | | |
|---|---|---|---|---|---|---|
| | All | Male | Female | All | Male | Female |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Disability type: | | | | | | |
| Hand amputation | 0.13 | 0.13 | 0.15 | 0.14 | 0.13 | 0.22 |
| Leg amputation | 0.67 | 0.73 | 0.49 | 0.87 | 0.88 | 0.78 |
| Limb paralysis | 0.22 | 0.16 | 0.41 | 0.00 | 0.00 | 0.00 |
| Cause of disability (percentage): | | | | | | |
| Landmine/UXO | 52.7 | 61.8 | 25.4 | 100.0 | 100.0 | 100.0 |
| War/armed conflict | 3.4 | 3.9 | 1.7 | | | |
| Accident | 11.4 | 12.4 | 8.5 | | | |
| Disease | 19.0 | 11.8 | 40.7 | | | |
| Birth defects | 11.8 | 8.4 | 22.0 | | | |
| Other | 1.7 | 1.7 | 1.7 | | | |
| Combatant at onset of disability | 0.37 | 0.46 | 0.08 | 0.70 | 0.73 | 0.44 |
| Non-migrant | 0.83 | 0.80 | 0.90 | 0.89 | 0.88 | 0.89 |
| Household head | 0.57 | 0.72 | 0.12 | 0.85 | 0.91 | 0.33 |
| No. observations | 238 | 179 | 59 | 87 | 78 | 9 |

*Notes:* Sample proportions are reported for dummy variables. The number of observations for cause of disability in columns (1) and (2) is 237 and 178, respectively.

## Table A-2. Correlates of landmine amputees

| | Adults | | Male adults | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Female | -0.191*** | -0.196*** | | |
| | (0.0243) | (0.0256) | | |
| Age | 0.0332*** | 0.0360*** | 0.0605*** | 0.0670*** |
| | (0.00797) | (0.00952) | (0.0149) | (0.0201) |
| Age squared | -0.000344*** | -0.000380*** | -0.000648*** | -0.000728*** |
| | (0.000106) | (0.000126) | (0.000204) | (0.000269) |
| Primary education | 0.0357 | 0.0504 | 0.00457 | 0.0288 |
| | (0.0316) | (0.0389) | (0.0538) | (0.0682) |
| Secondary education | -0.0267 | -0.0368 | -0.109** | -0.125 |
| | (0.0349) | (0.0449) | (0.0517) | (0.0770) |
| Village fixed effects | | YES | | YES |
| No. observations | 616 | 616 | 324 | 324 |
| R squared | 0.161 | 0.193 | 0.157 | 0.200 |
| Mean of dependent variables | 0.141 | 0.141 | 0.241 | 0.241 |

*Notes:* These are OLS estimates. The sample is the adult analysis sample in columns (1) and (2) and the male adult analysis sample in columns (3) and (4). Dependent variables are a dummy for an adult with disability. Robust standard errors are shown in parentheses. *p<0.1, **p<0.05, ***p<0.01

## Table A-3. Assets by type

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| **A. Nonland assets** | | | | | |
| | Consumer durable | Trans-portation | Agricultural equipment | Livestock | |
| **A1. Possession (0/1)** | | | | | |
| Within-village matching (WVM) | -0.0977 | -0.0172 | 0.0402 | -0.0920 | |
| | (0.0616) | (0.0707) | (0.0545) | (0.0765) | |
| Within-commune matching (WCM) | -0.121* | 0.0441 | 0.0249 | -0.113 | |
| | (0.0681) | (0.0714) | (0.0682) | (0.0788) | |
| *MHT (p-value)* | *0.363* | | | | |
| Control mean | 0.837 | 0.766 | 0.742 | 0.431 | |
| No. observations | 616 | 616 | 616 | 616 | |
| **A2. Amount (log USD)** | | | | | |
| WVM | -0.342 | -0.681* | -0.823** | -0.485 | |
| | (0.287) | (0.400) | (0.347) | (0.389) | |
| *MHT (p-value)* | | *0.311* | *0.211* | | |
| WCM | -0.342 | -0.347 | -0.726* | -0.618 | |
| | (0.277) | (0.393) | (0.380) | (0.406) | |
| *MHT (p-value)* | | | *0.363* | | |
| Control mean | 47.63 | 230.2 | 226.9 | 156.1 | |
| No. observations | 616 | 616 | 610 | 616 | |
| **A3. Normalized rank** | | | | | |
| WVM | -28.19 | -41.94 | -27.62 | -30.23 | |
| | (29.68) | (29.02) | (20.82) | (23.93) | |
| WCM | -31.69 | -14.90 | -30.45 | -37.69 | |
| | (29.10) | (27.80) | (25.19) | (25.13) | |
| Control mean | 5.613 | 4.212 | 4.741 | 2.164 | |
| No. observations | 616 | 616 | 610 | 616 | |
| **B. Social capital** | | | | | |
| | No. close friends | No. people who could offer small help | No. people who could offer large help | No. social events | No. social gatherings |
| WVM | -0.0928 | -0.329** | -0.127 | -0.277** | -0.136 |
| | (0.0761) | (0.128) | (0.125) | (0.119) | (0.0868) |
| *MHT (p-value)* | | *0.049* | | *0.049* | |
| WCM | -0.0224 | -0.251* | 0.0249 | -0.233* | -0.288 |
| | (0.0791) | (0.150) | (0.125) | (0.135) | (0.191) |
| *MHT (p-value)* | | *0.218* | | *0.218* | |
| Control mean | 0.0599 | 0.112 | 0.0351 | 0.113 | 0.0375 |
| No. observations | 616 | 616 | 616 | 616 | 616 |

*Notes:* The sample is the adult analysis sample. The dependent variable takes 0 if the orginal value is 0 in panel A2. Matching is done among adults within either villages (WVM) or communes (WCM) (see the text for matching designs). ATT estimates for having an adult household member with disability are reported. Standard errors are shown in parentheses, below which adjusted p-values for multiple hypothesis testing (MHT) for each variable group defined for each matching design in each panel are shown in italics for selected variables. The control mean of the dependent variable is the mean among households with no members with disability. The control mean of the original variable is shown in panel A2. The outcomes in columns (2) and (3) of panel B take 4 categories: 0, 1 or 2, 3 or 4, 5 or more.
*p<0.1, **p<0.05, ***p<0.01

## Table A-4. Household sectoral incomes

| | Earned | Farm | Cropping | Livestock | Fishing | Forest | Nonfarm | Unearned |
|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| **A. Participation/receipt (0/1)** | | | | | | | | |
| Within-village matching (WVM) | | -0.0172 | -0.132** | -0.0920 | -0.00575 | 0 | -0.132* | 0.0977 |
| | | (0.0552) | (0.0664) | (0.0765) | (0.0637) | (0.0640) | (0.0716) | (0.0650) |
| *MHT (p-value)* | | | *0.321* | | | | *0.256* | |
| Within-commune matching (WCM) | | -0.0230 | -0.132* | -0.113 | -0.0690 | -0.0536 | -0.186** | 0.107 |
| | | (0.0548) | (0.0732) | (0.0788) | (0.0699) | (0.0644) | (0.0811) | (0.0729) |
| *MHT (p-value)* | | | *0.283* | | | | *0.059* | |
| Control mean | | 0.866 | 0.660 | 0.431 | 0.297 | 0.608 | 0.455 | 0.297 |
| No. observations | | 616 | 616 | 616 | 616 | 616 | 616 | 616 |
| **B. Amount (log USD)** | | | | | | | | |
| WVM | -0.669*** | -0.395 | -0.555* | -0.101 | 0.00238 | -0.101 | -0.604 | 0.271 |
| | (0.239) | (0.319) | (0.307) | (0.173) | (0.175) | (0.158) | (0.372) | (0.301) |
| *MHT (p-value)* | *0.025* | | *0.321* | | | | | |
| WCM | -0.863*** | -0.530* | -0.665** | -0.132 | -0.116 | -0.115 | -0.903** | 0.378 |
| | (0.241) | (0.316) | (0.328) | (0.208) | (0.188) | (0.166) | (0.396) | (0.327) |
| *MHT (p-value)* | *0.002* | *0.112* | *0.254* | | | | *0.059* | |
| Control mean | 202.8 | 108.2 | 83.65 | 7.104 | 7.446 | 7.364 | 85.52 | 48.56 |
| No. observations | 610 | 616 | 616 | 616 | 616 | 616 | 610 | 614 |
| **C. Normalized rank** | | | | | | | | |
| WVM | -67.03** | -38.39 | -41.16* | -1.414 | -0.336 | -6.471 | -37.67 | 22.97 |
| | (26.82) | (28.48) | (23.53) | (19.27) | (19.62) | (22.57) | (24.75) | (20.82) |
| *MHT (p-value)* | *0.071* | | *0.321* | | | | | |
| WCM | -99.31*** | -51.54* | -50.03** | -4.937 | -18.54 | -12.64 | -57.66** | 30.07 |
| | (29.19) | (28.70) | (24.59) | (21.35) | (21.43) | (23.67) | (26.46) | (22.76) |
| *MHT (p-value)* | *0.002* | *0.109* | *0.254* | | | | *0.059* | |
| Control mean | 11.77 | 7.577 | 8.204 | -0.366 | 2.036 | 3.844 | 5.064 | -6.863 |
| No. observations | 610 | 616 | 616 | 616 | 616 | 616 | 610 | 614 |

*Notes:* The sample is the adult analysis sample. The dependent variable takes 0 if the orginal value is 0 in panel B. Matching is done among adults within either villages (WVM) or communes (WCM) (see the text for matching designs). ATT estimates for having an adult household member with disability are reported. Standard errors are shown in parentheses, below which adjusted p-values for multiple hypothesis testing (MHT) for each variable group defined for each matching design across panels are shown in italics for selected variables. Income group consists of earned and unearned income (columns 1 and 8). Earned income group consists of farm and nonfarm income (columns 2 and 7). Farm income group consists of cropping, livestock, fishing, and forest product gathering (columns 3-6). The control mean of the dependent variable is the mean among households with no members with disability in panels A and B, and the mean among adults belonging to households with no members with disability in panel C. The control mean of the original variable is shown in panel B. *p<0.1, **p<0.05, ***p<0.01

