Watch Your Step: The Economic and Behavioral Responses of Rural Households to Landmines During Conflict *

Felipe Parra Sakina Shibuya

November 14, 2025

Abstract

Anti-personnel landmines instill fear in people living in contaminated areas, disrupting economic activity and altering household decision-making. Using geocoded household panel data and administrative records of landmine events in Colombia, we estimate how recent landmine contamination influences labor allocation and healthcare use. We find that landmine exposure leads households to shift from more stable agricultural jobs to lower-paid, higher-risk jornalero labor, while reducing work on their own farms. These shifts are not uniform. Individuals in non-landowning households, who likely face tighter liquidity constraints, work 133% more hours in high-risk agricultural jobs following exposure, while landowners reduce their engagement by 58%. We also find that landmine exposure reduces adults' use of formal healthcare and increases reliance on alternative medicine, particularly among non-landowning households. Our findings reveal that landmine contamination imposes substantial economic and health costs on civilians beyond its immediate physical harm, and that these burdens fall unevenly across households with different levels of wealth.

*Parra (corresponding author): Brown University (freddy_felipe_parra_escobar@brown.edu). Shibuya: University of Tokyo Economic Consulting (sakina@utecon.net). We are deeply grateful to Laura Schechter for her invaluable guidance and support. We thank Paul Castañeda Dower, Soeren J. Henn, Priya Mukherjee, Fernanda Rojas-Ampuero, Emilia Tjernström, Santiago Tobón, and Eleanor Wiseman for insightful comments. Our appreciation extends to the Department of Economics' Data Center at Universidad de los Andes for providing access to the ELCA restricted data. This research was supported by grants from UW-Madison's AAE department and the Graduate School.

1 Introduction

Anti-personnel landmines, widely deployed in conflicts due to their low cost and ease of production, pose a grave threat to civilians that extends far beyond their military purpose. In 2022, landmine contamination affected at least 60 countries, with civilians accounting for approximately 85% of victims (International Campaign to Ban Landmines, 2023). Colombia exemplifies this crisis, having endured over 30 years of contamination amid a six-decade conflict, where 61% of the 12,000 documented victims were civilians (United Nations Mine Action Service, 2022). Beyond direct casualties, landmines reshape rural livelihoods by instilling fear and restricting mobility. Uncertainty about their locations confines individuals to their immediate surroundings, limiting access to farmland, hunting and fishing areas, schools, and health clinics – threatening not only food security and economic production but also access to essential services (Commission for Truth, 2022). Yet, little is known about how households adapt their livelihood strategies and healthcare access in response to these security threats while continuing to live in affected areas.

This paper examines how landmine exposure affects rural households' labor allocation and healthcare utilization amid ongoing conflict in Colombia. Our analysis focuses on three key dimensions. First, we assess how landmines influence labor allocation across income-generating activities with varying levels of exposure risk. Specifically, we distinguish between agricultural day labor (*jornalero*), agricultural non-jornalero, and non-agricultural non-jornalero jobs.[1] Agricultural work, particularly jornalero and agricultural non-jornalero jobs, carries a higher risk of landmine exposure because it requires working in fields, whereas non-agricultural non-jornalero jobs, such as processing harvested corn and selling tortillas from home, carry lower risk.

Second, we investigate why some farmers reduce engagement in risky work while others increase it, examining heterogeneity by land ownership, an important determinant of borrowing capacity and, consequently, risk tolerance. Finally, we explore the impact of landmine exposure on preventive healthcare utilization, an important outcome given that formal healthcare services are often distant and difficult to access for rural residents in Colombia (Ivarsson, Canon-Rubiano and Murgui Maties, 2023). By integrating these dimensions, our study provides a comprehensive perspective on how conflict-related hazards reshape economic behavior and access to essential services in rural areas.

To estimate the causal effect of landmine exposure, we address the identification challenge

[1]Jornaleros are individuals who work directly in agricultural production, typically paid a fixed amount or piece rate. These jobs generally offer lower wages and less stability compared to non-jornalero jobs. Agricultural non-jornalero positions may include roles such as a farm manager on a relatively large farm, responsible for maintaining the land and organizing workers.

posed by the geographical and temporal endogeneity of landmine events. To account for pre-existing exposure and conflict dynamics, we include individual and year fixed effects. Additionally, we incorporate baseline municipality characteristics interacted with year fixed effects to control for region- and time-varying conflict dynamics. Lastly, to address concerns about selective migration, we restrict our sample to households that remained in the same municipality across all three survey rounds.[2] This ensures that our analysis captures how households who stay in conflict-affected areas adapt to landmine exposure.

We use restricted spatial data from the Colombian Longitudinal Survey, collected every three years from 2010 to 2016. The survey includes households from regions in Colombia with varying levels of conflict intensity prior to the signing of the 2016 peace agreement, allowing us to capture household behavior in a period when non-state armed actors were continuously installing landmines. We combine this data with publicly available administrative records of landmine events dating back to 1990. The precise location and date of each landmine event enable us to determine whether these incidents occurred near a household's residence before the survey was administered.

Surprisingly, we find that farming households increase engagement in jornalero work (agricultural day labor) while reducing participation in more stable non-jornalero agricultural work following recent landmine exposure. This shift suggests that, rather than avoiding all agricultural labor, households may reallocate toward more flexible or short-term arrangements. We also find evidence that households reduce work on their own farms. These patterns are counterintuitive, as one might expect landmine contamination to reduce outdoor work across the board, particularly in agriculture, where risk of landmine exposure is high.

To understand these seemingly contradictory results, we examine heterogeneity along two key dimensions: prior exposure to landmine events and land ownership. Individuals with prior exposure may respond differently to new landmine events, potentially because they are more accustomed to risk or because they have updated beliefs about the likelihood of harm. Land ownership, in turn, is closely tied to financial security and borrowing capacity, which may influence households' ability to absorb shocks and avoid the most hazardous forms of work. In the next section, we explore how these factors shape labor allocation decisions in the aftermath of landmine contamination.

We find that individuals without prior landmine exposure adjust their labor allocation more sharply in response to new landmine events. In the immediate aftermath, they reduce

[2]We test whether exposure to landmines affects the likelihood of individuals remaining in the final analysis sample. Across survey years, we find no statistically significant effect of recent landmine exposure on sample inclusion.

participation in non-jornalero agricultural work. In contrast, those with previous exposure show more muted responses, with statistically significant reductions observed only in own-farm labor. Interestingly, both groups increase their reliance on hired labor for agricultural work on their own farms.

We find that households without land reduce participation in non-jornalero agricultural work and shift toward jornalero jobs, while landowning households reduce participation in non-jornalero work but do not take on more jornalero labor. These contrasting responses suggest that landowners may be better able to avoid high-risk employment. Further analysis using household member-level time-use data reveals that individuals in landowning households work 58% (2 hours) *fewer* hours in non-jornalero agricultural jobs, while those in non-landowning households work 133% (5 hours) *more* in the same type of work.

Our analysis reveals that landowning households seem to mitigate landmine exposure by reducing agricultural work altogether, while non-landowning households increase their participation in agricultural labor, both on and off their own farms. We consider two possible mechanisms driving this behavior. First, non-landowning households may turn to agricultural labor as a coping strategy to offset lost non-agricultural income following landmine exposure. Our data confirms that landmine events reduce non-agricultural earnings for these households, though it remains unclear whether this results from reallocating labor out of necessity or due to changed preference. Second, rural labor shortages caused by conflict may have driven up agricultural wages, incentivizing non-landowning households to take on more farm work. However, due to limited rural labor market data and household job preference information, we cannot fully test this hypothesis. While our study provides evidence on these mechanisms, future research could address them more directly through targeted data collection efforts.

The impact of landmine exposure extends beyond economic decisions, shaping access to essential services like healthcare. Just as landmines constrain movement for work, landmines can restrict access to medical care. In fact, we find that adults are 12% (8 percentage points) less likely to visit a formal medical facility without being sick soon after landmine events. In contrast, they are 60% (2 percentage points) more likely to seek alternative medicine, likely due to its closer proximity and lower transportation costs. A similar pattern emerges for children's healthcare: children exposed to landmines are 28% less likely to visit a dentist.

Taken together, these findings highlight the complex trade-offs households make in response to landmine exposure. Households that own land and have the financial capacity to absorb income losses appear to reduce risky agricultural work to avoid potential harm. In contrast, non-landowning households actually increase their engagement in riskier farm labor, although our data do not allow us to determine whether this shift is driven by neces-

sity, changing economic incentives, or other unobserved factors. Meanwhile, our healthcare findings provide further evidence that landmine exposure restricts mobility, as affected households become less likely to seek preventive care. This suggests that the economic disruptions caused by landmines are not just about labor reallocation but also about broader constraints on movement, which limit access to essential services and may contribute to worsening overall well-being.

This paper makes three key contributions. First, we fill an important gap in the landmine literature by providing rigorous evidence on the contemporaneous effects of landmine exposure. Much of the existing research has focused on the long-term consequences of landmines (Merrouche, 2008, 2011; Takasaki, 2020; Lekfuangfu, 2022), with some notable exceptions (Camacho, 2008; Arcand, Rodella-Boitreaud and Rieger, 2015; Vargas et al., 2024). Among these, Camacho (2008) is particularly relevant, examining the in utero impact of landmine explosions on child birth weight in Colombia and finding that maternal stress from exposure negatively affects birth outcomes. While Camacho's study focuses on health at birth, our research investigates landmine exposure's effects on household labor allocation and healthcare-seeking behavior. Similarly, Vargas et al. (2024) explores how landmine explosions near polling stations affect voter turnout in Colombia. Our work extends this approach by analyzing landmine exposure's effects on economic decisions and healthcare access, broadening our understanding of how landmines shape behavior in the short term.

Second, we contribute to the literature on the local economic effects of demining campaigns (Chiovelli, Papaioannou and Michalopoulos, 2024; Prem, Purroy and Vargas, 2024). While these studies use geocoded data to analyze how demining affects outcomes like nightlight intensity, standardized test scores, and deforestation, they do not examine how individuals respond to landmine contamination itself. Our study complements this research by focusing on household-level behavioral adjustments to landmine exposure, shedding light on the microeconomic mechanisms behind the broader trends identified in demining studies.

Finally, we contribute to the literature on violent shocks by estimating the effects of landmine exposure with greater granularity and precision than previous studies (Verpoorten, 2009; Besley and Mueller, 2012; Bove and Gavrilova, 2014; Brown and Velásquez, 2017; Rockmore, 2017; Arias, Ibáñez and Zambrano, 2019; Brück, Di Maio and Miaari, 2019; Brown et al., 2019; Adelaja and George, 2019). Two notable exceptions are Callen et al. (2014) and Blumenstock et al. (2024), who use geocoded data on violent events to study the effects of conflict on risk preferences and mobile money use in Afghanistan. We extend this approach by integrating high-resolution household location data from the Colombian Longitudinal Survey (2010, 2013, and 2016)[3] with administrative records of landmine events

[3]Access to household location data is restricted and requires a permit.

dating back to 1990. By leveraging precise location and timing of each landmine incident, our study provides novel insights into how individuals and households adapt their labor and healthcare decisions in response to localized security threats.