## Table A-5. Attributes of landmine amputees by sample

| | All | Adults belonging to households with children | | | Parents with children | | |
|---|---|---|---|---|---|---|---|
| | | Age 6-19 | Age 12-19 | Age 10-19 | Age 6-19 | Age 12-19 | Age 10-19 |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| **A. All** | | | | | | | |
| Hand amputation | 0.14 | 0.14 | 0.13 | 0.13 | 0.16 | 0.16 | 0.15 |
| Leg amputation | 0.87 | 0.88 | 0.87 | 0.89 | 0.86 | 0.84 | 0.87 |
| Combatant at onset of disability | 0.70 | 0.73 | 0.70 | 0.74 | 0.75 | 0.72 | 0.75 |
| Non-migrant | 0.89 | 0.86 | 0.87 | 0.87 | 0.89 | 0.88 | 0.88 |
| Household head | 0.85 | 0.88 | 0.87 | 0.89 | 0.91 | 0.91 | 0.90 |
| No. observations | 87 | 66 | 54 | 62 | 57 | 43 | 52 |
| **B. Males** | | | | | | | |
| Hand amputation | 0.13 | 0.14 | 0.13 | 0.13 | 0.15 | 0.15 | 0.15 |
| Leg amputation | 0.88 | 0.88 | 0.87 | 0.89 | 0.87 | 0.85 | 0.88 |
| Combatant at onset of disability | 0.73 | 0.78 | 0.77 | 0.80 | 0.79 | 0.75 | 0.79 |
| Non-migrant | 0.88 | 0.86 | 0.87 | 0.87 | 0.89 | 0.88 | 0.88 |
| Household head | 0.91 | 0.95 | 0.96 | 0.96 | 0.98 | 0.98 | 0.98 |
| No. observations | 78 | 59 | 47 | 55 | 53 | 40 | 48 |
| **C. Females** | | | | | | | |
| Hand amputation | 0.22 | 0.14 | 0.14 | 0.14 | 0.25 | 0.33 | 0.25 |
| Leg amputation | 0.78 | 0.86 | 0.86 | 0.86 | 0.75 | 0.67 | 0.75 |
| Combatant at onset of disability | 0.44 | 0.29 | 0.29 | 0.29 | 0.25 | 0.33 | 0.25 |
| Non-migrant | 0.89 | 0.86 | 0.86 | 0.86 | 1.00 | 1.00 | 1.00 |
| Household head | 0.33 | 0.29 | 0.29 | 0.29 | 0.00 | 0.00 | 0.00 |
| No. observations | 9 | 7 | 7 | 7 | 4 | 3 | 4 |

*Notes:* These are sample proportions. Column (1) replicates the results reported in columns (4)-(6) of Table A-1.

## Table A-6. Covariate balance - adults belonging to households with children

| | | **Analysis sample** | | | **Within-village matching (WVM)** | | | **Within-commune matching (WCM)** | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Treatment mean | Control mean | Norma-lized diff. | p-value | Control mean | Norma-lized diff. | p-value | Control mean | Norma-lized diff. | p-value |
| **A. Adults with children (age 6-19)** | | | | | | | | | | |
| Female | 0.106 | 0.520 | -0.574 | 0.000 | 0.119 | -0.030 | 0.810 | 0.138 | -0.068 | 0.593 |
| Age | 45.985 | 37.006 | 0.559 | 0.000 | 42.985 | 0.266 | 0.026 | 44.586 | 0.133 | 0.298 |
| Primary education | 0.500 | 0.397 | 0.145 | 0.127 | 0.448 | 0.073 | 0.550 | 0.431 | 0.097 | 0.446 |
| Secondary education | 0.076 | 0.228 | -0.292 | 0.000 | 0.090 | -0.035 | 0.775 | 0.086 | -0.027 | 0.833 |
| No. observations | 66 | 325 | | | 67 | | | 58 | | |
| **B. Adults with children (age 12-19)** | | | | | | | | | | |
| Female | 0.130 | 0.522 | -0.543 | 0.000 | 0.137 | -0.016 | 0.910 | 0.152 | -0.045 | 0.750 |
| Age | 46.037 | 37.636 | 0.518 | 0.000 | 44.020 | 0.178 | 0.196 | 45.696 | 0.035 | 0.807 |
| Primary education | 0.463 | 0.329 | 0.191 | 0.075 | 0.353 | 0.156 | 0.256 | 0.413 | 0.070 | 0.620 |
| Secondary education | 0.074 | 0.254 | -0.333 | 0.000 | 0.118 | -0.103 | 0.455 | 0.087 | -0.033 | 0.816 |
| No. observations | 54 | 228 | | | 51 | | | 46 | | |
| **C. Adults with children (age 10-19)** | | | | | | | | | | |
| Female | 0.113 | 0.516 | -0.560 | 0.000 | 0.119 | -0.013 | 0.922 | 0.137 | -0.052 | 0.701 |
| Age | 46.274 | 37.523 | 0.547 | 0.000 | 43.610 | 0.247 | 0.051 | 45.059 | 0.124 | 0.355 |
| Primary education | 0.484 | 0.391 | 0.130 | 0.188 | 0.441 | 0.061 | 0.637 | 0.451 | 0.046 | 0.730 |
| Secondary education | 0.081 | 0.224 | -0.276 | 0.001 | 0.102 | -0.051 | 0.691 | 0.078 | 0.006 | 0.966 |
| No. observations | 62 | 281 | | | 59 | | | 51 | | |

*Notes:* Normalized difference is the difference in means scaled by the square root of the average of the two within-group variances. p-values for the t-statistic for the test of equal means are shown. All covariates except for age are dummies. Matching is done among adults within either villages (WVM) or communes (WCM) (see the text for matching designs).

## Table A-7. Child time use

| | Time allocated for: | | | Proportion of time allocated for: | | |
|---|---|---|---|---|---|---|
| | Nonfarm | Farm | Hhld chore | Nonfarm | Farm | Hhld chore |
| | (0-1) | (0-1) | (0-1) | (0-1) | (0-1) | (0-1) |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **A. Household-level outcomes** | | | | | | |
| Within-village matching (WVM) | 0.105 | 0.0812 | 0.00269 | 0.0336 | 0.0202 | -0.00538 |
| | (0.0640) | (0.0535) | (0.0799) | (0.0206) | (0.0147) | (0.0147) |
| | 52.8% | 67.5% | 0.8% | 56.5% | 81.0% | -9.3% |
| Within-commune matching (WCM) | 0.0860 | 0.0503 | 0.0336 | 0.0238 | 0.0144 | 0.00336 |
| | (0.0684) | (0.0626) | (0.0753) | (0.0219) | (0.0166) | (0.0139) |
| Control mean | 0.199 | 0.120 | 0.342 | 0.0596 | 0.0250 | 0.0580 |
| No. observations | 391 | 282 | 282 | 343 | 343 | 343 |
| **B. Parent-level outcomes** | | | | | | |
| WVM | 0.0737 | 0.0455 | -0.00641 | 0.0230 | 0.00848 | -0.00254 |
| | (0.0703) | (0.0559) | (0.0837) | (0.0231) | (0.0148) | (0.0134) |
| | 33.1% | 32.7% | -2.0% | 35.0% | 31.3% | -5.3% |
| Control mean | 0.223 | 0.139 | 0.314 | 0.0657 | 0.0271 | 0.0482 |
| No. observations | 206 | 206 | 206 | 206 | 206 | 206 |

*Notes:* The sample is the adult analysis sample for children at age 10-19 in panel A and parent analysis sample for children at age 10-19 in panel B. Dependent variables are household means among children in panel A and parent means among children in panel B. Matching is done among adults within either villages (WVM) or communes (WCM) in panel A and among parents within villages (WVM) (see the text for matching designs). ATT estimates for having an adult household member with disability are reported in panel A, and those for a parent with disability are reported in panel B. Standard errors are shown in parentheses. The WVM estimates divided by control means are shown in percentage. *p<0.1, **p<0.05, ***p<0.01

## Table A-8. Covariate balance - parents

| | Analysis sample | | | | Within-village matching (WVM) | | | |
|---|---|---|---|---|---|---|---|---|
| | Treatment mean | Control mean | Normalized diff. | p-value | Treatment mean | Control mean | Normalized diff. | p-value |
| **A. Parents with children (age 6-19)** | | | | | | | | |
| Female | 0.070 | 0.529 | -0.630 | 0.000 | | 0.089 | -0.049 | 0.711 |
| Age | 46.544 | 42.042 | 0.407 | 0.000 | | 44.911 | 0.186 | 0.158 |
| Primary education | 0.491 | 0.397 | 0.133 | 0.212 | | 0.446 | 0.063 | 0.637 |
| Secondary education | 0.070 | 0.127 | -0.133 | 0.175 | | 0.071 | -0.003 | 0.980 |
| No. observations | 57 | 189 | | | | 56 | | |
| **B. Parents with children (age 12-19)** | | | | | | | | |
| Female | 0.070 | 0.538 | -0.636 | 0.000 | 0.071 | 0.075 | -0.010 | 0.951 |
| Age | 46.628 | 45.815 | 0.098 | 0.398 | 46.643 | 47.325 | -0.093 | 0.551 |
| Primary education | 0.488 | 0.328 | 0.226 | 0.070 | 0.500 | 0.350 | 0.210 | 0.174 |
| Secondary education | 0.070 | 0.109 | -0.097 | 0.417 | 0.071 | 0.050 | 0.063 | 0.688 |
| No. observations | 43 | 119 | | | 42 | 40 | | |
| **C. Parents with children (age 10-19)** | | | | | | | | |
| Female | 0.077 | 0.532 | -0.623 | 0.000 | | 0.082 | -0.012 | 0.931 |
| Age | 46.596 | 44.195 | 0.257 | 0.011 | | 45.816 | 0.095 | 0.502 |
| Primary education | 0.481 | 0.390 | 0.129 | 0.256 | | 0.449 | 0.045 | 0.752 |
| Secondary education | 0.077 | 0.104 | -0.066 | 0.546 | | 0.061 | 0.043 | 0.758 |
| No. observations | 52 | 154 | | | | 49 | | |

*Notes:* Normalized difference is the difference in means scaled by the square root of the average of the two within-group variances. p-values for the t-statistic for the test of equal means are shown. All covariates except for age are dummies. Matching is done among parents within villages (WVM) (see the text for matching designs). In panel B, one treatment observation is dropped in matching due to no common support.