The rest of the paper is organized as follows. Section 2 provides context on the Colombian armed conflict and the strategic use of landmines by armed actors. Section 3 presents a conceptual framework to understand how farmers respond to landmine exposure. Section 4 discusses the empirical strategy, including data sources, landmine event records, and the identification approach used to estimate the effects of landmines on rural households' behavior. Section 5 presents the main findings and explores potential mechanisms driving these effects. Finally, Section 6 summarizes the results and discusses their broader implications.

2 Background

Before we proceed further into our analysis, we provide more contextual information about Colombia's conflict and landmines.

2.1 Colombian armed conflict

Colombia has been in one of the world's longest armed conflicts since the mid-1960s. This long-standing, low-intensity conflict involves the Colombian state and various insurgency groups, some of which have roots in peasant uprisings at the beginning of the conflict, though today entangled with drug production and trafficking and terrorism. The war is extremely violent and chaotic, involving not only fights between the states and guerrilla groups, but also conflicts among various insurgent groups (Sweig, 2002). It is estimated that at least 220,000 people were killed between 1958 and 2012, of which 80% is civilian (Centro Nacional de Memoria Histórica, 2016). While the Colombian government and the Revolutionary Armed Forces of Colombia (FARC, by its Spanish acronym), a major insurgency group, have reached a peace agreement in 2016, the conflict persists.

2.2 Use of improvised landmines

Although the conflict in Colombia has lasted for over half a century, the widespread use of improvised antipersonnel landmines is a relatively recent development, beginning in the 1990s. Figure 1 illustrates the trends in landmine explosions and military demining operations since 1990. Guerrilla groups significantly escalated their use of handmade landmines by the late 1990s, as reflected in the sharp rise in explosions. In the mid-2000s, the Colombian Army improved its capacity to detect and remove landmines with the establishment of

Explosions and Demolitions Groups (EXDE, in Spanish), leading to a decline in landmine explosions and an increase in mines removed during military operations. Insurgent groups continued installing these devices until 2013, when peace negotiations with the government started.

There are two main non-governmental militia groups that used these inexpensive explosive devices: FARC and the National Liberation Army (ELN) (Centro Nacional de Memoria Histórica, 2016). These insurgency groups used hand-made landmines to compensate for the lack of military capacities relative to the government forces, and curb the advancement of their opponents.

Improvised landmines that these groups used were easy and inexpensive to produce, and very difficult to detect. Figure 2 provides examples of improvised anti-personnel landmines typically used by insurgency groups. Such landmines can be made with common household materials such as plastic soda bottles that can easily be found even in a very remote area of the country. One estimate suggests that such landmines can be produced and laid for USD 3 to 30 (ReliefWeb, 2001).

Landmines are incredibly difficult to find once they are installed. They contain minimal metals, which make it extremely hard to locate with metal detectors which is a common tool used for landmine identification (ReliefWeb, 2017). While landmines are commonly placed underground, they are sometimes installed on trees in order to affect different parts of the body.

2.3 Placement of landmines

Learning about the purpose and strategies of landmine installation gives us a sense of the proximity to landmines with which rural Colombian households have lived, even though landmines were not installed to harm civilians, rather to slow down the Colombian military advancement. As such, landmines were manufactured so that they would severely injure members of the military in lieu of killing them. By injuring soldiers rather than killing them, insurgency groups can increase the high cost of the war, for the government would have to take care of landmine-affected soldiers, who are often severely mutilated and require long-term support. Landmines also exerted an enormous moral and psychological effect on the official forces.

To obstruct the State's military advancement into their territories in rural Colombia, guerrillas installed landmines in footpaths, near their valuable assets including coca fields, and near camps (Centro Nacional de Memoria Histórica, 2016, 2017). In rural Colombia where vegetation is thick and the availability of walking paths is limited, footpaths that

state soldiers use are often those villagers use. These roads pass next to farming plots (lower photo in Figure 2), where some households also have their residences. Guerrillas also often use local schools for meetings and resting at night, as school buildings are often the only large structures in rural villages.

Insurgents kept track of the exact locations of landmines that they installed in order to avoid injuring their own members (Centro Nacional de Memoria Histórica, 2017). Such knowledge was kept in secret for obvious military strategic reasons; however, guerrillas have occasionally told villagers approximate landmine locations. Villagers often found such knowledge inadequate, because keeping one safe requires exact locations, and only knowing approximate location makes the whole area unusable, thus unproductive (Monitor and Cluster, 2018).

2.4 Military demining operations

Given the significant harm caused by landmines on military operations, official forces developed methods to protect troops from stepping on them. One such method involved assigning a team of five soldiers who were trained in mine removal to accompany each squad. These teams, known as Explosives and Demolition Groups (EXDE), were equipped with dogs and metal detectors to locate and remove mines.

The procedure for detecting and removing mines used by the EXDE group was as follows: when the group suspected the presence of a minefield, they would first use a trained dog to locate potential mines. The locations identified by the dog were then confirmed using a metal detector. Any mines found were either removed or detonated safely. The EXDE group also recorded the coordinates of each mine's location and the number of mines removed or destroyed.

Insurgent groups employed tactics to evade detection by demining efforts, such as masking the scent of explosive substances with coffee, and avoiding the use of metallic materials. This can be seen in the increase of demining operations during military actions following the planting of mines by guerrillas in the late 1990s, peaking around 2013. However, after 2015, there was a significant decrease in military demining operations as humanitarian demining efforts increased following the conclusion of peace talks.

The peace agreement signed between the Colombian government and FARC marks a new period in terms of the use of landmines. While the agreement led to the bilateral and definite ceasefire, and ended the use of landmines by FARC, it also included the disclosure of existing landmine locations to the Colombian government, which then provided the information to humanitarian demining operators among others. Villagers were gradually informed of exact

landmine locations after the historic peace agreement. Thus, this study focuses on the period before 2016, as it investigates the role of uncertainty around landmine locations.

2.5 Influence of landmines on rural households' livelihoods

Given that insurgent groups tend to place landmines in areas commonly used by rural households, the presence of these devices may significantly alter household behavior, as individuals seek to avoid encountering them. Testimonies from rural Colombians offer qualitative evidence of behavioral changes resulting from the threat of landmines.

As discussed earlier, households in conflict-affected areas often lack precise information about landmine locations. Instead, individuals update their beliefs about the presence of landmines based on nearby incidents. This dynamic is captured in the words of a woman from rural Colombia: "I cannot shake off the fear that I might step on something or hear another explosion. That fear does not go away; I never leave the path, but you still live with the fear that you might have stepped off by accident" (Centro Nacional de Memoria Histórica, 2017, p. 135). People also use other conflict-related events to form expectations about landmine contamination. For example, a landmine survivor explains: "You are practically never at ease because in an area like this, the Army and the guerrilla pass through, so you cannot feel calm since the guerrilla lays their mines, and how is one supposed to know where they put them? You are always left in doubt" (Centro Nacional de Memoria Histórica, 2017, p. 136). The lack of reliable information about landmine locations amplifies their disruptive impact, forcing households to adapt their daily activities to minimize risk.

Rural households report that certain activities—especially agricultural work—become particularly hazardous in the presence of landmines. A female farmer, whose husband was injured by a landmine, recounts: "When he stepped on that mine, he was alone (...) he had gone to burn a clearing to plant cassava and plantain, and just as he was arriving at the clearing on horseback, there was an explosion. I had a feeling it was my husband" (Centro Nacional de Memoria Histórica, 2017, p. 131). The threat of landmines also deters labor outside the households' farms. As one male agricultural worker explains: "Back where we used to live, whenever there was work to clear brush or cut grass, no one would go because you would end up finding a landmine" (Centro Nacional de Memoria Histórica, 2017, p. 134). These testimonies suggest that households reallocate labor away from riskier tasks, potentially reducing income and worsening their economic well-being.

The impact of landmines extends beyond labor allocation to other activities that require leaving home. One testimony illustrates this shift in daily habits: "Yes, habits have changed; we usually stick to the road or a path, we try not to stray from it, bring our own water, try

to use the bathroom before or after, and those outings... those trips, those routines, they do not really happen anymore" (Centro Nacional de Memoria Histórica, 2017, p. 135). As this suggests, landmine contamination may reduce the frequency of activities that involve leaving the home, such as accessing healthcare, attending school, among others.

Together, these testimonies illustrate how rural households adjust their behavior in response to the presence of landmines—by reallocating labor and reducing activities that require movement outside the home. In the following sections, we provide empirical evidence to further examine and support these claims.

3 Conceptual Framework

Landmines pose a severe threat to life, instilling fear in individuals exposed to them and discouraging participation in activities that may increase the likelihood of encountering these devices. Armed actors typically place landmines on agricultural land, walking paths, and next to roads, making activities such as working on fields and commuting potentially hazardous. As a result, in response to new landmine events, individuals may avoid activities like agricultural labor—whether on their own fields or on other households' farms—as well as any tasks requiring them to leave their home.

Our argument is based on the idea that individuals form beliefs about landmine contamination in the areas where they live, as they lack precise knowledge of the locations where non-state armed actors have installed these devices. This belief is represented as a subjective probability of encountering landmines during daily activities. An individual's subjective probability depends on their past exposure to landmine events: those previously exposed are likely to believe that similar incidents will continue to occur nearby, while individuals without past exposure may consider future events less likely in their vicinity. Consequently, individuals adjust their beliefs about landmine presence upwards after witnessing a new event. Over time, however, if no new events occur, the subjective probability declines as individuals become accustomed to living among these devices.

Consequently, individuals adjust their behavior in response to recent landmine events in three key ways. First, they tend to avoid agricultural labor—whether on their own farms or elsewhere—as well as non-agricultural work conducted outside their home, as non-state armed actors frequently place landmines in fields, along walking paths, and near roads. This avoidance mechanically leads to a decline in labor income. Second, exposed households may opt to hire agricultural workers for their plots, reducing their own involvement in farm labor while maintaining agricultural production levels. Third, individuals avoid activities that require leaving home, such as seeking healthcare, due to the need to travel to health centers,

which are typically located in urban areas.

However, responses to landmine events may differ for those facing liquidity constraints. Liquidity-constrained individuals cannot afford to reduce labor activities after landmine events without lowering their consumption. Consequently, they may need to maintain or even increase participation in risky labor activities if their income from other sources declines. Specifically, liquidity-constrained individuals might continue working—or increase their work—in both agricultural jobs and non-agricultural occupations outside home, despite the associated risks. For instance, households might experience reduced income following landmine events, which could lead to a drop in local demand for goods and services. Individuals employed in these sectors may then supply less labor to these economic activities and seek work in areas with higher demand. One such option is agricultural labor, as neighboring farmers affected by landmines may prefer to hire external labor to replace their own in their fields.