## Table A-9. Demography and assets - intergenerational effects

| | Demography | | | | Assets | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Hhld head | Married | Hhld size | Age 20-59 | Crop land | | | Nonland assets | | Soc. Capital |
| | (0/1) | (0/1) | | | (0/1) | (ha) | (rank) | (log USD) | (rank) | (z-score) |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| **A. All adults** | | | | | | | | | | |
| WVM | 0.103** | -0.0230 | -0.276 | -0.115 | -0.144** | -0.676*** | -65.31*** | -0.786** | -70.65*** | -0.192** |
| | (0.0480) | (0.0568) | (0.287) | (0.182) | (0.0672) | (0.209) | (21.86) | (0.336) | (26.55) | (0.0760) |
| WCM | 0.0766 | -0.0536 | -0.437 | -0.230 | -0.0977 | -0.739*** | -62.85** | -0.694** | -58.82** | -0.154* |
| | (0.0511) | (0.0588) | (0.296) | (0.201) | (0.0765) | (0.248) | (24.76) | (0.297) | (23.85) | (0.0874) |
| No. obs. | 616 | 616 | 616 | 616 | 611 | 611 | 611 | 610 | 610 | 616 |
| **B. Adults belonging to households with children** | | | | | | | | | | |
| WVM | 0.0985*** | -0.0530 | -0.174 | -0.220 | -0.0985 | -0.583** | -34.73** | -0.760** | -42.57** | -0.208** |
| age 6-19 | (0.0367) | (0.0538) | (0.327) | (0.221) | (0.0737) | (0.244) | (16.25) | (0.368) | (19.55) | (0.0825) |
| WCM | 0.0455 | -0.0758 | -0.174 | -0.174 | -0.0909 | -0.592** | -35.94* | -0.686** | -34.90** | -0.187** |
| age 6-19 | (0.0366) | (0.0634) | (0.327) | (0.235) | (0.0802) | (0.291) | (18.44) | (0.315) | (16.89) | (0.0879) |
| No. obs. | 391 | 391 | 391 | 391 | 386 | 386 | 386 | 385 | 385 | 391 |
| WVM | 0.148*** | 0.0556 | -0.120 | -0.296 | -0.130 | -1.020*** | -37.37*** | -0.745* | -32.11** | -0.257*** |
| age 12-19 | (0.0565) | (0.0733) | (0.390) | (0.253) | (0.0809) | (0.333) | (14.06) | (0.395) | (14.99) | (0.0906) |
| WCM | 0.0741 | -0.0185 | -0.407 | -0.352 | -0.0926 | -0.697** | -26.34* | -0.521 | -24.55* | -0.207** |
| age 12-19 | (0.0478) | (0.0721) | (0.419) | (0.275) | (0.0934) | (0.335) | (14.89) | (0.369) | (14.04) | (0.0977) |
| No. obs. | 282 | 282 | 282 | 282 | 277 | 277 | 277 | 278 | 278 | 282 |
| WVM | 0.121*** | -0.0403 | -0.145 | -0.210 | -0.105 | -0.634** | -30.88** | -0.715* | -35.06** | -0.229*** |
| age 10-19 | (0.0416) | (0.0599) | (0.332) | (0.227) | (0.0749) | (0.267) | (14.54) | (0.381) | (17.54) | (0.0872) |
| WCM | 0.0484 | -0.0806 | -0.226 | -0.161 | -0.0806 | -0.503 | -25.31 | -0.670* | -29.80* | -0.172* |
| age 10-19 | (0.0391) | (0.0678) | (0.352) | (0.245) | (0.0868) | (0.316) | (16.93) | (0.342) | (15.87) | (0.0891) |
| No. obs. | 343 | 343 | 343 | 343 | 338 | 338 | 338 | 339 | 339 | 343 |
| **C. Parents with children** | | | | | | | | | | |
| WVM | 0 | -0.0702 | -0.333 | -0.404* | -0.116 | -0.735*** | -27.75** | -0.959** | -34.62*** | -0.230*** |
| age 6-19 | (0.0255) | (0.0561) | (0.318) | (0.240) | (0.0830) | (0.281) | (11.67) | (0.393) | (13.26) | (0.0793) |
| No. obs. | 246 | 246 | 246 | 246 | 242 | 242 | 242 | 243 | 243 | 246 |
| WVM | -0.0238 | -0.0238 | -0.631 | -0.667** | -0.0976 | -0.728** | -17.02* | -1.008** | -26.85*** | -0.286*** |
| age 12-19 | (0.0241) | (0.0730) | (0.405) | (0.284) | (0.0921) | (0.335) | (8.744) | (0.445) | (9.911) | (0.0957) |
| No. obs. | 161 | 161 | 161 | 161 | 157 | 157 | 157 | 160 | 160 | 161 |
| WVM | 0 | -0.0769 | -0.500 | -0.442* | -0.108 | -0.616** | -19.88** | -0.903** | -27.33** | -0.249*** |
| age 10-19 | (0.0280) | (0.0616) | (0.337) | (0.257) | (0.0848) | (0.283) | (9.822) | (0.416) | (11.80) | (0.0858) |
| No. obs. | 206 | 206 | 206 | 206 | 202 | 202 | 202 | 205 | 205 | 206 |

WVM: Within-village matching, WCM: Within-commune matching

*Notes:* Panel A replicates the results reported in Table 3. The sample is the adult analysis sample for each child cohort in panel B and the parent analysis sample for each child cohort in panel B. Matching is done among adults within either villages or communes (see the text for matching designs). ATT estimates for an adult with disability are reported in columns (1) and (2) of panel B and those for a parent with disability are reported in columns (1) and (2) of panel C. ATT estimates for having an adult household member with disability are reported in columns (3)-(10) of panel B, and those for having a parent with disability in the household are reported in columns (3)-(10) of panel C. Standard errors are shown in parentheses. *p<0.1, **p<0.05, ***p<0.01

## Table A-10. Productivity - intergenerational effects

| | Adult nonfarm work | | | | | Adult time allocated for: | | | | Proportion of adult time allocated for: | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Employ-ment | Earnings | | Labor supply | | Any work | Nonfarm | Farm | Hhld chore | Any work | Nonfarm | Farm | Hhld chore |
| | | | | per week | per month | | | | | | | | |
| | (0/1) | (log USD) | (rank) | (hours) | (days) | (0/1) | (0/1) | (0/1) | (0/1) | (0-1) | (0-1) | (0-1) | (0-1) |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
| **A. All adults** | | | | | | | | | | | | | |
| WVM | -0.144** | -0.873** | -45.71** | -2.517 | -0.879 | -0.103** | -0.0690 | -0.121* | 0.0345 | -0.0597*** | -0.0274 | -0.0493** | 0.0170** |
| | (0.0661) | (0.392) | (20.76) | (3.596) | (1.811) | (0.0416) | (0.0750) | (0.0720) | (0.0535) | (0.0192) | (0.0254) | (0.0216) | (0.00863) |
| No. obs. | 616 | 613 | 615 | 616 | 616 | 616 | 616 | 616 | 616 | 616 | 616 | 616 | 616 |
| **B. Adults belonging to households with children** | | | | | | | | | | | | | |
| Age 6-19 | -0.152** | -0.875** | -28.92** | -3.121 | -1.523 | -0.121*** | -0.121 | -0.114 | 0.0303 | -0.0690*** | -0.0412 | -0.0439* | 0.0161 |
| | (0.0657) | (0.407) | (13.72) | (3.656) | (1.825) | (0.0466) | (0.0821) | (0.0819) | (0.0683) | (0.0210) | (0.0275) | (0.0245) | (0.0115) |
| No. obs. | 391 | 387 | 389 | 391 | 391 | 391 | 391 | 391 | 391 | 391 | 391 | 391 | 391 |
| Age 12-19 | -0.0926 | -0.615 | -14.27 | -2.194 | -0.815 | -0.111* | -0.00926 | -0.148* | 0.0648 | -0.0646** | -0.0195 | -0.0644** | 0.0193* |
| | (0.0774) | (0.475) | (11.55) | (3.846) | (1.865) | (0.0641) | (0.0993) | (0.0868) | (0.0660) | (0.0257) | (0.0328) | (0.0272) | (0.0112) |
| No. obs. | 282 | 280 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 | 282 |
| Age 10-19 | -0.129* | -0.765* | -21.73* | -3.661 | -1.702 | -0.113** | -0.105 | -0.129 | 0.0161 | -0.0704*** | -0.0375 | -0.0494** | 0.0165 |
| | (0.0710) | (0.438) | (12.92) | (3.648) | (1.811) | (0.0528) | (0.0891) | (0.0850) | (0.0710) | (0.0231) | (0.0298) | (0.0252) | (0.0122) |
| No. obs. | 343 | 339 | 341 | 343 | 343 | 343 | 343 | 343 | 343 | 343 | 343 | 343 | 343 |
| **C. Parents with children** | | | | | | | | | | | | | |
| Age 6-19 | -0.0789 | -0.368 | -7.330 | 1.035 | 0.588 | -0.0702 | -0.105 | -0.0965 | 0.0965 | -0.0524** | -0.0316 | -0.0446* | 0.0238** |
| | (0.0671) | (0.401) | (8.421) | (3.531) | (1.744) | (0.0500) | (0.0933) | (0.0877) | (0.0667) | (0.0223) | (0.0305) | (0.0258) | (0.0112) |
| No. obs. | 246 | 243 | 244 | 246 | 246 | 246 | 246 | 246 | 246 | 246 | 246 | 246 | 246 |
| Age 12-19 | -0.0714 | -0.467 | -5.905 | -0.940 | -0.214 | -0.0952 | -0.0595 | -0.119 | 0.131* | -0.0657** | -0.0370 | -0.0546* | 0.0258*** |
| | (0.0800) | (0.486) | (6.708) | (3.981) | (1.906) | (0.0673) | (0.117) | (0.0987) | (0.0669) | (0.0274) | (0.0376) | (0.0311) | (0.00944) |
| No. obs. | 161 | 160 | 161 | 161 | 161 | 161 | 161 | 161 | 161 | 161 | 161 | 161 | 161 |
| Age 10-19 | -0.0865 | -0.452 | -7.265 | -1.423 | -0.606 | -0.0769 | -0.115 | -0.106 | 0.106 | -0.0555** | -0.0359 | -0.0457 | 0.0260** |
| | (0.0737) | (0.438) | (7.685) | (3.523) | (1.721) | (0.0549) | (0.102) | (0.0962) | (0.0732) | (0.0243) | (0.0334) | (0.0282) | (0.0122) |
| No. obs. | 206 | 203 | 204 | 206 | 206 | 206 | 206 | 206 | 206 | 206 | 206 | 206 | 206 |

*Notes:* Panel A replicates the results reported in Table 4. The sample is the adult analysis sample for each child cohort in panel B and the parent analysis sample for each child cohort in panel C. Matching is done among adults within villages (WVM) (see the text for matching designs). ATT estimates for an adult with disability are reported in panel B and those for a parent with disability are reported in panel C. Standard errors are shown in parentheses. *p<0.1, **p<0.05, ***p<0.01

## Table A-11. Child composition

| | Age 6-19 | | Age 12-19 | | Age 10-19 | |
|---|---|---|---|---|---|---|
| | Female (0-1) | Age | Female (0-1) | Age | Female (0-1) | Age |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **A. Household-level outcomes** | | | | | | |
| Within-village matching (WVM) | -0.156*** | 0.366 | -0.144** | -0.667* | -0.113* | 0.267 |
| | (0.0565) | (0.467) | (0.0707) | (0.361) | (0.0628) | (0.419) |
| *MHT (p-value)* | *0.035* | | *0.109* | *0.109* | *0.109* | |
| | -27.6% | 2.8% | -24.5% | -4.2% | -19.9% | 1.8% |
| Within-commune matching (WCM) | -0.101* | 0.244 | -0.131* | -0.949** | -0.0575 | 0.0511 |
| | (0.0561) | (0.484) | (0.0776) | (0.385) | (0.0633) | (0.460) |
| *MHT (p-value)* | *0.182* | | *0.182* | *0.082* | | |
| Control mean | 0.565 | 13.13 | 0.586 | 16.02 | 0.566 | 14.74 |
| No. observations | 391 | 391 | 282 | 282 | 343 | 343 |
| **B. Parent-level outcomes** | | | | | | |
| WVM | -0.101* | 0.481 | -0.0397 | -0.810** | -0.0766 | 0.0361 |
| | (0.0579) | (0.495) | (0.0783) | (0.396) | (0.0699) | (0.464) |
| *MHT (p-value)* | *0.244* | | | *0.244* | | |
| | -18.5% | 3.9% | -7.1% | -5.1% | -14.1% | 0.3% |
| Control mean | 0.544 | 12.33 | 0.560 | 15.94 | 0.544 | 14.38 |
| No. observations | 246 | 246 | 161 | 161 | 206 | 206 |