Individuals' responses to new landmine events may also differ based on their prior exposure to such incidents. On one hand, those with past exposure may not significantly alter their behavior in response to new events, as they have adapted to living amid these devices. Having experienced landmine events in the past, they consider future incidents likely to occur and may have learned which actions to take to avoid landmines. On the other hand, individuals without previous exposure may react differently to new landmine events. Since they perceive such events as unlikely, they may lack strategies to navigate these risks while conducting their daily activities. Consequently, those without prior exposure may avoid activities that would increase their chances of encountering landmines after a new event occurs.

Predictions

Our framework suggests several predictions that we test empirically. First, in the absence of liquidity constraints, individuals are expected to respond to new landmine events by reducing both agricultural labor—whether on their own farm or on others'—and non-agricultural labor conducted outside home. As a result, households are likely to increase their hiring of agricultural workers, substituting their own labor with external labor. Similarly, following landmine events, individuals tend to avoid seeking healthcare, particularly when medical facilities are located far from their home and require travel.

Second, liquidity-constrained individuals may instead continue working in both agricultural jobs and non-agricultural occupations outside their home. They may even increase their participation in these jobs if they experience a reduction in income from other sources.

Third, individuals without previous exposure to landmines are expected to respond to new events by reducing both agricultural and non-agricultural labor conducted outside home.

Conversely, individuals with prior exposure to landmines are predicted not to adjust their behavior in response to new landmine events.

4 Empirical Strategy

4.1 Data

To estimate the effects of landmine presence on farmers' behavior, we combine the administrative data on landmine explosions and military demining operations, and the longitudinal data from a survey that tracks households in rural Colombia.

Landmine Related Events Data

The data on landmine explosions and military demining operations used in this study was obtained from the Office of the High Commissioner for Peace (OACP). The dataset spans from 1990 to the present and includes information on the date, location, and number of civilian and military casualties for landmine explosions, as well as the number of ordnance removed or destroyed during military demining operations.

The OACP has been recording both landmine accidents and incidents[4] in the Information Management System for Mine Action (IMSMA) daily since 2002, which is the United Nations' preferred information system for managing data in UN-supported programs. Most information is sourced from local authorities, the national civil defense, national park rangers, and the armed forces. The agency also conducts interviews with survivors and affected civilians to supplement the data. For the period from 1990 to 2001, the OACP established a baseline using information from both government and non-government sources, such as newspapers and mass media. Additionally, IMSMA logs details on all demining operations conducted by the Army during this time.

The data includes the latitude and longitude coordinates for each event. The coordinates of military demining events are accurate as they were taken with GPS devices. However, the coordinates for explosions do not always correspond to the exact locations where the events occurred. Some explosions are recorded in the OACP dataset because of reported by victims or unharmed civilians. In such cases, the coordinates were often approximated to the township of the municipality where the incident occurred, as the exact location was not always known. This may pose a problem, as events approximated to the municipality's

[4]Landmine accidents are undesired events which results in harm, whereas a landmine incident is an event that gives rise to an accident or has the potential to lead to an accident.

township can introduce measurement error. Households close to townships could be mistakenly considered affected by landmines, whereas some households exposed to landmine events could be treated as unexposed.

We conclude that the concern for measurement error is small. Figure 3 illustrates the number of landmine-related events recorded by the method of location recording in the municipalities where the surveyed households reside, as well as in the neighboring municipalities. The graph shows that, for the analysis period, we know the exact location of the majority of events.

Household Panel Data

The Longitudinal Survey of Colombia (ELCA) is a study that tracks households and individuals over time, collecting data in 2010, 2013, and 2016. The survey is representative of urban areas in Colombia and representative of four specific micro-regions of the country at the rural level. ELCA originally targeted 4,578 rural households, comprising 8,365 adults (i.e., household heads and their spouses) and 4,411 children under nine years old. The original rural sample was located in 224 villages (*veredas* in Spanish), across 17 municipalities. The data includes household and individual characteristics, including access to and use of medical services, land ownership and use, hours spent on agricultural tasks on family and non-family farms, hours spent on non-agricultural wage labor, and crop choices. ELCA contains household GPS locations which can be accessed with permission on a secure server and dates when the surveys were administered.

We conduct the empirical analysis on a balanced panel of households who stayed in the rural area of the same municipality for all three rounds. Additionally, we exclude households where the household head changed due to the household splitting between rounds, but keep households where the household head remained the same even if the household split. Moreover, we remove from the analysis households with no follow-up subjects in all three rounds. We conclude with a sample of 3,215 households, accounting for 5,518 adults. For the children's sample, we consider individuals who appear in at least two consecutive rounds, resulting in a sample of 2,888 children from 1,763 households.

Individuals may migrate or leave the sample due to violence, particularly in response to the presence of landmines. We test this possibility by examining whether prior exposure to landmine events predicts an individual's likelihood of remaining in the sample used for the econometric analysis. Specifically, we estimate a model where the outcome variable is an indicator of whether an individual appears in both (i) 2010 and 2013, (ii) 2010 and 2016, and (iii) 2013 and 2016. The key independent variable is an indicator of whether at least one landmine event occurred within 5 km of an individual's residence in the three

years preceding the survey interview. All specifications control for age, years of education, gender, and municipality fixed effects. Table 1 presents the results. Our findings indicate that exposure to nearby landmine events prior to the survey does not significantly predict migration and/or sample attrition.

Treatment Variable Construction

We combine the household GPS coordinates with the locations of landmine-related events to identify which households were exposed during different time windows. To do so, we first construct a 5 km-radius buffer centered at the residence of each household in ELCA. We then indicate if there is any landmine event within the buffer which took place before the household was interviewed. For all three rounds, the surveys were administered between March and July, which coincided with the first planting season of the year from February to May. Based on this timeline, we define four different time windows.

Figure 4 illustrates the four treatment windows overlaid with the calendar months. First, we define the pre-survey window, which extends from March 1 to the date of the survey interview, varying by household. Next, we establish two periods during which households make most of their planting decisions. *Pre-planting window 1* spans from September of the year before the household is surveyed to February of the survey year, while *pre-planting window 2* covers the period from March to August of the same year. Finally, *history window* extends from February of the year preceding the survey to March three years before the household's survey interview. Any landmine events occurring within this timeframe are considered part of the household's historical exposure.

Table 2 presents the proportion of individuals in our sample who were exposed to landmine events across all four time windows, as well as from 2002 until 36 months before the start of the planting season. The regions surveyed by ELCA were not as heavily affected by landmines as other parts of the country. In our individual analysis sample, 13% of individuals experienced at least one landmine event either in the six months or in the 12 to 36 months prior to the planting season. Most of these incidents occurred in 2010, a period when conflict intensity in Colombia remained high. However, landmine exposure declined after peace talks began in 2012, a period marked by a de-escalation of violence. Therefore, our findings provide insights into how individuals respond to landmine exposure in contexts of medium- or low-intensity conflict and should be interpreted with caution when extrapolating to high-intensity conflict settings.

Outcome Variable Construction

We investigate the effect of landmine exposure on farmers' labor market decisions and health-care seeking for preventative reasons. We use the ELCA data to construct the relevant outcome variables.

We begin by providing a brief description of the individuals in our sample. Table 3 presents descriptive statistics for the final sample in 2010. On average, individuals are 45 years old, indicating a middle-aged population. Additionally, the sample has relatively low educational attainment, with an average of four years of schooling—less than a complete primary education. The sample is evenly distributed between males and females. Additionally, most households are smallholders, with an average landholding of two hectares. Approximately one-third of individuals in the sample own their farmland.

To examine the impact of landmine events on labor market outcomes, we construct five different measures. First, we assess whether farmers worked outside their farm in the past week. Specifically, we consider jobs in the private and public sector, agricultural day labor (*jornaleros*), domestic work, and self-employment. We then consider two categories based on this outcome: whether farmers work as (1) *jornaleros* or (2) any other job. Notice that these categories are non-mutually exclusive as a farmer can be a *jornalero* and also work in a different job. Additionally, we also know the number of hours per week farmers work in non-*jornalero* jobs. Finally, we explore whether households hire agricultural workers in the past 12 months.

We observe that, in 2010, one-third of the adults in our sample worked outside their own farms. Among off own farm occupations, jornalero jobs were the most common, with 22% of individuals engaged in this type of work, while only 16% were employed in non-jornalero jobs. Additionally, labor hiring was relatively common, as 36% of households hired jornaleros to work on their fields.

In addition to these outcomes, we also analyze how exposure to landmines impacts income derived from these labor sources. We calculate the income earned by each farmer in all jobs conducted outside the household's farms in the past month. To do this, we first add the income received in all non-*jornalero* jobs, which is reported by the respondents in the survey. We then calculate the income received from *jornalero* jobs. In 2013 and 2016, respondents reported how much they earned working in this type of job, so we sum these amounts. However, in 2010, farmers only reported how many days per month they worked as *jornaleros*. In this case, we use the daily wage paid to *jornaleros* in the village from the community survey and multiply it by the number of days each farmer worked in this type of

job in the month before being surveyed[5].

We also construct distinct measures using ELCA's land and agricultural production module. First, we identify land ownership by looking at farmers' response to whether they claim ownership, either formal or informal, to at least one plot. We then determine whether households have access to land; in addition to ownership of a plot, we consider households with renting or sharecropping agreements to have access to land. We also examine the amount of land farmers allocate to agricultural production. Specifically, we categorize this into four different types: land cultivated with perennial crops, seasonal crops, or mixed crops (i.e., a combination of perennial and seasonal crops within the same portion of land), and land devoted to livestock raising. Additionally, we create two broader categories of land use: land devoted to agricultural production, which encompasses all four categories previously listed, and land allocated to cultivation, which includes only the land with perennial, seasonal, and mixed crops.

We also use information from ELCA's time use module to examine how much time farmers spend working in agricultural jobs in their fields. Specifically, we calculate the time each farmer allocates to this activity from the time they wake up until they retire for the night in a typical day of the week prior to being surveyed. Given the substantial number of zeros, we construct four binary variables to indicate whether farmers spent more time than some predetermined thresholds.

Finally, we examine some activities farmers typically conduct outside their farms and home. One such activity is seeking for healthcare, which usually makes farmers leave their farms and travel to the closest town. We identify if farmers visited a medical professional over the past 12 months without being sick and for preventative reasons. We look at five different medical professionals for household heads and their spouses: general practitioner or any specialist (e.g., gynecologist, urologist, cardiologist, etc.), dentist, optometrist, family planning services, and alternative medicine (e.g., homeopaths, acupuncturist, etc.). Similarly, we also identify if children 0 to 9 years old in 2010 seek medical assistance for preventative care in the past 12 months. We consider the same categories as for adults, with the exception of family planning services, and we include visits to pediatricians.

Preventative healthcare-seeking is common among farmers; in 2010, 61% of individuals in the sample visited a medical professional—excluding those specializing in alternative medicine—within the past 12 months. The most frequently consulted providers were general practitioners (60%), followed by dentists (40%) and optometrists (13%). In contrast,

[5]The ELCA community survey was not completed in 24 out of the 224 villages in 2010. For these villages, we substituted the missing daily wage data for *jornaleros* with the average wage from other villages within the same municipality.

visits to alternative and traditional medical providers were rare, with only 1% of the sample seeking this type of care. Among children, healthcare-seeking was even more prevalent, with 83% visiting a medical professional (excluding alternative medicine providers) in the past year. Most children consulted general practitioners or specialists (76%), followed by dentists (58%), pediatricians (23%), and optometrists (13%).

4.2 Main Identification Strategy

The main identification threat in estimating the effect of landmines on economic activities of rural Colombian households is the potential correlation between conflict intensity and landmine installation. Non-state armed actors installed landmines to attack official forces and to protect strongholds and strategic assets, such as camps and coca fields. Therefore, the timing and location of landmine placement are endogenous to the characteristics of households and individuals inhabiting in these areas.

To address this endogeneity concern, we exploit the longitudinal nature of the ELCA household survey and incorporate a rich set of fixed effects in our analysis. First, we include individual fixed effects to account for time-invariant farmer characteristics, such as the initial level of landmine contamination around their residence and their prior beliefs about landmine presence. Second, we incorporate year fixed effects to account for nationwide policy changes and economic trends. However, year fixed effects do not capture region-specific changes in conflict dynamics, which tend to be very common in the Colombian context. To address this, we include interactions between a set of 2005 municipality characteristics and indicators for each round of the household survey. These baseline characteristics include population density, distance to the department's capital, average altitude, homicide rate per 100,000 inhabitants, and an indicator of whether landmine events occurred in the municipality between 1990 and 2005.

Our econometric model is specified as follows. Let y_{ihmt} be an outcome for individual i of household h residing in municipality m at year t; E^{S}_{hmt} be an indicator of whether household h had a landmine event between March 1 of year t and the date h was surveyed (*pre-survey window*); $E^{(0-6]}_{hmt}$ is an indicator of whether household h had a landmine event 0 to 6 months before March 1 of year t (*pre-planting window 1*); $E^{(6-12]}_{hmt}$ is an indicator of whether household h had a landmine event 6 to 12 months before March 1 of year t (*pre-planting window 2*); $E^{(12-36]}_{hmt}$ is an indicator of whether household h had a landmine 12 to 36 months before March 1 of year t (*history window*); ϕ_i and θ_t are individual and year fixed effects, respectively; $x_m \times \theta_t$ is an interaction term between a 2005-level municipality characteristic x_m and year fixed effects; and ε_{ihmt} is an error term. We estimate the following equation by OLS where

standard errors are clustered at the village level:

$$y_{ihmt} = \beta_1 E^S_{hmt} + \beta_2 E^{(0-6]}_{hmt} + \beta_3 E^{(6-12]}_{hmt} + \beta_4 E^{(12-36]}_{hmt} + \phi_i + \theta_t + \sum_{x_m \in X_m} (x_m \times \theta_t) + \varepsilon_{ihmt} \quad (1)$$

We cluster standard errors at the village level rather than at the individual level because, although we measure exposure at the individual level, landmine exposure tends to exhibit limited variation within villages. Table A1 presents (i) the proportion of villages with at least one individual recently exposed to landmines and (ii) the degree of within-village variation in exposure. Most villages in our sample report no landmine exposure during the analysis period. For example, even in the period of highest exposure—the six months before the 2010 planting season—only 14% of surveyed villages had at least one individual exposed to landmines. Moreover, among villages with at least one exposed individual, exposure is typically highly correlated within the village. In 2010, half of such villages had at least 65% of surveyed individuals experiencing a landmine event in the six months prior to the planting season. This concentration increases in later years: in 2013 and 2016, half of exposed villages had 94% and 100% of individuals exposed, respectively. These patterns indicate that landmine exposure is largely a village-level phenomenon, justifying the choice to cluster at that level. Nonetheless, some within-village variation remains, as there are cases where only a few households are exposed. Therefore, it remains worthwhile to analyze landmine exposure at the individual level.

For the household level analysis of agricultural labor hiring, we use household fixed effects instead of individual fixed effects, maintaining the village-level clustering standard errors.

5 Results

This section presents the results of our statistical analysis. First, we discuss the analysis regarding the effect of landmine events on labor allocation. We start by presenting the general results which show that an average farming household increases engagement in jornalero jobs (agricultural day labor), while decreasing working in more stable non-jornalero agricultural work. These results are counterintuitive given that one expects landmine exposure to reduce participation in any kind of agricultural work that requires working outside and poses higher risk of landmine exposure compared to non-agricultural work that is conducted indoor. To investigate this enigma, we explore the heterogeneity along previous landmine exposure and land ownership. Finally, we present the results on the effect of landmine exposure on adults' and children's usage of healthcare services.

5.1 Effects of Landmine Events on Labor Allocation

We begin by examining how recent landmine events affect individuals' participation in the labor market. Specifically, we estimate the effects of landmine exposure on four outcomes: (1) whether individuals worked outside their household's own agricultural fields in the past week, (2) whether they held jornalero jobs (typically short-term, daily agricultural labor), (3) whether they engaged in non-jornalero jobs, and (4) the number of hours worked in non-jornalero jobs per week. Because individuals can hold multiple roles at once, participation in jornalero and non-jornalero work is not mutually exclusive.

Table 4 presents the estimated effects of landmine exposure on labor allocation outcomes. We find no change in the overall likelihood of working outside one's own farm, but this masks offsetting patterns across job types. Individuals are 16% more likely to work in jornalero jobs (3.1 percentage points) following a landmine event in the six months prior to the planting season. At the same time, they are 16% less likely to engage in non-jornalero work (3.8 percentage points) and reduce hours in these jobs by 30% (2.7 hours). These negative effects appear to dissipate over time: 12–36 months after exposure, individuals are 19% more likely to work in non-jornalero jobs (4.5 percentage points) and increase hours worked by 21% (1.9 hours), suggesting partial recovery.

To better understand what type of work is being reduced, we use time-use data from 2013 and 2016 to disaggregate non-jornalero jobs into agricultural and non-agricultural activities.[6] Table 5 shows that the decline in non-jornalero work is concentrated in agriculture: individuals reduce hours worked in agricultural non-jornalero jobs by 54% (1.9 hours) after recent landmine exposure. In contrast, we find no significant change in hours spent in non-agricultural non-jornalero work. At the same time, individuals increase hours worked in jornalero jobs by 50% (3 hours). We also find that the recovery in non-jornalero work observed 12–36 months after exposure is driven primarily by a rebound in agricultural jobs.

We next ask whether these shifts are reflected in labor input on households' own farms. Table 6 shows that recently exposed individuals are less likely to work on their own plots and more likely to hire jornalero labor. Specifically, landmine events in the 0-6 and 6-12 months before the planting season reduce the probability of spending any time on own farm by 5.5 and 4.5 percentage points, respectively, representing declines of 12% and 11% relative to the mean. At the same time, individuals are 63% (21.2 percentage points) and 21% (7.2 percentage points) more likely to hire jornaleros in the pre-survey and 0-6 month windows,

[6]We restrict this analysis to the 2013 and 2016 survey rounds due to inconsistencies in how time-use questions were asked across waves. In those years, respondents reported the number of hours worked in the past week for each job and its associated economic activity. However, in 2010, the survey did not ask for the total number of hours worked outside their plots in all non-jornalero occupations, which prevents us from disaggregating time worked by sector for that year.

respectively. These effects diminish over time.

To verify robustness, we re-estimate these models using alternative buffer sizes (4 and 6 km) and by incorporating landmine events occurring in concentric rings beyond 5 km (5–10 km and 10–20 km). Tables A2, A3, A4, A5 and A6 present the results with these alternative buffers. The results are consistent: labor decisions appear most sensitive to recent landmine events in close proximity, with limited response to more distant events. This pattern likely reflects both perceived safety and actual mobility constraints: households prefer to work in fields closer to home, where they have more information and shorter travel distances.

Taken together, these results reveal a striking pattern. Rather than reducing agricultural work across the board, households exposed to recent landmine events shift away from more stable, often better-paid non-jornalero agricultural jobs and increase their reliance on jornalero work, an occupation typically characterized by lower pay, instability, and greater exposure to risk. This is counterintuitive: one might expect households to avoid all forms of agricultural labor in the wake of heightened physical danger. A possible explanation for this puzzle is that liquidity-constrained households may be unable to forego risky work without experiencing a significant drop in income, especially when alternative employment opportunities are limited. In the next section, we investigate whether these responses differ by prior exposure to landmine events and by land ownership—factors that may shape how households perceive risk and constrain their ability to adapt.

5.1.1 Heterogeneous Effects

In this section, we examine how landmine effects vary by previous exposure to landmine events and land ownership. Previous exposure to landmine is an important factor as it affects individuals' belief about landmine contamination in their vicinity, which influence their mobility. And the formation of this belief relies on and differ by past experience. In addition, land ownership is a critical element of life in rural Colombia, because it predicts wealth and determines individuals' ability to borrow. A wealthier individual who can borrow is more likely to reduce agricultural jobs as she can more easily absorb the loss of income. In this section, we first explore the heterogeneous effect by previous exposure. We then discuss the heterogeneity by land ownership, and explore the associated results in depth.

Previous Exposure

To explore the heterogeneity along previous landmine exposure, we construct an indicator of whether individuals and households experienced landmine events in the period between 2002[7]

[7]We begin measuring past exposure in 2002 because this is the year when the Colombian government began systematically recording landmine events nationwide.

and the three years before the start of the planting season preceding the survey interview. We consider individuals who have experienced landmine events in this period as "exposed before" and those who have not as "unexposed before." We then interact this indicator with each of the binary variables indicating if individuals were exposed to landmines during the different time windows.

Figure 5 presents the estimated heterogeneous effects of previous exposure on the labor allocation decisions. The graphs plot the estimated coefficients on the binary variables indicating landmine exposure at each of the time windows as the effect on the unexposed before. Meanwhile, the graphs plot the linear combination of the estimated coefficients on the said binary variables and the interaction terms between each of the landmine dummies and the previous exposure dummies in a given time period as the effect on the exposed before.

We find that individuals without previous landmine exposure adjust their labor allocation more strongly in response to recent landmine events than those who had been exposed before. Specifically, among the previously unexposed, landmine events occurring in the six months prior to the planting season reduce the likelihood of working in non-jornalero jobs by 6.4 percentage points and reduce hours in these jobs by 3.6 hours per week. In contrast, we do not observe significant changes in non-jornalero or jornalero participation among individuals who were previously exposed.