*Notes:* The sample is the adult analysis sample for the child cohort in panel A and the parent analysis sample for the child cohort in panel B. Dependent variables are household means among children in panel A and parent means among children in panel B. Matching is done among adults within either villages (WVM) or communes (WCM) in panel A and among parents within villages (WVM) in panel B (see the text for matching designs). ATT estimates for having an adult household member with disability are reported in panel A, and those for a parent with disability are reported in panel B. Standard errors are shown in parentheses, below which adjusted p-values for multiple hypothesis testing (MHT) for each variable group defined for each matching design in each panel are shown in italics for selected variables. The WVM estimates divided by control means are shown in percentage. The control mean of the dependent variable is the mean among households with no members with disability in panel A and the mean among parents with no disability in panel B. *p<0.1, **p<0.05, ***p<0.01

## Table A-12. Covariate balance - children

| | | **Analysis sample** | | | **Within-village chilld matching** | | |
|---|---|---|---|---|---|---|---|
| | Treatment mean | Control mean | Norma-lized diff. | p-value | Control mean | Norma-lized diff. | p-value |
| **A. Children (age 6-19)** | | | | | | | |
| Female | 0.473 | 0.556 | -0.116 | 0.071 | 0.564 | -0.128 | 0.097 |
| Age | 13.195 | 13.133 | 0.011 | 0.859 | 13.250 | -0.010 | 0.893 |
| Head: primary education | 0.517 | 0.409 | 0.152 | 0.018 | 0.429 | 0.124 | 0.106 |
| Head: secondary education | 0.073 | 0.189 | -0.238 | 0.000 | 0.093 | -0.050 | 0.521 |
| No. observations | 205 | 286 | | | 140 | | |
| **B. Children (age 12-19)** | | | | | | | |
| Female | 0.463 | 0.556 | -0.130 | 0.118 | 0.551 | -0.122 | 0.212 |
| Age | 15.350 | 15.917 | -0.179 | 0.032 | 15.820 | -0.148 | 0.128 |
| Head: primary education | 0.512 | 0.379 | 0.188 | 0.024 | 0.427 | 0.120 | 0.221 |
| Head: secondary education | 0.065 | 0.201 | -0.277 | 0.000 | 0.090 | -0.065 | 0.511 |
| No. observations | 123 | 169 | | | 89 | | |
| **C. Children (age 10-19)** | | | | | | | |
| Female | 0.462 | 0.548 | -0.121 | 0.100 | 0.582 | -0.168 | 0.053 |
| Age | 14.595 | 14.849 | -0.064 | 0.382 | 14.800 | -0.053 | 0.547 |
| Head: primary education | 0.544 | 0.429 | 0.161 | 0.027 | 0.445 | 0.139 | 0.112 |
| Head: secondary education | 0.063 | 0.187 | -0.260 | 0.000 | 0.100 | -0.094 | 0.291 |
| No. observations | 158 | 219 | | | 110 | | |

*Notes:* Normalized difference is the difference in means scaled by the square root of the average of the two within-group variances. p-values for the t-statistic for the test of equal means are shown. All covariates except for age are dummies. Matching is done among children within villages (see Appendix E for matching designs).

## Table A-13. Child composition channel

| | Age 6-19 School enrollment (0/1) | Age 12-19 Primary complete (0/1) | Secondary schooling (0/1) | Age 10-19 Time allocated for: Study (0/1) | Any work (0/1) | Proportion of time allocated for: Study (0-1) | Any work (0-1) |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| **A. Correlates of child outcomes - child-level village-fixed effects regression** | | | | | | | |
| Disability | -0.111*** | -0.162*** | -0.102* | -0.0839* | 0.0949* | -0.0288* | 0.0211 |
| | (0.0380) | (0.0527) | (0.0530) | (0.0485) | (0.0566) | (0.0154) | (0.0159) |
| Female | -0.0130 | 0.0757 | 0.105* | 0.0581 | 0.0135 | 0.0241 | -0.0121 |
| | (0.0386) | (0.0529) | (0.0541) | (0.0513) | (0.0509) | (0.0160) | (0.0163) |
| Age | 0.251*** | 0.595*** | 0.624*** | 0.105 | -0.0463 | 0.0723** | -0.0538* |
| | (0.0380) | (0.182) | (0.172) | (0.0969) | (0.0993) | (0.0288) | (0.0293) |
| Age squared | -0.0117*** | -0.0172*** | -0.0204*** | -0.00637* | 0.00389 | -0.00315*** | 0.00278*** |
| | (0.00144) | (0.00581) | (0.00551) | (0.00328) | (0.00332) | (0.000976) | (0.000998) |
| Head primary education | 0.0724<br>(0.0521) | 0.317***<br>(0.0685) | 0.130*<br>(0.0665) | 0.0472<br>(0.0656) | -0.105<br>(0.0654) | 0.0276<br>(0.0212) | -0.0269<br>(0.0213) |
| Head secondary education | 0.0543<br>(0.0737) | 0.170*<br>(0.0920) | 0.121<br>(0.0927) | -0.131<br>(0.0981) | 0.231**<br>(0.0998) | -0.0428<br>(0.0322) | 0.0486<br>(0.0303) |
| Village FE | YES | YES | YES | YES | YES | YES | YES |
| No. observations | 491 | 290 | 292 | 366 | 366 | 366 | 366 |
| R squared | 0.421 | 0.500 | 0.366 | 0.425 | 0.388 | 0.399 | 0.449 |
| **B. Disability effects through child composition** | | | | | | | |
| Within-village matching (WVM) | | | | | | | |
| Female | 0.0020 | -0.0109 | -0.0151 | -0.0065 | -0.0015 | -0.0027 | 0.0014 |
| Age | -0.0198 | -0.0315 | 0.0184 | -0.0225 | 0.0184 | -0.0056 | 0.0077 |
| Within-commune matching (WCM) | | | | | | | |
| Female | 0.0013 | -0.0099 | -0.0138 | -0.0033 | -0.0008 | -0.0014 | 0.0007 |
| Age | -0.0133 | -0.0448 | 0.0261 | -0.0043 | 0.0035 | -0.0011 | 0.0015 |

*Notes:* In panel A, the sample is the child analysis sample. Dependent variables are household means among children. Secondary schooling means secondary school enrollment or attainment (incompletion or completion). Disability is a dummy for having an adult household member with disability. Dummies for day of the week are also controlled for in columns (4)-(7). Robust standard errors are shown in parentheses. Panel B shows the product of the adult-matching estimates of the effects of disability on sex reported in Table A-11 and the FE estimates of the effects of sex on schooling/labor reported in panel A, and the product of the adult-matching estimates of the effects of disability on age reported in Table A-11 and the FE estimates of the marginal effects on schooling/labor of age at the control mean age calculated from the results reported in panel A. *p<0.1, **p<0.05, ***p<0.01

## Table A-14. Randomness: household outcomes

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| **A. Welfare and poverty** | | | | | | | | | | |
| | Consumption/income per capita | | Poverty | | | Extreme poverty | | | Happiness | Life satisfaction |
| | | | $P_0$ | $P_1$ | $P_2$ | $P_0$ | $P_1$ | $P_2$ | | |
| | (log USD) | (rank) | (0/1) | (0-1) | (0-1) | (0/1) | (0-1) | (0-1) | (1-5) | (1-5) |
| **A1. Consumption and subjective well-being** | | | | | | | | | | |
| Within-village matching (WVM) | -0.164** | -54.28** | 0.0647 | 0.0769** | 0.0523** | 0.171** | 0.0642** | 0.0310* | -0.0172 | -0.195 |
| | (0.0741) | (25.41) | (0.0633) | (0.0353) | (0.0238) | (0.0710) | (0.0303) | (0.0167) | (0.0914) | (0.131) |
| No. observations | 601 | 601 | 601 | 601 | 601 | 601 | 601 | 601 | 616 | 616 |
| Village fixed-effects (FE) regression | -0.201*** | -32.89*** | 0.0701 | 0.0970*** | 0.0657*** | 0.194*** | 0.0798*** | 0.0392*** | -0.0583 | -0.257** |
| | (0.0594) | (9.685) | (0.0505) | (0.0283) | (0.0192) | (0.0598) | (0.0243) | (0.0139) | (0.0677) | (0.102) |
| No. observations | 289 | 289 | 289 | 289 | 289 | 289 | 289 | 289 | 296 | 296 |
| **A2. Income** | | | | | | | | | | |
| WVM | -0.349*** | -55.82** | 0.0783 | 0.0887* | 0.0935** | 0.0964 | 0.106** | 0.0888** | | |
| | (0.129) | (25.12) | (0.0620) | (0.0462) | (0.0398) | (0.0726) | (0.0442) | (0.0355) | | |
| No. observations | 584 | 584 | 584 | 584 | 584 | 584 | 584 | 584 | | |
| Village FE | -0.383*** | -30.62*** | 0.0752 | 0.108*** | 0.107*** | 0.124** | 0.120*** | 0.0969*** | | |
| | (0.120) | (10.58) | (0.0532) | (0.0412) | (0.0362) | (0.0627) | (0.0396) | (0.0332) | | |
| No. observations | 281 | 281 | 281 | 281 | 281 | 281 | 281 | 281 | | |
| **B. Demography and assets** | | | | | | | | | | |
| | Hhld size | Age 20-59 | Crop land | | | Nonland assets | | Soc. capital | | |
| | | | (0/1) | (ha) | (rank) | (log USD) | (rank) | (z-score) | | |
| WVM | -0.276 | -0.115 | -0.144** | -0.676*** | -65.31*** | -0.786** | -70.65*** | -0.192** | | |
| | (0.287) | (0.182) | (0.0672) | (0.209) | (21.86) | (0.336) | (26.55) | (0.0760) | | |
| No. observations | 616 | 616 | 611 | 611 | 611 | 610 | 610 | 616 | | |
| Village FE | 0.238 | 0.0156 | -0.134** | -0.657*** | -29.84*** | -0.647** | -27.05*** | -0.212*** | | |
| | (0.235) | (0.139) | (0.0540) | (0.186) | (9.196) | (0.261) | (10.11) | (0.0738) | | |
| No. observations | 296 | 296 | 294 | 294 | 294 | 294 | 294 | 296 | | |

*Notes:* Within-village matching (WVM) results in panels A and B replicate the results reported in Tables 2 and 3 (excluding columns 1-2). Village fixed-effects (FE) regressions are based on the household analysis sample. Estimated coefficients for having an adult household member with disability are reported. Robust standard errors are shown in parentheses. *p<0.1, **p<0.05, ***p<0.01