To better understand which types of non-jornalero work are being reduced, we use the time-use data to disaggregate hours worked by sector. Figure 6 shows that the reduction is concentrated in agricultural non-jornalero work. Among previously unexposed individuals, hours worked in this category decline by 112% relative to the mean in the months following a landmine event. However, this group eventually increases hours in agricultural non-jornalero work further out in time, suggesting some recovery. We do not observe meaningful changes in non-agricultural non-jornalero or jornalero jobs for either group. These patterns suggest that individuals without prior exposure initially avoid high-risk agricultural tasks, while individuals with previous exposure appear less responsive overall.

Turning to labor on own farms, we find that individuals with previous exposure reduce their work input more consistently and more substantially than the unexposed. As shown in Figure 7, those with prior exposure reduce the likelihood of working on their own farm for more than 0, 1, 2, and 4 hours by 7, 9, 12, and 14 percentage points, respectively, in the 6–12 months preceding the planting season. These reductions represent a 15–34% decline relative to the mean. Meanwhile, individuals without prior exposure only show significant reductions at the lower time thresholds (0 and 1 hour), and only in the 12–36 month window before the planting season.

Finally, both groups, regardless of prior exposure, increase their reliance on hired jornalero labor shortly after landmine events. Individuals unexposed in the past are 25.6 percentage points more likely to hire jornalero workers immediately after a landmine event, while those with prior exposure are 18.5 percentage points more likely to do so.

These findings suggest that prior exposure to landmine events shapes how individuals perceive and respond to subsequent risk. Those without previous exposure react more strongly to new events by avoiding agricultural non-jornalero work, particularly in the immediate aftermath. In contrast, individuals who have previously encountered landmine threats appear less responsive overall, but exhibit a greater reduction in labor on their own farms. One possible explanation for this pattern is that previously exposed individuals may have already adjusted their routines to minimize risk, leaving little room for further behavioral change—especially outside their farms. By contrast, new events represent a more salient update for those without prior exposure, prompting shifts in behavior to reduce the likelihood of landmine encounters. Regardless of exposure history, however, both groups increase their reliance on jornalero work in response to recent events. Overall, these results underscore the nuanced ways in which past experiences with conflict-related hazards influence labor decisions and highlight the importance of accounting for individuals' exposure histories when assessing the behavioral impacts of violence.

Land Ownership

We now turn to heterogeneity by land ownership, which serves as a proxy for households' wealth and borrowing capacity. We classify households into landowners, defined as those who owned at least one plot in 2010, and non-landowners, defined as those farmers who did not own any land in that year. In rural Colombia, owning land is strongly associated with greater financial security and access to credit[8]. These advantages may allow landowning households to absorb income losses and avoid high-risk work following landmine exposure. In contrast, non-landowning households may have fewer resources to buffer shocks and may be forced to continue or even increase participation in hazardous labor. In this section, we test these predictions by comparing how landmine events affect labor allocation, own-farm work, and income for landowning and non-landowning households.

Figure 8 shows how landmine exposure affects labor allocation differently for landowning and non-landowning individuals. We find that non-landowning individuals decrease participation in non-jornalero jobs and shift toward jornalero work, suggesting a movement toward

[8]Table A10 presents some descriptive statistics by land ownership. In our sample, landowning households were more likely to have a credit, either formal or informal, in 2010 than non-landowning households. This difference becomes larger for formal credits.

lower-wage, higher-risk jobs. In contrast, landowning individuals also reduce participation in non-jornalero work but do not shift into jornalero jobs. This pattern is consistent with the idea that landowners are better positioned to avoid the most precarious and risky forms of labor in the aftermath of violence.

We use time-use data to further explore how landmine exposure affects the intensity and type of work across land ownership groups. Figure 9 shows that non-landowning individuals significantly increase hours worked in both jornalero and agricultural non-jornalero jobs, while reducing time in more stable non-agricultural non-jornalero jobs. Specifically, they increase hours worked in agricultural non-jornalero jobs by 133% (4.7 hours) and in jornalero jobs by 113% (6.6 hours), while decreasing non-agricultural non-jornalero work by 65% (4.1 hours). In contrast, landowning individuals reduce hours in agricultural non-jornalero jobs by 57% (2 hours) and show only a modest increase in jornalero work (64%, or 3.5 hours).

These differences are also reflected in work on households' own farms[9]. Figure 10 shows that non-landowning individuals increase both their own labor input and the likelihood of hiring jornalero labor on their farms, whereas landowners show smaller changes. More specifically, we find that non-landowners increase the probability of working more than 0 hours and hiring jornalero laborers on own farm by 50% (22.8 percentage point) and 137% (46 percentage point) relative to the mean, when exposed to landmine events before the survey interview. Meanwhile, landowners decrease the probability of working more than 0 hours on own farm by 16% (3.2 percentage point) due to landmine events in 0-6 months before the planting season. However, they also increase the likelihood of hiring jornalero by 48% (16.2 percentage point) when exposed to landmine events before the survey interview. This increase in own-farm activity among non-landowners may reflect an attempt to offset income losses from reduced non-agricultural employment or to intensify production in response to rising risk. We also find weak evidence that non-landowning households expand the area under mixed cultivation, plots growing both perennial and seasonal crops, following landmine exposure (Table A14).

These differences are also reflected in work on households' own farms. Figure 10 shows that non-landowning individuals increase both their own labor input and the likelihood of hiring jornalero workers, whereas landowners show smaller changes. Specifically, among non-landowners, landmine exposure before the survey interview increases the probability of working more than 0 hours on their own farm by 50% (22.8 percentage points) and of hiring jornalero laborers by 137% (46 percentage points), relative to the mean. In contrast, landowners reduce the probability of working more than 0 hours on their own farms by 16%

[9]Non-landowning households access land primarily through rental or sharecropping arrangements. On average, they cultivate 1.2 hectares, compared to 2.6 hectares among landowning households (Table A10).

(3.2 percentage points) following landmine events in the 0–6 months prior to the planting season. However, even among landowners, landmine exposure before the survey is associated with a 48% (16.2 percentage point) increase in the likelihood of hiring jornalero labor.

This increase in own-farm activity among non-landowning households may reflect an attempt to offset income losses from reduced non-agricultural employment or to intensify production under heightened risk. Consistent with the latter explanation, we find weak evidence that these households also expand the area under mixed cultivation—plots used to grow both perennial and seasonal crops, following landmine exposure (Table A14).

We next examine whether the shift in labor allocation translates into changes in income sources. Figure 11 shows that non-landowning individuals experience a reallocation of income consistent with their increased engagement in agricultural labor. Following landmine exposure, their income from jornalero work increases by 49%, while income from non-jornalero work decreases by 47%. As a result, their overall off-farm income remains relatively stable. In contrast, landowning individuals experience an overall decline in off-farm income, driven by a 33% reduction in non-jornalero income, and no corresponding increase in jornalero earnings. This suggests that landowners respond to landmine exposure by reducing engagement in off-farm labor without substituting into higher-risk work.

While these patterns broadly mirror the labor allocation results, we cannot directly infer whether income changes are a cause or consequence of labor reallocation. Our data do not allow us to observe the sequence of decisions or underlying preferences. Nonetheless, the results suggest that landmine exposure may constrain economic options more acutely for non-landowning households, who respond by shifting toward more hazardous agricultural work.

Taken together, these findings suggest that landmine exposure interacts with pre-existing differences in household resources to shape how families respond to risk. Landowning households appear better positioned to avoid hazardous work, likely because they have greater access to resources that allow them to absorb short-term income shocks. In contrast, non-landowning households respond to the same risks by intensifying agricultural labor, both on and off their own farms—despite the heightened exposure to danger. These households also show signs of modifying production strategies, potentially to maintain income under constrained conditions. While we cannot fully disentangle whether these shifts are driven by necessity or changing preferences, the patterns are consistent with a scenario in which liquidity constraints and limited employment alternatives force more vulnerable households to accept greater risk in the wake of conflict-related violence.

5.2 Effects on Healthcare Access

We now turn to how landmine exposure affects access to healthcare services. In rural Colombia, formal medical care is typically accessed through clinics located in municipal centers, requiring considerable travel.[10] Landmine contamination may restrict this mobility, either by increasing perceived danger during travel or by physically blocking access routes. To examine these effects, we analyze changes in preventive healthcare utilization among adults and children, focusing on both formal medical services and alternative medicine. We also explore whether these effects differ by land ownership to better understand the channels through which landmine exposure shapes health-seeking behavior.

Table 7 presents the effects of landmine exposure on adults' use of formal and alternative medical care[11]. We find that recent exposure to landmines significantly reduces the likelihood of seeking formal preventive care. Specifically, adults exposed to a landmine event just before the survey are 12% (8.2 percentage points) less likely to visit a formal medical provider without being sick, relative to the mean. This effect is particularly strong for dentists (38%), general practitioners or specialists (15%), and optometrists (45%).

While we observe some recovery in preventive dental care over time, the same is not true for other services. Adults exposed in the 6–12 and 12–36 months prior to the planting season are 23% and 13% (9.1 and 5 percentage points) more likely, respectively, to have visited a dentist, suggesting partial resumption of care. However, we do not observe a similar rebound in visits to general practitioners or optometrists.

At the same time, landmine exposure increases the use of alternative medicine, which is often provided by traditional healers and located closer to rural communities. Adults exposed in the 0–6 and 12–36 month windows are 60% and 97% (1.8 and 2.9 percentage points) more likely to seek alternative care. These patterns suggest a substitution away from formal healthcare toward more accessible, informal services in response to mobility constraints.

We now turn to healthcare access among children. Table 8 presents the effects of landmine exposure on children aged 0–9 in 2010—the only cohort tracked over time in the panel. The analysis uses an unbalanced panel, including children who appear in at least two consecutive rounds of the household survey. We find that landmine exposure reduces children's use of preventive dental care. Specifically, children who experienced a landmine event before the survey are 28% (16.3 percentage points) less likely to visit a dentist, relative to the mean.

[10] According to ELCA community survey, only 9% of surveyed villages had a health center in 2010, and in 86% of them, patients with serious illnesses were taken to medical centers in the municipal capital.

[11] Since we do not know the number of visits and the dates when they took place, it is possible that some of these visits occurred before the landmine events.

We do not observe statistically significant changes in visits to general practitioners or other types of formal care.

These results suggest that landmine exposure may disrupt children's access to routine health services, although the effects appear to be more limited in scope compared to adults. This difference may reflect differences in health needs, parental decision-making, or the structure of child healthcare provision in rural areas.

To further probe the role of liquidity constraints, we examine whether healthcare responses to landmine exposure also differ by land ownership. This approach mirrors our earlier analysis of labor allocation, where we found that non-landowning households, likely more financially constrained, responded to landmine exposure by increasing participation in risky agricultural work. If similar constraints influence healthcare decisions, we would expect non-landowning households to reduce formal care more sharply or switch to lower-cost alternatives.

Figure 12 presents the heterogeneous effects of landmine exposure on adults' healthcare-seeking behavior by land ownership status. Consistent with the idea that non-landowning households face tighter liquidity constraints, we find that non-landowning adults are significantly less likely to seek formal medical care following recent landmine exposure. Specifically, they are 31% (20.7 percentage point) less likely to visit a formal medical provider if exposed just before the survey, relative to the mean. A similar, though smaller, decline is observed for exposure during the six months prior to the planting season.

In contrast, landowning adults do not significantly reduce their use of formal care, suggesting they are better able to maintain access despite potential income shocks or mobility risks. However, one exception is dental care: both landowners and non-landowners reduce dental visits following recent landmine exposure, possibly due to the lower perceived urgency of this type of care or the longer travel distances involved.

We also find that non-landowning adults are more likely to substitute toward alternative medicine. They are 110% (3.3 percentage point) more likely to seek traditional care when exposed just before the survey, reinforcing the idea that these households shift toward lower-cost, more accessible providers when formal care becomes harder to reach or afford.

Figure 13 shows how landmine exposure affects children's healthcare use by land ownership status. In contrast to the adult results, we find that children in both landowning and non-landowning households do not significantly change their overall use of formal preventive care in response to landmine exposure. However, we do find that children in landowning households are less likely to visit general practitioners and specialists, while no such change is observed for children in non-landowning households. Finally, children in landowning households are more likely to use alternative medicine following exposure. One possible

explanation is that baseline usage of medical care among non-landowning households is already low, leaving less room for further behavioral adjustment. In contrast, landowning households may have more flexibility to shift away from formal care when risk increases.

These results suggest that landmine exposure alters healthcare access in ways that reflect financial constraints. Adults in non-landowning households reduce formal care and turn to alternative medicine, consistent with the idea that they cannot afford the time or cost of seeking care in more distant facilities. In contrast, adults in landowning households maintain their own access to formal care, suggesting they are better able to absorb shocks without sacrificing access to essential services. Interestingly, landowners are more likely to reduce formal healthcare and increase alternative medicine for children, perhaps reflecting a heightened concern with mobility risks for children. Taken together, the patterns underscore how economic resources shape households' ability to mitigate risk.

6 Conclusion

This paper investigates how exposure to landmine contamination affects rural households' labor allocation and healthcare access in Colombia. While landmine contamination is often viewed primarily as a security concern, we show that it also has far-reaching consequences for economic behavior and use of essential services. Specifically, we estimate how recent landmine events influence individuals' decisions about where and how to work, as well as their ability to access preventive healthcare services.

Our findings reveal that landmine exposure reduces participation in more stable forms of agricultural labor and increases reliance on jornalero work, an occupation that is lower-paid, more precarious, and potentially riskier. These shifts are not uniform: individuals without prior landmine exposure react more strongly to new events, while those with prior exposure appear less responsive, possibly due to adaptation. Similarly, landowning households are better able to reduce riskier work with higher potential for landmine exposure, while non-landowning households respond by intensifying labor on others' farms and hiring more workers for their own plots, potentially due to the lack of ability to absorb negative income shocks unlike their landowning counterparts.

We also find that landmine exposure disrupts access to preventive healthcare. Adults reduce visits to formal providers and increase reliance on alternative medicine, especially in non-landowning households. Children's access is less affected, possibly because households prioritize their health even under constraints. These patterns suggest that landmine exposure shapes not only how people work but also how they care for themselves and their families by constraining movement.

Together, our findings reveal that landmine contamination can impose substantial economic and health costs on civilians, beyond its immediate physical harm. Moreover, these burdens fall unevenly across households along the wealth line. Our study also points to several directions for future research. While we document behavioral responses to landmine exposure, we do not observe households' underlying preferences or perceptions of risk. Future work that incorporates richer data on rural labor markets and household decision-making—especially around job preferences and perceived constraints—could offer deeper insights into the mechanisms driving these responses.

References

Adelaja, Adesoji, and Justin George. 2019. "Effects of Conflict on Agriculture: Evidence from the Boko Haram Insurgency." *World Development*, 117: 184–195.

Arcand, Jean Louis, Aude Sophie Rodella-Boitreaud, and Matthias Rieger. 2015. "The Impact of Land Mines on Child Health: Evidence from Angola." *Economic Development and Cultural Change*, 63(2): 249–279.

Arias, María Alejandra, Ana María Ibáñez, and Andrés Zambrano. 2019. "Agricultural Production Amid Conflict: Separating the Effects of Conflict into Shocks and Uncertainty." *World Development*, 119: 165–184.

Besley, Timothy, and Hannes Mueller. 2012. "Estimating the Peace Dividend: The Impact of Violence on House Prices in Northern Ireland." *American Economic Review*, 102(2): 810–833.

Blumenstock, Joshua, Michael Callen, Tarek Ghani, and Robert Gonzalez. 2024. "Violence and Financial Decisions: Evidence from Mobile Money in Afghanistan." *Review of Economics and Statistics*, 1–18.

Bove, Vincenzo, and Evelina Gavrilova. 2014. "Income and Livelihoods in the War in Afghanistan." *World Development*, 60: 113–131.

Brown, Ryan, and Andrea Velásquez. 2017. "The effect of violent crime on the human capital accumulation of young adults." *Journal of Development Economics*, 127: 1–12.

Brown, Ryan, Verónica Montalva, Duncan Thomas, and Andrea Velásquez. 2019. "Impact of Violent Crime on Risk Aversion: Evidence from the Mexican Drug War." *Review of Economics and Statistics*, 101(5): 892–904.

Brück, Tilman, Michele Di Maio, and Sami H Miaari. 2019. "Learning The Hard Way: The Effect of Violent Conflict on Student Academic Achievement." *Journal of the European Economic Association*, 17(5): 1502–1537.

Callen, Michael, Mohammad Isaqzadeh, James D Long, and Charles Sprenger. 2014. "Violence and Risk Preference: Experimental Evidence from Afghanistan." *American Economic Review*, 104(1): 123–148.

Camacho, Adriana. 2008. "Stress and Birth Weight: Evidence from Terrorist Attacks." *American Economic Review*, 98(2): 511–515.

Centro Nacional de Memoria Histórica. 2016. "Basta Ya! Colombia: Memories of War and Dignity." Centro Nacional de Memoria Histórica (CNMH).

Centro Nacional de Memoria Histórica. 2017. *La guerra escondida: Minas antipersonal y remanentes explosivos en Colombia.* Bogotá:CNMH.

Chiovelli, Giorgio, Elias Papaioannou, and Stelios Michalopoulos. 2024. "Landmines and Spatial Development."

Commission for Truth. 2022. "There is a Future if There is Truth - Final Report."

International Campaign to Ban Landmines. 2023. "International Campaign to Ban Landmines (ICBL) Landmine Monitor 2023." Geneva.

Ivarsson, Ellin, Leonardo Canon-Rubiano, and Carlos Murgui Maties. 2023. "When The Nearest School or Hospital is Hours Sway... Making The Case for Better Transport in Rural Colombia." *https://blogs.worldbank.org/en/transport/when-nearest-school-or-hospital-hours-away-making-case-better-transport-rural-colombia*, Accessed: 2025-3-5.

Lekfuangfu, Warn N. 2022. "Mortality Risk, Perception, and Human Capital Investments: The Legacy of Landmines in Cambodia." *Labour Economics*, 78: 102234.

Merrouche, Ouarda. 2008. "Landmines and Poverty: IV Evidence from Mozambique." *Peace Economics, Peace Science, and Public Policy*, 14(1).

Merrouche, Ouarda. 2011. "The Long Term Educational Cost of War: Evidence from Landmine Contamination in Cambodia." *Journal of Development Studies*, 47(3): 399–416.

Monitor, Landmine, and Cluster. 2018. "Colombia Mine Action." *http://www.the-monitor.org/en-gb/reports/2018/colombia/mine-action.aspx#*, Accessed: 2023-1-29.

Prem, Mounu, Miguel E. Purroy, and Juan F. Vargas. 2024. "Landmines: The Local Effects of Demining."

ReliefWeb. 2001. "Anti-personnel mines in Colombia." *https://reliefweb.int/report/colombia/anti-personnel-mines-colombia*, Accessed: 2022-6-14.

ReliefWeb. 2017. "APOPO to detect landmines in Colombia." *https://reliefweb.int/report/colombia/apopo-detect-landmines-colombia*, Accessed: 2023-1-17.

Rockmore, Marc. 2017. "The Cost of Fear: The Welfare Effect of the Risk of Violence in Northern Uganda." *The World Bank Economic Review*, 31(3): 650–669.

Sweig, Julia E. 2002. "What Kind of War for Colombia?" *Foreign Aff.*, 81(5): 122–141.

Takasaki, Yoshito. 2020. "Impacts of Disability on Poverty: Quasi-Experimental Evidence from Landmine Amputees in Cambodia." *Journal of Economic Behavior and Organization*, 180: 85–107.

United Nations Mine Action Service. 2022. "Colombia." *https://www.unmas.org/en/programmes/colombia*, Accessed: 2022-8-1.

Vargas, Juan F, Miguel E Purroy, Felipe Coy, Sergio Perilla, and Mounu Prem. 2024. "Fear to Vote: Explosions, Salience, and Elections."

Verpoorten, Marijke. 2009. "Household Coping in War- and Peacetime: Cattle Sales in Rwanda, 1991–2001." *Journal of Development Economics*, 88(1): 67–86.