## Table A-15. Randomness: adult outcomes

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|---|---|---|---|---|---|---|---|
| **A. Demography and nonfarm work** | | | | | | | | |
| | Hhld head | Married | Employment | Earnings | | Labor supply | | |
| | | | | | | per week | per month | |
| | (0/1) | (0/1) | (0/1) | (log USD) | (rank) | (hours) | (days) | |
| Within-village matching (WVM) | 0.103** | -0.0230 | -0.144** | -0.873** | -45.71** | -2.517 | -0.879 | |
| | (0.0480) | (0.0568) | (0.0661) | (0.392) | (20.76) | (3.596) | (1.811) | |
| No. observations | 616 | 616 | 616 | 613 | 615 | 616 | 616 | |
| Village fixed-effects (FE) regression | 0.513*** | 0.124** | -0.0504 | -0.307 | -15.34 | 0.526 | 0.438 | |
| | (0.0428) | (0.0491) | (0.0477) | (0.272) | (14.79) | (2.581) | (1.381) | |
| with covariates | 0.126*** | -0.0680 | -0.0826 | -0.492 | -26.15 | -0.894 | -0.489 | |
| | (0.0396) | (0.0506) | (0.0545) | (0.314) | (16.96) | (2.875) | (1.560) | |
| **B. Time use** | | | | | | | | |
| | Adult time allocated for: | | | | Proportion of adult time allocated for: | | | |
| | Any work | Nonfarm | Farm | Hhld chore | Any work | Nonfarm | Farm | Hhld chore |
| | (0/1) | (0/1) | (0/1) | (0/1) | (0-1) | (0-1) | (0-1) | (0-1) |
| WVM | -0.103** | -0.0690 | -0.121* | 0.0345 | -0.0597*** | -0.0274 | -0.0493** | 0.0170** |
| | (0.0416) | (0.0750) | (0.0720) | (0.0535) | (0.0192) | (0.0254) | (0.0216) | (0.00863) |
| No. observations | 616 | 616 | 616 | 616 | 616 | 616 | 616 | 616 |
| Village FE | -0.0952** | -0.0324 | -0.0292 | -0.151*** | -0.0509*** | -0.0138 | -0.0141 | -0.0230** |
| | (0.0377) | (0.0583) | (0.0541) | (0.0478) | (0.0146) | (0.0195) | (0.0158) | (0.0104) |
| with covariates | -0.0950** | -0.0788 | -0.0928 | 0.0161 | -0.0566*** | -0.0284 | -0.0374** | 0.00926 |
| | (0.0406) | (0.0637) | (0.0569) | (0.0507) | (0.0159) | (0.0210) | (0.0167) | (0.0106) |

*Notes:* Within-village matching (WVM) results in panels A and B replicate the results reported in Tables 3 (columns 1-2) and 4. Village fixed-effects (FE) regressions are based on the adult analysis sample. Estimated coefficients for a dummy for an adult with disability are reported. Covariates are female, age, age squared, primary education, and secondary education. Dummies for day of the week are also controlled for in panel B. Robust standard errors are shown in parentheses. *p<0.1, **p<0.05, ***p<0.01

## Table A-16. Randomness: child outcomes

| | Age 6-19 School enrollment (0-1) (1) | Age 12-19 Primary complete (0-1) (2) | Secondary schooling (0-1) (3) | Age 10-19 Time allocated for: Study (0-1) (4) | Any work (0-1) (5) | Proportion of time allocated for: Study (0-1) (6) | Any work (0-1) (7) |
|---|---|---|---|---|---|---|---|
| **A. Household-level outcomes** | | | | | | | |
| Within-village matching (WVM) | -0.143** | -0.267*** | -0.177** | -0.118 | 0.151* | -0.0471** | 0.0485* |
| | (0.0627) | (0.0723) | (0.0747) | (0.0737) | (0.0903) | (0.0240) | (0.0264) |
| No. observations | 391 | 391 | 391 | 391 | 391 | 391 | 391 |
| Village fixed-effects (FE) regression | -0.103* | -0.217*** | -0.102 | -0.0855 | 0.0812 | -0.0257 | 0.0318 |
| | (0.0575) | (0.0699) | (0.0659) | (0.0751) | (0.0753) | (0.0223) | (0.0230) |
| No. observations | 190 | 135 | 135 | 166 | 166 | 166 | 166 |
| **B. Parent-level outcomes** | | | | | | | |
| WVM | -0.124* | -0.248*** | -0.133 | -0.102 | 0.0615 | -0.0392 | 0.0289 |
| | (0.0648) | (0.0801) | (0.0825) | (0.0816) | (0.0908) | (0.0262) | (0.0273) |
| No. observations | 246 | 161 | 161 | 206 | 206 | 206 | 206 |
| Village FE | -0.0879 | -0.189*** | -0.0622 | -0.0944 | 0.0511 | -0.0294 | 0.0247 |
| | (0.0575) | (0.0715) | (0.0641) | (0.0752) | (0.0730) | (0.0225) | (0.0233) |
| No. observations | 246 | 162 | 162 | 206 | 206 | 206 | 206 |

*Notes:* Within-village matching (WVM) results in panels A and B replicate the results reported in Table 5. Village fixed-effects (FE) regressions are based on the household analysis sample for the child cohort in panel A and the parent analysis sample for the child cohort in panel B. Estimated coefficients for having an adult household member with disability are reported in panel A, and those for a parent with disability are reported in panel B. Robust standard errors are shown in parentheses. *p<0.1, **p<0.05, ***p<0.01

## Table A-17. Correlates of ex-combatants

| | Adults | Male adults |
|---|---|---|
| | (1) | (2) |
| Female | -0.292* | |
| | (0.158) | |
| Age | 0.147*** | 0.217*** |
| | (0.0505) | (0.0475) |
| Age squared | -0.00147** | -0.00229*** |
| | (0.000625) | (0.000599) |
| Primary education | 0.102 | 0.106 |
| | (0.0900) | (0.0907) |
| Secondary education | 0.350*** | 0.282*** |
| | (0.117) | (0.0948) |
| Constant | -2.882*** | -4.333*** |
| | (1.003) | (0.928) |
| No. observations | 87 | 78 |
| R squared | 0.334 | 0.330 |
| Mean of dependent variables | 0.701 | 0.731 |

*Notes:* These are OLS estimates. The sample is treated adults in the adult analysis sample in column (1) and in the male adult analysis sample in column (2). Dependent variables are a dummy for an ex-combatant at the onset of disability. Robust standard errors are shown in parentheses. *p<0.1, **p<0.05, ***p<0.01

## Table A-18. Endogeneity and heterogeneity: consumption and poverty

| | Consumption per capita | | Poverty | | | Extreme poverty | | | Happi-ness | Life satis-faction |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | $P_0$ | $P_1$ | $P_2$ | $P_0$ | $P_1$ | $P_2$ | | |
| | (log USD) | (rank) | (0/1) | (0-1) | (0-1) | (0/1) | (0-1) | (0-1) | (1-5) | (1-5) |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| **A. Adult matching - All** | | | | | | | | | | |
| WVM | -0.164** | -54.28** | 0.0647 | 0.0769** | 0.0523** | 0.171** | 0.0642** | 0.0310* | -0.0172 | -0.195 |
| | (0.0741) | (25.41) | (0.0633) | (0.0353) | (0.0238) | (0.0710) | (0.0303) | (0.0167) | (0.0914) | (0.131) |
| WCM | -0.186** | -56.37** | 0.0941 | 0.0766** | 0.0468* | 0.176** | 0.0566* | 0.0249 | 0.0268 | -0.165 |
| | (0.0816) | (26.94) | (0.0662) | (0.0373) | (0.0247) | (0.0765) | (0.0314) | (0.0173) | (0.0939) | (0.129) |
| No. obs. | 601 | 601 | 601 | 601 | 601 | 601 | 601 | 601 | 616 | 616 |
| **B. Household matching - All** | | | | | | | | | | |
| WVM | -0.217*** | -33.35*** | 0.0941 | 0.0971*** | 0.0644*** | 0.200*** | 0.0796*** | 0.0380** | -0.0632 | -0.259* |
| | (0.0727) | (11.63) | (0.0631) | (0.0336) | (0.0224) | (0.0706) | (0.0283) | (0.0161) | (0.0933) | (0.138) |
| No. obs. | 289 | 289 | 289 | 289 | 289 | 289 | 289 | 289 | 296 | 296 |
| **C. Non-migrants** | | | | | | | | | | |
| WVM | -0.233*** | -62.98*** | 0.0676 | 0.113*** | 0.0756*** | 0.216*** | 0.0916*** | 0.0440** | -0.0526 | -0.257* |
| | (0.0805) | (21.90) | (0.0671) | (0.0402) | (0.0270) | (0.0828) | (0.0338) | (0.0188) | (0.0973) | (0.148) |
| WCM | -0.216*** | -51.68** | 0.0676 | 0.0910** | 0.0664** | 0.135 | 0.0793** | 0.0453** | -0.140 | -0.353** |
| | (0.0820) | (22.57) | (0.0711) | (0.0412) | (0.0274) | (0.0881) | (0.0353) | (0.0192) | (0.113) | (0.158) |
| No. obs. | 471 | 471 | 471 | 471 | 471 | 471 | 471 | 471 | 481 | 481 |
| **D. Males** | | | | | | | | | | |
| WVM | -0.192** | -32.02** | 0.118* | 0.0891** | 0.0557** | 0.184** | 0.0662** | 0.0316* | -0.0577 | -0.192 |
| | (0.0799) | (14.01) | (0.0642) | (0.0372) | (0.0256) | (0.0744) | (0.0327) | (0.0183) | (0.0996) | (0.137) |
| WCM | -0.222** | -33.81** | 0.145** | 0.0920** | 0.0534** | 0.217*** | 0.0618* | 0.0274 | 0.00427 | -0.171 |
| | (0.0878) | (14.91) | (0.0682) | (0.0396) | (0.0264) | (0.0825) | (0.0336) | (0.0186) | (0.102) | (0.136) |
| No. obs. | 315 | 315 | 315 | 315 | 315 | 315 | 315 | 315 | 324 | 324 |
| **E. Single-leg amputees** | | | | | | | | | | |
| WVM | -0.153* | -40.95* | 0.0692 | 0.0728* | 0.0471* | 0.177** | 0.0581 | 0.0251 | -0.0970 | -0.187 |
| | (0.0857) | (22.45) | (0.0711) | (0.0403) | (0.0278) | (0.0830) | (0.0355) | (0.0195) | (0.101) | (0.138) |
| WCM | -0.213** | -49.35** | 0.108 | 0.0864* | 0.0506* | 0.200** | 0.0586 | 0.0257 | -0.00249 | -0.149 |
| | (0.0980) | (25.17) | (0.0763) | (0.0444) | (0.0300) | (0.0906) | (0.0383) | (0.0208) | (0.103) | (0.124) |
| No. obs. | 453 | 453 | 453 | 453 | 453 | 453 | 453 | 453 | 468 | 468 |
| **F. Onset in 1998 or before** | | | | | | | | | | |
| WVM | -0.193** | -51.39** | 0.0929 | 0.0821** | 0.0508** | 0.164** | 0.0587* | 0.0277 | -0.0556 | -0.194 |
| | (0.0761) | (22.64) | (0.0686) | (0.0373) | (0.0257) | (0.0771) | (0.0331) | (0.0184) | (0.0975) | (0.150) |
| WCM | -0.218** | -51.84** | 0.129* | 0.0812* | 0.0413 | 0.186** | 0.0440 | 0.0170 | 0.0394 | -0.174 |
| | (0.0900) | (25.70) | (0.0715) | (0.0415) | (0.0279) | (0.0848) | (0.0357) | (0.0195) | (0.0947) | (0.148) |
| No. obs. | 513 | 513 | 513 | 513 | 513 | 513 | 513 | 513 | 528 | 528 |

WVM: Within-village matching, WCM: Within-commune matching

*Notes:* Panel A replicates the results reported in panel A of Table 2. In panel B the sample is the household analysis sample. Matching is done among households within villages (see Appendix E for matching designs). In panels C-F the sample is the adult analysis subsample. Matching is done among adults within either villages or communes (see the text for matching designs). ATT estimates for having an adult household member with disability are reported. Standard errors are shown in parentheses. *p<0.1, **p<0.05, ***p<0.01

## Table A-19. Endogeneity and heterogeneity: income and poverty

| | Income per capita | | Poverty | | | Extreme poverty | | |
|---|---|---|---|---|---|---|---|---|
| | | | $P_0$ | $P_1$ | $P_2$ | $P_0$ | $P_1$ | $P_2$ |
| | (log USD) | (rank) | (0/1) | (0-1) | (0-1) | (0/1) | (0-1) | (0-1) |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| **A. Adult matching - All** | | | | | | | | |
| WVM | -0.349*** | -55.82** | 0.0783 | 0.0887* | 0.0935** | 0.0964 | 0.106** | 0.0888** |
| | (0.129) | (25.12) | (0.0620) | (0.0462) | (0.0398) | (0.0726) | (0.0442) | (0.0355) |
| WCM | -0.401*** | -74.63*** | 0.0964 | 0.128** | 0.123*** | 0.171** | 0.139*** | 0.106*** |
| | (0.145) | (28.40) | (0.0700) | (0.0525) | (0.0455) | (0.0805) | (0.0504) | (0.0408) |
| No. obs. | 584 | 584 | 584 | 584 | 584 | 584 | 584 | 584 |
| **B. Household matching - All** | | | | | | | | |
| WVM | -0.370*** | -27.36** | 0.0542 | 0.0917* | 0.105** | 0.0723 | 0.119*** | 0.105*** |
| | (0.134) | (12.10) | (0.0635) | (0.0472) | (0.0415) | (0.0723) | (0.0459) | (0.0382) |
| No. obs. | 278 | 278 | 278 | 278 | 278 | 278 | 278 | 278 |
| **C. Non-migrants** | | | | | | | | |
| WVM | -0.453*** | -58.81*** | 0.0743 | 0.124** | 0.129*** | 0.162** | 0.145*** | 0.119*** |
| | (0.145) | (22.00) | (0.0686) | (0.0512) | (0.0442) | (0.0804) | (0.0490) | (0.0393) |
| WCM | -0.405** | -53.09** | 0.0405 | 0.116* | 0.122** | 0.164* | 0.135** | 0.113** |
| | (0.173) | (26.24) | (0.0770) | (0.0614) | (0.0538) | (0.0923) | (0.0590) | (0.0480) |
| No. obs. | 465 | 465 | 465 | 465 | 465 | 465 | 465 | 465 |
| **D. Males** | | | | | | | | |
| WVM | -0.393*** | -34.56** | 0.0743 | 0.110** | 0.113*** | 0.122 | 0.130*** | 0.105*** |
| | (0.132) | (13.62) | (0.0686) | (0.0478) | (0.0406) | (0.0777) | (0.0451) | (0.0361) |
| WCM | -0.410*** | -39.70*** | 0.0991 | 0.134** | 0.124*** | 0.169** | 0.139*** | 0.105** |
| | (0.150) | (15.31) | (0.0784) | (0.0538) | (0.0463) | (0.0842) | (0.0512) | (0.0421) |
| No. obs. | 305 | 305 | 305 | 305 | 305 | 305 | 305 | 305 |
| **E. Single-leg amputees** | | | | | | | | |
| WVM | -0.162 | -17.94 | 0.0391 | 0.0271 | 0.0328 | -0.00781 | 0.0414 | 0.0326 |
| | (0.128) | (20.62) | (0.0704) | (0.0501) | (0.0410) | (0.0794) | (0.0464) | (0.0343) |
| WCM | -0.262* | -38.68 | 0.0937 | 0.0802 | 0.0711 | 0.104 | 0.0829 | 0.0549 |
| | (0.143) | (23.77) | (0.0817) | (0.0580) | (0.0470) | (0.0928) | (0.0534) | (0.0385) |
| No. obs. | 444 | 444 | 444 | 444 | 444 | 444 | 444 | 444 |
| **F. Onset in 1998 or before** | | | | | | | | |
| WVM | -0.298** | -44.94* | 0.0662 | 0.0859* | 0.0863** | 0.0956 | 0.0977** | 0.0785** |
| | (0.138) | (23.40) | (0.0725) | (0.0506) | (0.0426) | (0.0782) | (0.0470) | (0.0371) |
| WCM | -0.343** | -60.85** | 0.0735 | 0.125** | 0.114** | 0.172** | 0.129** | 0.0909** |
| | (0.152) | (25.43) | (0.0788) | (0.0551) | (0.0473) | (0.0844) | (0.0522) | (0.0420) |
| No. obs. | 496 | 496 | 496 | 496 | 496 | 496 | 496 | 496 |

WVM: Within-village matching, WCM: Within-commune matching

*Notes:* Panel A replicates the results reported in panel B of Table 2. In panel B the sample is the household analysis sample. Matching is done among households within villages (see Appendix E for matching designs). In panels C-F the sample is the adult analysis subsample. Matching is done among adults within either villages or communes (see the text for matching designs). ATT estimates for having an adult household member with disability are reported. Standard errors are shown in parentheses. *p<0.1, **p<0.05, ***p<0.01

## Table A-20. Endogeneity and heterogeneity: demography and assets

| | Demographic factors | | | | Assets | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Hhld head | Married | Hhld size | Age 20-59 | Crop land | | | Nonland assets | | Soc. Capital |
| | (0/1) | (0/1) | | | (0/1) | (ha) | (rank) | (log USD) | (rank) | (z-score) |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| **A. Adult matching - All** | | | | | | | | | | |
| WVM | 0.103** | -0.0230 | -0.276 | -0.115 | -0.144** | -0.676*** | -65.31*** | -0.786** | -70.65*** | -0.192** |
| | (0.0480) | (0.0568) | (0.287) | (0.182) | (0.0672) | (0.209) | (21.86) | (0.336) | (26.55) | (0.0760) |
| WCM | 0.0766 | -0.0536 | -0.437 | -0.230 | -0.0977 | -0.739*** | -62.85** | -0.694** | -58.82** | -0.154* |
| | (0.0511) | (0.0588) | (0.296) | (0.201) | (0.0765) | (0.248) | (24.76) | (0.297) | (23.85) | (0.0874) |
| No. obs. | 616 | 616 | 616 | 616 | 611 | 611 | 611 | 610 | 610 | 616 |
| **B. Household matching - All** | | | | | | | | | | |
| WVM | | | -0.0287 | -0.0345 | -0.144** | -0.696*** | -32.66*** | -0.920*** | -39.60*** | -0.285*** |
| | | | (0.260) | (0.175) | (0.0643) | (0.212) | (10.59) | (0.342) | (13.43) | (0.106) |
| No. obs. | | | 296 | 296 | 296 | 289 | 289 | 289 | 289 | 289 |
| **C. Non-migrants** | | | | | | | | | | |
| WVM | 0.145** | 0.0132 | -0.105 | -0.0658 | -0.138* | -0.714*** | -49.70** | -0.724** | -51.36** | -0.199** |
| | (0.0575) | (0.0640) | (0.280) | (0.172) | (0.0727) | (0.249) | (19.39) | (0.348) | (21.56) | (0.0805) |
| WCM | 0.101* | -0.0482 | -0.349 | -0.138 | -0.0921 | -0.653** | -39.48* | -0.858*** | -56.80*** | -0.189** |
| | (0.0577) | (0.0641) | (0.300) | (0.206) | (0.0912) | (0.285) | (21.80) | (0.329) | (20.58) | (0.0912) |
| No. obs. | 481 | 481 | 481 | 481 | 476 | 476 | 476 | 475 | 475 | 481 |
| **D. Males** | | | | | | | | | | |
| WVM | 0.0897* | -0.0513 | -0.199 | -0.115 | -0.122* | -0.701*** | -33.27*** | -0.662* | -33.61** | -0.150* |
| | (0.0472) | (0.0575) | (0.312) | (0.193) | (0.0699) | (0.232) | (12.31) | (0.364) | (15.38) | (0.0772) |
| WCM | 0.0470 | -0.0470 | -0.376 | -0.173 | -0.0662 | -0.781*** | -32.05** | -0.596* | -28.16** | -0.133 |
| | (0.0527) | (0.0616) | (0.325) | (0.215) | (0.0784) | (0.255) | (13.12) | (0.316) | (13.64) | (0.0957) |
| No. obs. | 324 | 324 | 324 | 324 | 323 | 323 | 323 | 322 | 322 | 324 |
| **E. Single-leg amputees** | | | | | | | | | | |
| WVM | 0.0746 | -0.0448 | -0.112 | 0.0821 | -0.112 | -0.587** | -39.45** | -0.624 | -48.12** | -0.159* |
| | (0.0552) | (0.0609) | (0.325) | (0.206) | (0.0752) | (0.239) | (17.95) | (0.381) | (23.20) | (0.0901) |
| WCM | 0.0498 | -0.0697 | -0.179 | 0 | -0.0299 | -0.600** | -31.38 | -0.565* | -41.59** | -0.0948 |
| | (0.0552) | (0.0611) | (0.339) | (0.232) | (0.0838) | (0.297) | (21.77) | (0.334) | (20.96) | (0.106) |
| No. obs. | 468 | 468 | 468 | 468 | 463 | 463 | 463 | 462 | 462 | 468 |
| **F. Onset in 1998 or before** | | | | | | | | | | |
| WVM | 0.0972* | 0 | -0.167 | -0.0417 | -0.118 | -0.564** | -46.63** | -0.743** | -60.70** | -0.217*** |
| | (0.0545) | (0.0586) | (0.313) | (0.206) | (0.0766) | (0.224) | (20.22) | (0.374) | (24.91) | (0.0832) |
| WCM | 0.0949* | -0.0231 | -0.285 | -0.208 | -0.104 | -0.783*** | -57.43*** | -0.686** | -53.00** | -0.203** |
| | (0.0535) | (0.0597) | (0.350) | (0.235) | (0.0826) | (0.252) | (21.88) | (0.316) | (21.32) | (0.100) |
| No. obs. | 528 | 528 | 528 | 528 | 523 | 523 | 523 | 522 | 522 | 528 |

WVM: Within-village matching, WCM: Within-commune matching

*Notes:* Panel A replicates the results reported in Table 3. In panel B the sample is the household analysis sample. Matching is done among households within villages (see Appendix E for matching designs). ATT estimates for having an adult household member with disability are reported. In panels C-F the sample is the adult analysis subsample. Matching is done among adults within either villages or communes (see the text for matching designs). ATT estimates for an adult with disability are reported in columns (1) and (2); those for having an adult household member with disability are reported in columns (3)-(10). Standard errors are shown in parentheses. *p<0.1, **p<0.05, ***p<0.01