7 Figures

Figure 1: Landmine related events and analysis period

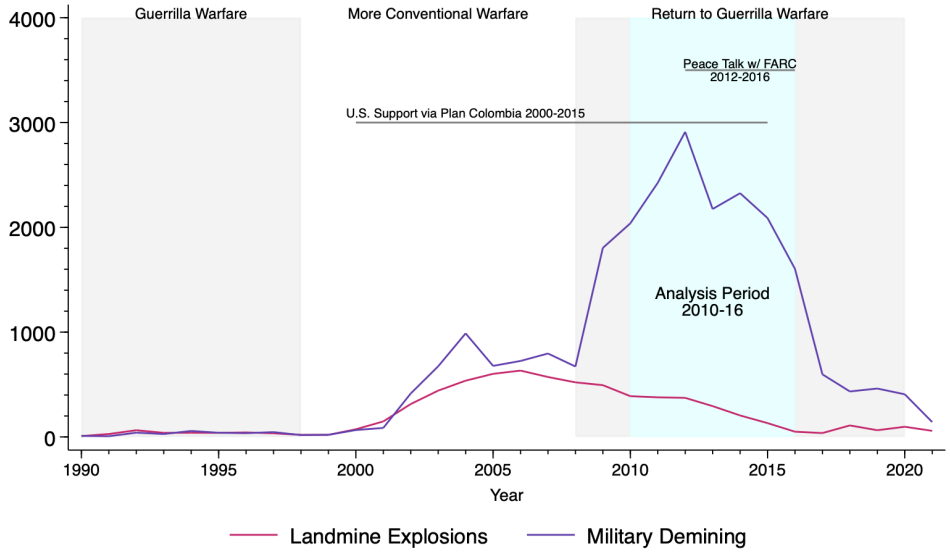
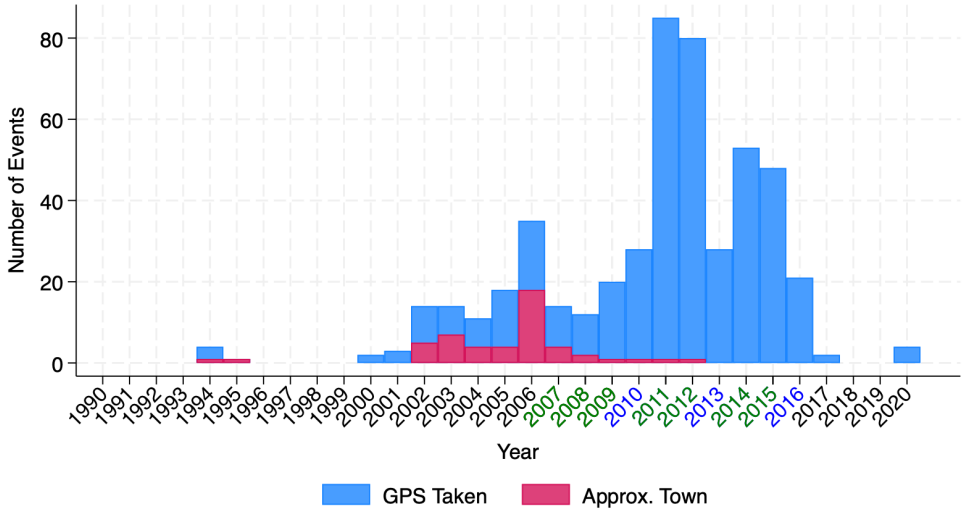


Figure 2: Examples of improvised antipersonnel landmines in Colombia

(a) Artisanal landmine

(b) Minefield in Valle del Cauca

Figure 3: Landmine related events and location type in surveyed and neighboring municipalities



Notes: Blue indicates the years in which ELCA data were collected, while green represents the years in which landmine exposure is considered

Figure 4: Planting Seasons and Landmine Exposure

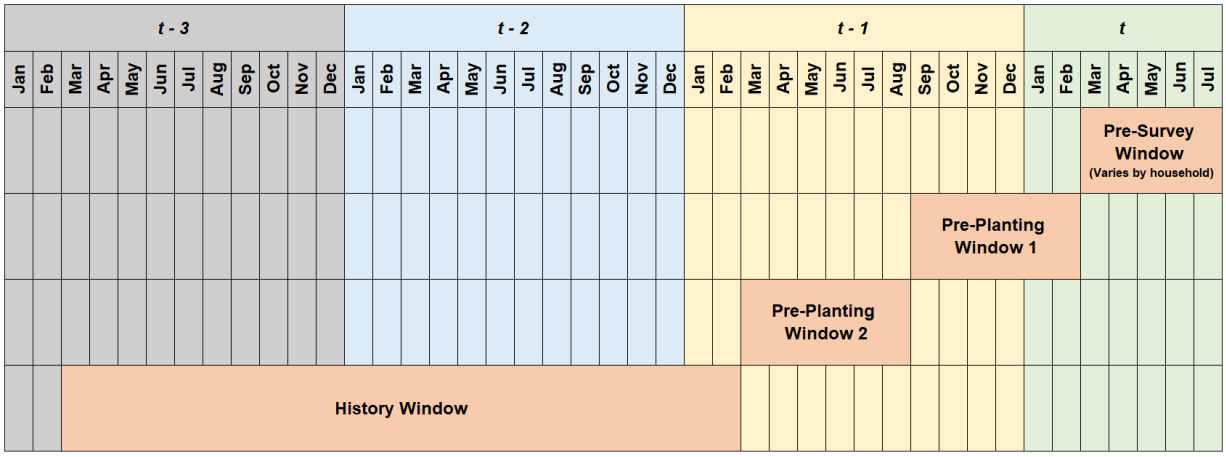
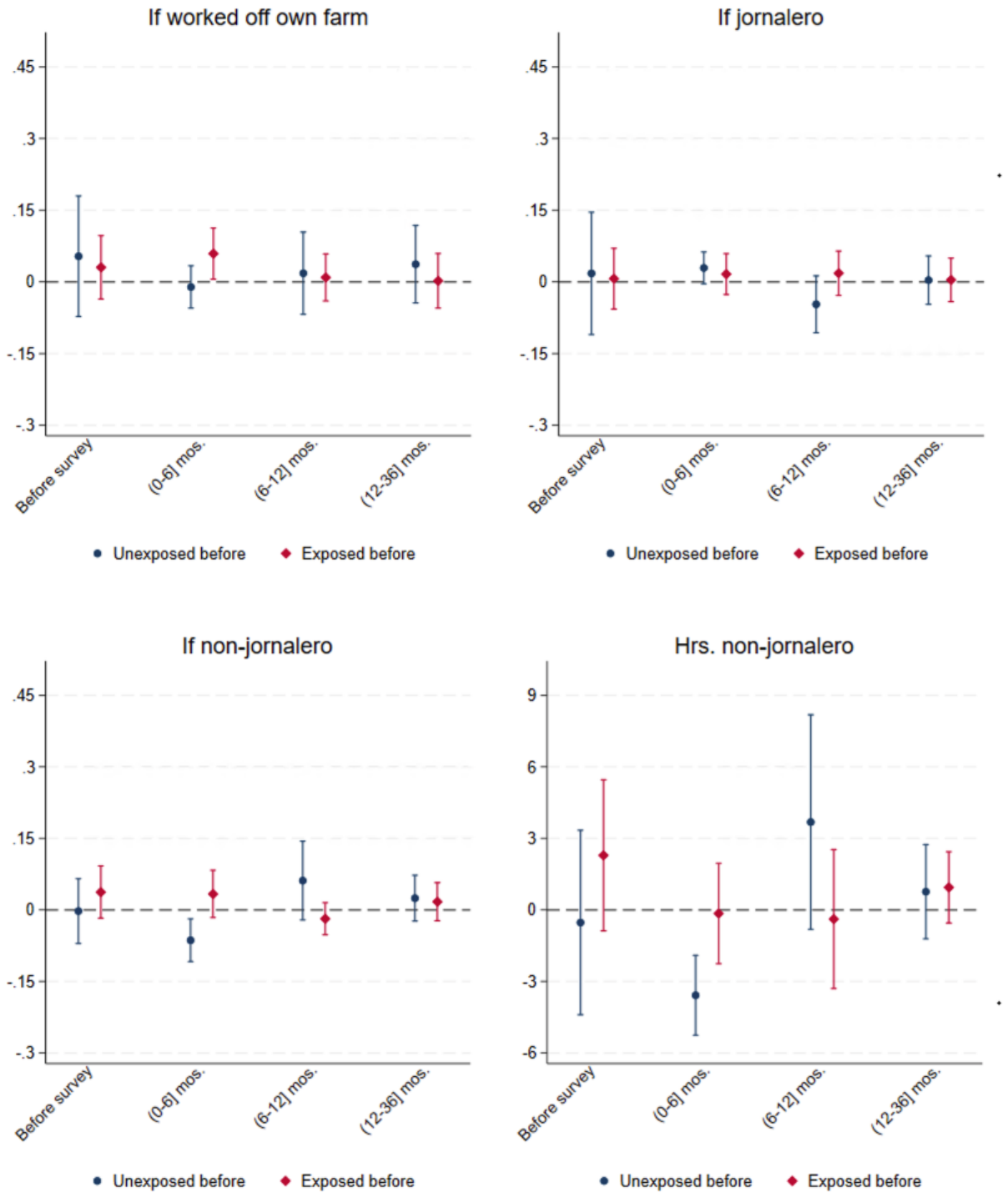
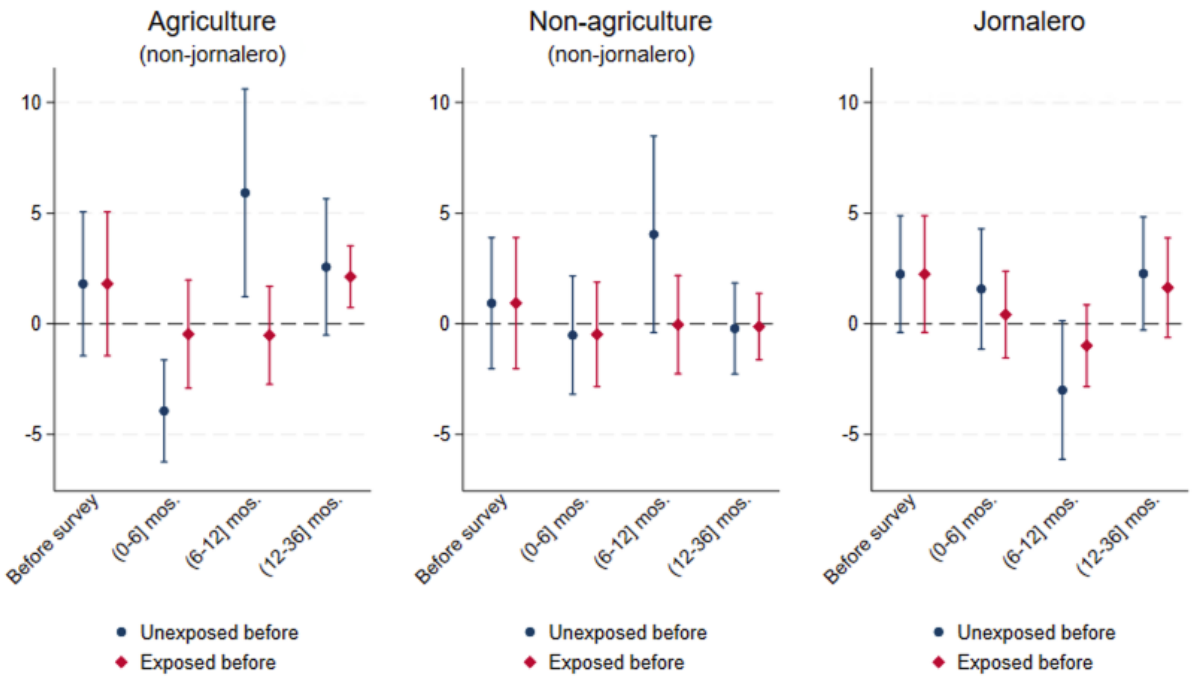