**Table A-21. Heterogeneity: productivity**

| | Adult nonfarm work | | | | | Adult time allocated for: | | | | Proportion of adult time allocated for: | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Employ-ment | Earnings | | Labor supply | | Any work | Nonfarm | Farm | Hhld chore | Any work | Nonfarm | Farm | Hhld chore |
| | | | | per week | per month | | | | | | | | |
| | (0/1) | (log USD) | (rank) | (hours) | (days) | (0/1) | (0/1) | (0/1) | (0/1) | (0-1) | (0-1) | (0-1) | (0-1) |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
| **A. All** | | | | | | | | | | | | | |
| WVM | -0.144** | -0.873** | -45.71** | -2.517 | -0.879 | -0.103** | -0.0690 | -0.121* | 0.0345 | -0.0597*** | -0.0274 | -0.0493** | 0.0170** |
| | (0.0661) | (0.392) | (20.76) | (3.596) | (1.811) | (0.0416) | (0.0750) | (0.0720) | (0.0535) | (0.0192) | (0.0254) | (0.0216) | (0.00863) |
| WCM | -0.149** | -0.919** | -48.11** | -2.793 | -1.552 | -0.103** | -0.0651 | -0.134* | 0.0881 | -0.0559*** | -0.0285 | -0.0485** | 0.0212** |
| | (0.0676) | (0.395) | (21.05) | (3.473) | (1.820) | (0.0482) | (0.0816) | (0.0742) | (0.0552) | (0.0215) | (0.0290) | (0.0231) | (0.00954) |
| No. obs. | 616 | 613 | 615 | 616 | 616 | 616 | 616 | 616 | 616 | 616 | 616 | 616 | 616 |
| **B. Non-migrants** | | | | | | | | | | | | | |
| WVM | -0.125* | -0.681* | -28.54* | -2.888 | -0.941 | -0.105** | -0.151* | -0.0724 | 0.0329 | -0.0718*** | -0.0496* | -0.0411* | 0.0189* |
| | (0.0704) | (0.403) | (17.11) | (3.503) | (1.731) | (0.0417) | (0.0788) | (0.0755) | (0.0628) | (0.0199) | (0.0264) | (0.0227) | (0.0105) |
| WCM | -0.125 | -0.763* | -31.43* | -5.336 | -1.487 | -0.105** | -0.167** | -0.0943 | 0.0811 | -0.0603*** | -0.0512* | -0.0317 | 0.0226** |
| | (0.0773) | (0.450) | (19.09) | (3.796) | (1.990) | (0.0458) | (0.0842) | (0.0799) | (0.0647) | (0.0217) | (0.0292) | (0.0248) | (0.0106) |
| No. obs. | 481 | 478 | 480 | 481 | 481 | 481 | 481 | 481 | 481 | 481 | 481 | 481 | 481 |
| **C. Males** | | | | | | | | | | | | | |
| WVM | -0.160** | -0.963** | -27.17** | -2.314 | -0.788 | -0.103** | -0.0833 | -0.109 | 0.0577 | -0.0654*** | -0.0334 | -0.0438* | 0.0118 |
| | (0.0714) | (0.419) | (11.68) | (3.954) | (1.979) | (0.0449) | (0.0792) | (0.0764) | (0.0546) | (0.0199) | (0.0279) | (0.0232) | (0.00853) |
| WCM | -0.145** | -0.914** | -26.04** | -1.190 | -1.081 | -0.103* | -0.0449 | -0.158** | 0.105* | -0.0585*** | -0.0211 | -0.0552** | 0.0177* |
| | (0.0714) | (0.417) | (11.72) | (3.734) | (1.971) | (0.0527) | (0.0865) | (0.0771) | (0.0580) | (0.0226) | (0.0304) | (0.0245) | (0.00955) |
| No. obs. | 324 | 322 | 323 | 324 | 324 | 324 | 324 | 324 | 324 | 324 | 324 | 324 | 324 |
| **D. Single-leg amputees** | | | | | | | | | | | | | |
| WVM | -0.127 | -0.804* | -31.43* | -3.328 | -1.037 | -0.104** | -0.0672 | -0.0896 | 0.0149 | -0.0409* | -0.0179 | -0.0289 | 0.00591 |
| | (0.0779) | (0.466) | (18.60) | (4.161) | (2.108) | (0.0498) | (0.0851) | (0.0829) | (0.0539) | (0.0217) | (0.0298) | (0.0246) | (0.00763) |
| WCM | -0.127 | -0.810* | -31.95* | -2.142 | -1.642 | -0.104* | -0.0224 | -0.139 | 0.0299 | -0.0357 | -0.00627 | -0.0332 | 0.00373 |
| | (0.0785) | (0.461) | (18.61) | (3.834) | (2.148) | (0.0584) | (0.0978) | (0.0850) | (0.0604) | (0.0245) | (0.0341) | (0.0260) | (0.00981) |
| No. obs. | 468 | 465 | 467 | 468 | 468 | 468 | 468 | 468 | 468 | 468 | 468 | 468 | 468 |
| **E. Onset in 1998 or before** | | | | | | | | | | | | | |
| WVM | -0.104 | -0.630 | -27.47 | -0.764 | 0.257 | -0.111** | -0.0694 | -0.104 | 0.0208 | -0.0644*** | -0.0308 | -0.0463** | 0.0127* |
| | (0.0713) | (0.422) | (18.96) | (3.884) | (1.968) | (0.0435) | (0.0812) | (0.0763) | (0.0535) | (0.0211) | (0.0278) | (0.0232) | (0.00704) |
| WCM | -0.0764 | -0.475 | -20.88 | 0.424 | 0.306 | -0.111** | -0.0278 | -0.157** | 0.0833 | -0.0555** | -0.0170 | -0.0556** | 0.0171** |
| | (0.0728) | (0.417) | (19.03) | (3.886) | (2.010) | (0.0519) | (0.0944) | (0.0787) | (0.0617) | (0.0239) | (0.0322) | (0.0262) | (0.00862) |
| No. obs. | 528 | 525 | 527 | 528 | 528 | 528 | 528 | 528 | 528 | 528 | 528 | 528 | 528 |

WVM: Within-village matching, WCM: Within-commune matching

*Notes:* Panel A replicates the results reported in Table 4. In panels B-E the sample is the adult analysis subsample. Matching is done among adults within either villages or communes (see the text for matching designs). ATT estimates for an adult with disability are reported. Standard errors are shown in parentheses. *p<0.1, **p<0.05, ***p<0.01

## Table A-22. Endogeneity and heterogeneity: intergenerational effects

| | Age 6-19 School enrollment | Age 12-19 Primary complete | Secondary schooling | Age 10-19 Time allocated for: Study | Any work | Proportion of time allocated for: Study | Any work |
|---|---|---|---|---|---|---|---|
| | (0-1) | (0-1) | (0-1) | (0-1) | (0-1) | (0-1) | (0-1) |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| **A. Adult/parent matching - All** | | | | | | | |
| Within-village adult matching (WVAM) | -0.143** | -0.267*** | -0.177** | -0.118 | 0.151* | -0.0471** | 0.0485* |
| | (0.0627) | (0.0723) | (0.0747) | (0.0737) | (0.0903) | (0.0240) | (0.0264) |
| Within-commune adult matching (WCAM) | -0.124* | -0.267*** | -0.125* | -0.0992 | 0.151* | -0.0396 | 0.0415 |
| | (0.0704) | (0.0804) | (0.0751) | (0.0877) | (0.0902) | (0.0264) | (0.0282) |
| No. observations | 391 | 391 | 391 | 391 | 391 | 391 | 391 |
| Within-village parent matching (WVPM) | -0.124* | -0.248*** | -0.133 | -0.102 | 0.0615 | -0.0392 | 0.0289 |
| | (0.0648) | (0.0801) | (0.0825) | (0.0816) | (0.0908) | (0.0262) | (0.0273) |
| No. observations | 246 | 161 | 161 | 206 | 206 | 206 | 206 |
| **B. Household/child matching - All** | | | | | | | |
| Within-village household matching | -0.131* | -0.258*** | -0.168** | -0.134* | 0.140 | -0.0526** | 0.0493* |
| | (0.0678) | (0.0735) | (0.0757) | (0.0788) | (0.0895) | (0.0242) | (0.0267) |
| | 190 | 135 | 135 | 166 | 166 | 166 | 166 |
| Within-village child matching | -0.109* | -0.217*** | -0.165** | -0.0643 | 0.0414 | -0.0278 | 0.0150 |
| | (0.0600) | (0.0699) | (0.0645) | (0.0673) | (0.0717) | (0.0208) | (0.0215) |
| | -15.9% | -38.4% | -49.9% | -12.4% | 6.9% | -20.4% | 9.7% |
| Control mean | 0.685 | 0.565 | 0.331 | 0.519 | 0.603 | 0.136 | 0.154 |
| No. observations | 491 | 290 | 292 | 367 | 367 | 367 | 367 |
| **C. Non-migrants** | | | | | | | |
| WVAM | -0.142** | -0.259*** | -0.119 | -0.117 | 0.151 | -0.0429 | 0.0448 |
| | (0.0693) | (0.0734) | (0.0762) | (0.0897) | (0.0955) | (0.0294) | (0.0277) |
| WCAM | -0.128* | -0.274*** | -0.143* | -0.162* | 0.172* | -0.0505* | 0.0471 |
| | (0.0725) | (0.0794) | (0.0805) | (0.0930) | (0.105) | (0.0303) | (0.0288) |
| No. observations | 289 | 289 | 289 | 289 | 289 | 289 | 289 |
| WVPM | -0.108 | -0.242*** | -0.0484 | -0.0892 | 0.0571 | -0.0274 | 0.0159 |
| | (0.0732) | (0.0880) | (0.0829) | (0.0993) | (0.0974) | (0.0319) | (0.0311) |
| No. observations | 182 | 114 | 114 | 149 | 149 | 149 | 149 |
| **D. Males** | | | | | | | |
| WVAM | -0.133** | -0.268*** | -0.165** | -0.147* | 0.129 | -0.0599** | 0.0446 |
| | (0.0661) | (0.0766) | (0.0795) | (0.0776) | (0.0954) | (0.0249) | (0.0280) |
| WCAM | -0.0914 | -0.239*** | -0.0975 | -0.104 | 0.131 | -0.0365 | 0.0380 |
| | (0.0752) | (0.0909) | (0.0865) | (0.0944) | (0.0965) | (0.0264) | (0.0306) |
| No. observations | 205 | 205 | 205 | 205 | 205 | 205 | 205 |
| WVPM | -0.111* | -0.279*** | -0.143 | -0.100 | 0.0354 | -0.0451 | 0.0231 |
| | (0.0675) | (0.0842) | (0.0898) | (0.0854) | (0.0959) | (0.0275) | (0.0284) |
| No. observations | 140 | 92 | 92 | 118 | 118 | 118 | 118 |

(continued)

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| **E. Single-leg amputees** | | | | | | | |
| WVAM | -0.168** | -0.378*** | -0.250*** | -0.195** | 0.186* | -0.0698*** | 0.0652** |
| | (0.0763) | (0.0789) | (0.0863) | (0.0806) | (0.0968) | (0.0251) | (0.0293) |
| WCAM | -0.127 | -0.366*** | -0.184** | -0.168* | 0.178* | -0.0601** | 0.0534* |
| | (0.0889) | (0.0835) | (0.0836) | (0.0979) | (0.0976) | (0.0286) | (0.0323) |
| No. observations | 295 | 295 | 295 | 295 | 295 | 295 | 295 |
| WVPM | -0.164** | -0.395*** | -0.218** | -0.189** | 0.0987 | -0.0619** | 0.0518* |
| | (0.0772) | (0.0877) | (0.0993) | (0.0954) | (0.101) | (0.0300) | (0.0313) |
| No. observations | 187 | 121 | 121 | 163 | 163 | 163 | 163 |
| **F. Onset in 1998 or before** | | | | | | | |
| WVAM | -0.149** | -0.278*** | -0.168** | -0.141* | 0.177* | -0.0556** | 0.0516* |
| | (0.0686) | (0.0758) | (0.0803) | (0.0819) | (0.0970) | (0.0266) | (0.0278) |
| WCAM | -0.133* | -0.296*** | -0.119 | -0.0909 | 0.167* | -0.0385 | 0.0407 |
| | (0.0796) | (0.0897) | (0.0882) | (0.0967) | (0.100) | (0.0287) | (0.0307) |
| No. observations | 342 | 342 | 342 | 342 | 342 | 342 | 342 |
| WVPM | -0.140** | -0.292*** | -0.156* | -0.107 | 0.0711 | -0.0423 | 0.0260 |
| | (0.0715) | (0.0830) | (0.0891) | (0.0906) | (0.0985) | (0.0289) | (0.0294) |
| No. observations | 232 | 155 | 155 | 196 | 196 | 196 | 196 |

*Notes:* Panel A replicates the results reported in Table 5. In panel B the sample is the household analysis sample for household matching and the child analysis sample for child matching. Matching is done among households/children within villages (WVM) (see Appendix E for matching designs). ATT estimates for having an adult household member with disability are reported. For child matching, dependent variables are original child-level measures; those in columns (1)-(5) are dummies. The WVM estimates divided by control means are shown in percentage. The control mean of the dependent variable is the mean among children belonging to households with no members with disability. In panels C-F the sample is the adult analysis subsample for the child cohort for adult matching and the parent analysis subsample for the child cohort for parent matching. Matching is done among adults within either villages (WVAM) or communes (WVCM) for adult matching and among parents within villages for parent matching (WVPM) (see the text for matching designs). ATT estimates for having an adult household member with disability are reported for adult matching and those for a parent with disability are reported for parent matching. Standard errors are shown in parentheses. *p<0.1, **p<0.05, ***p<0.01

## Table A-23. Selection of children

| | Age 6-19 | | Age 12-19 | | Age 10-19 | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| **A. Household-level outcomes** | | | | | | |
| | Hhld with children (0/1) | No. children in hhld | Hhld with children (0/1) | No. children in hhld | Hhld with children (0/1) | No. children in hhld |
| Within-village matching (WVM) | -0.0287 | 0.0920 | 0.109 | 0.167 | 0 | 0.0977 |
| | (0.0608) | (0.210) | (0.0741) | (0.175) | (0.0635) | (0.184) |
| Within-commune matching (WCM) | -0.0881 | 0.00192 | 0.0594 | 0.111 | -0.0268 | 0.0900 |
| | (0.0626) | (0.203) | (0.0715) | (0.172) | (0.0604) | (0.172) |
| Control mean | 0.727 | 1.464 | 0.526 | 0.890 | 0.617 | 1.110 |
| No. observations | 616 | 616 | 616 | 616 | 616 | 616 |
| **B. Parent-level outcomes** | | | | | | |
| | Parent with own children (0/1) | No. own children | Parent with own children (0/1) | No. own children | Parent with own children (0/1) | No. own children |
| WVM | 0.0575 | 0.339* | 0.207*** | 0.310* | 0.0977 | 0.276 |
| | (0.0648) | (0.201) | (0.0737) | (0.164) | (0.0672) | (0.179) |
| *MHT (p-value)* | | *0.175* | *0.030* | *0.175* | | |
| WCM | -0.0345 | 0.140 | 0.126* | 0.159 | 0.0402 | 0.161 |
| | (0.0652) | (0.206) | (0.0726) | (0.178) | (0.0656) | (0.179) |
| *MHT (p-value)* | | | *0.488* | | | |
| Control mean | 0.471 | 0.964 | 0.333 | 0.578 | 0.395 | 0.728 |
| No. observations | 616 | 616 | 616 | 616 | 616 | 616 |

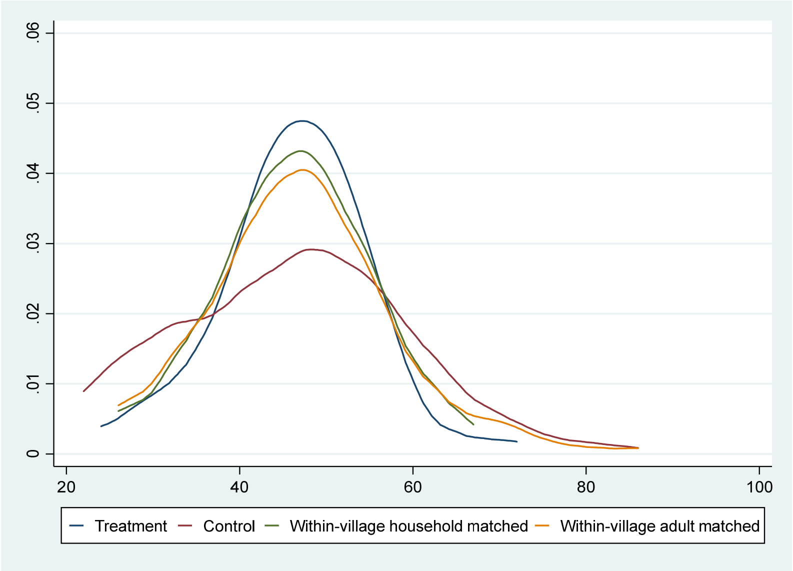
*Notes:* The sample is the adult analysis sample. Matching is done among adults within either villages (WVM) or communes (WCM) (see the text for matching designs). ATT estimates for an adult with disability are reported. Standard errors are shown in parentheses, below which adjusted p-values for multiple hypothesis testing (MHT) for each variable group defined for each matching design in each panel are shown in italics for selected variables. The control mean is the mean among adults with no disability. *p<0.1, **p<0.05, ***p<0.01

## Table A-24. Covariate balance - households

| | Treatment mean | Household analysis sample | | | Within-village hhld matching | | | Within-village adult matching | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Control mean | Normalized diff. | p-value | Control mean | Normalized diff. | p-value | Control mean | Normalized diff. | p-value |
| Head: female | 0.069 | 0.139 | -0.160 | 0.056 | 0.062 | 0.021 | 0.851 | 0.118 | -0.117 | 0.276 |
| Head: age | 46.126 | 45.957 | 0.011 | 0.893 | 46.160 | -0.003 | 0.979 | 47.000 | -0.066 | 0.542 |
| Head: primary education | 0.448 | 0.383 | 0.093 | 0.301 | 0.432 | 0.023 | 0.834 | 0.400 | 0.069 | 0.525 |
| Head: secondary education | 0.103 | 0.206 | -0.197 | 0.018 | 0.086 | 0.041 | 0.708 | 0.082 | 0.051 | 0.636 |
| No. observations | 87 | 209 | | | 81 | | | 85 | | |

*Notes:* Normalized difference is the difference in means scaled by the square root of the average of the two within-group variances. p-values for the t-statistic for the test of equal means are shown. All covariates except for age are dummies. Matching is done among households within villages for household matching and among adults within villages for adult matching (see the text and Appendix E for matching designs).

## Figure A-5. Distribution: age of household heads




*Notes:* These are the kernel density estimates. The sample is the household analysis sample. The bandwidth for the Epanechnikov kernel is 0.5. Matching is done among households or adults within villages (see the text and Appendix E for matching designs).

## Table A-25. Covariate balance - households with children

| | Treatment mean | Analysis sample: Control mean | Analysis sample: Normalized diff. | Analysis sample: p-value | Within-village hhld matching: Control mean | Within-village hhld matching: Normalized diff. | Within-village hhld matching: p-value | Within-village adult matching: Control mean | Within-village adult matching: Normalized diff. | Within-village adult matching: p-value |
|---|---|---|---|---|---|---|---|---|---|---|
| **A. Households with children (age 6-19)** | | | | | | | | | | |
| Head: female | 0.061 | 0.113 | -0.130 | 0.205 | 0.067 | -0.017 | 0.891 | 0.075 | -0.039 | 0.750 |
| Head: age | 46.788 | 46.242 | 0.045 | 0.646 | 45.333 | 0.152 | 0.228 | 45.582 | 0.113 | 0.357 |
| Head: primary education | 0.485 | 0.387 | 0.138 | 0.199 | 0.433 | 0.072 | 0.566 | 0.433 | 0.073 | 0.551 |
| Head: secondary education | 0.091 | 0.226 | -0.256 | 0.010 | 0.100 | -0.022 | 0.864 | 0.090 | 0.003 | 0.978 |
| No. observations | 66 | 124 | | | 60 | | | 67 | | |
| **B. Households with children (age 12-19)** | | | | | | | | | | |
| Head: female | 0.074 | 0.111 | -0.089 | 0.463 | 0.102 | -0.069 | 0.622 | 0.118 | -0.103 | 0.455 |
| Head: age | 46.630 | 48.654 | -0.173 | 0.134 | 47.653 | -0.112 | 0.423 | 48.490 | -0.172 | 0.211 |
| Head: primary education | 0.463 | 0.370 | 0.131 | 0.290 | 0.347 | 0.164 | 0.234 | 0.373 | 0.128 | 0.352 |
| Head: secondary education | 0.074 | 0.198 | -0.249 | 0.033 | 0.061 | 0.036 | 0.797 | 0.078 | -0.011 | 0.934 |
| No. observations | 54 | 81 | | | 49 | | | 51 | | |
| **C. Households with children (age 10-19)** | | | | | | | | | | |
| Head: female | 0.065 | 0.096 | -0.082 | 0.461 | 0.054 | 0.033 | 0.803 | 0.085 | -0.054 | 0.676 |
| Head: age | 46.790 | 47.394 | -0.052 | 0.617 | 46.000 | 0.083 | 0.528 | 46.458 | 0.031 | 0.808 |
| Head: primary education | 0.484 | 0.413 | 0.099 | 0.381 | 0.429 | 0.078 | 0.551 | 0.441 | 0.061 | 0.637 |
| Head: secondary education | 0.081 | 0.192 | -0.226 | 0.034 | 0.054 | 0.076 | 0.559 | 0.085 | -0.010 | 0.935 |
| No. observations | 62 | 104 | | | 56 | | | 59 | | |

*Notes:* Normalized difference is the difference in means scaled by the square root of the average of the two within-group variances. p-values for the t-statistic for the test of equal means are shown. All covariates except for age are dummies. Matching is done among households or adults within villages (see Appendix E and the text for matching designs).