Figure 5: Landmine effects on labor allocation by previous exposure



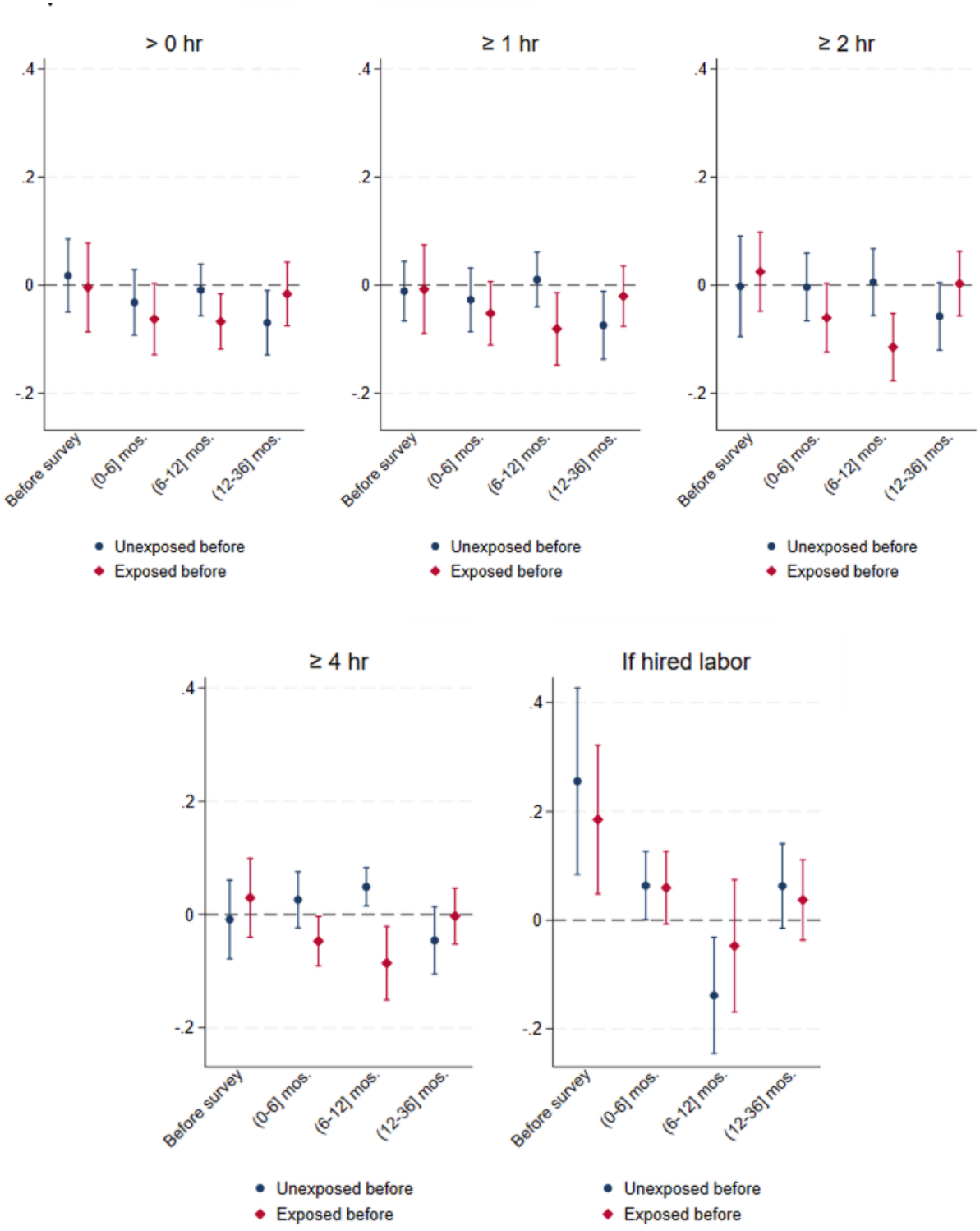
Note: Lines represent 90% confidence intervals. Exposed coefficients are the linear combination of *If events since 2002 until 36 mos.* × *If events in time window.* Table A7 presents the full regression results.

Figure 6: Landmine effects on hours of labor allocated by previous exposure



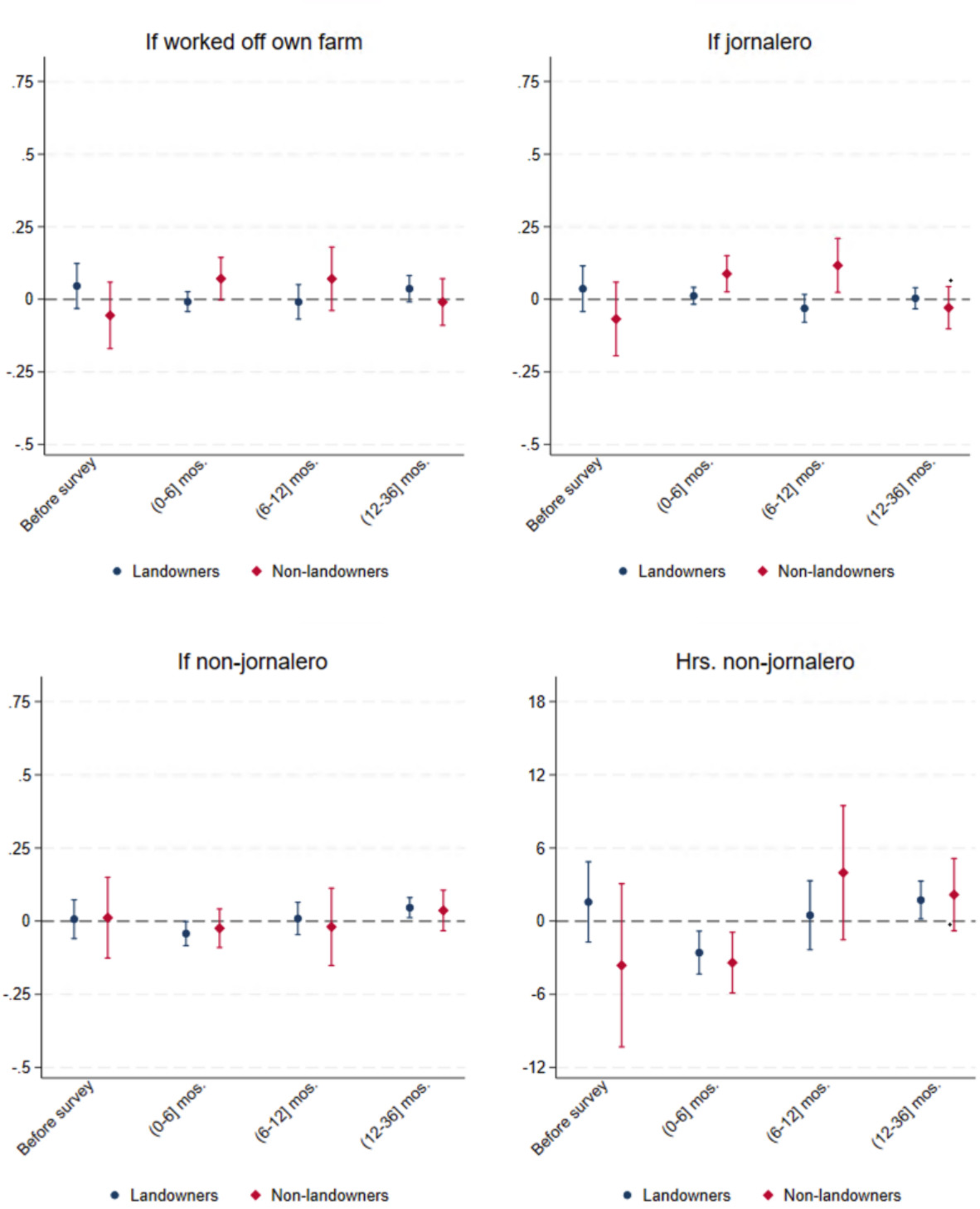
Note: Lines represent 90% confidence intervals. Exposed coefficients are the linear combination of *If events since 2002 until 36 mos.* × *If events in time window.* Table A8 presents the full regression results.

Figure 7: Landmine effects on own farm labor by previous exposure



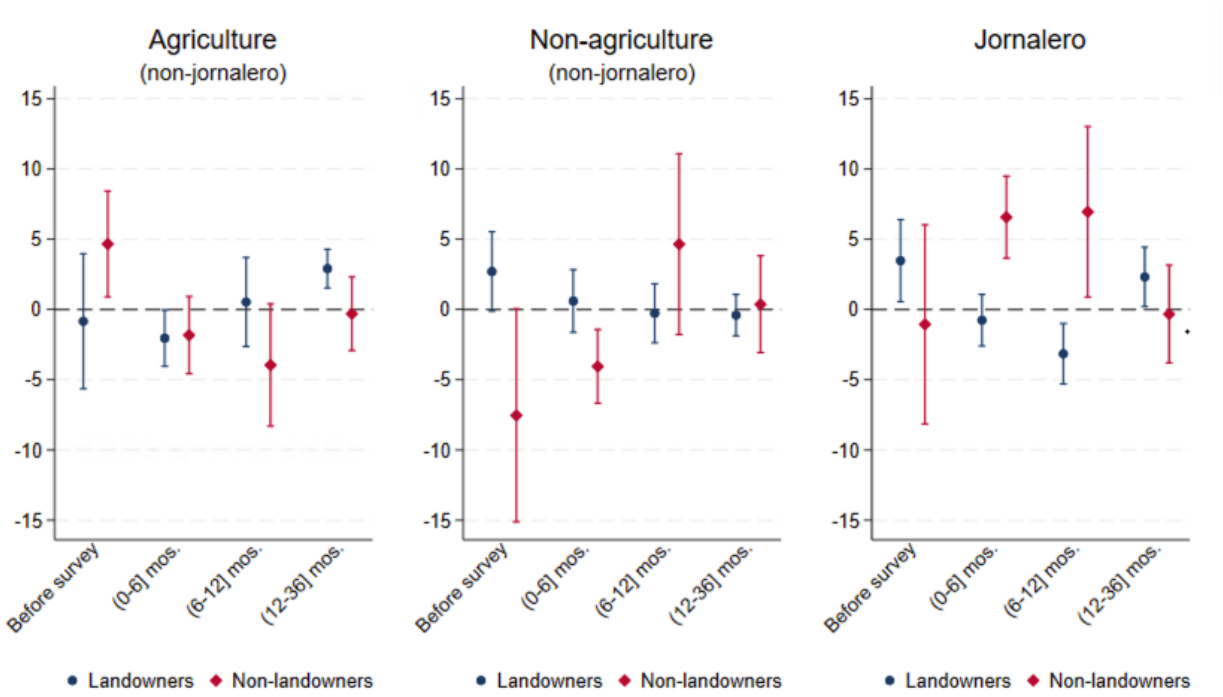
Note: Lines represent 90% confidence intervals. Exposed coefficients are the linear combination of *If events since 2002 until 36 mos.* × *If events in time window.* Table A9 presents the full regression results.

Figure 8: Landmine effects on labor allocation by land ownership



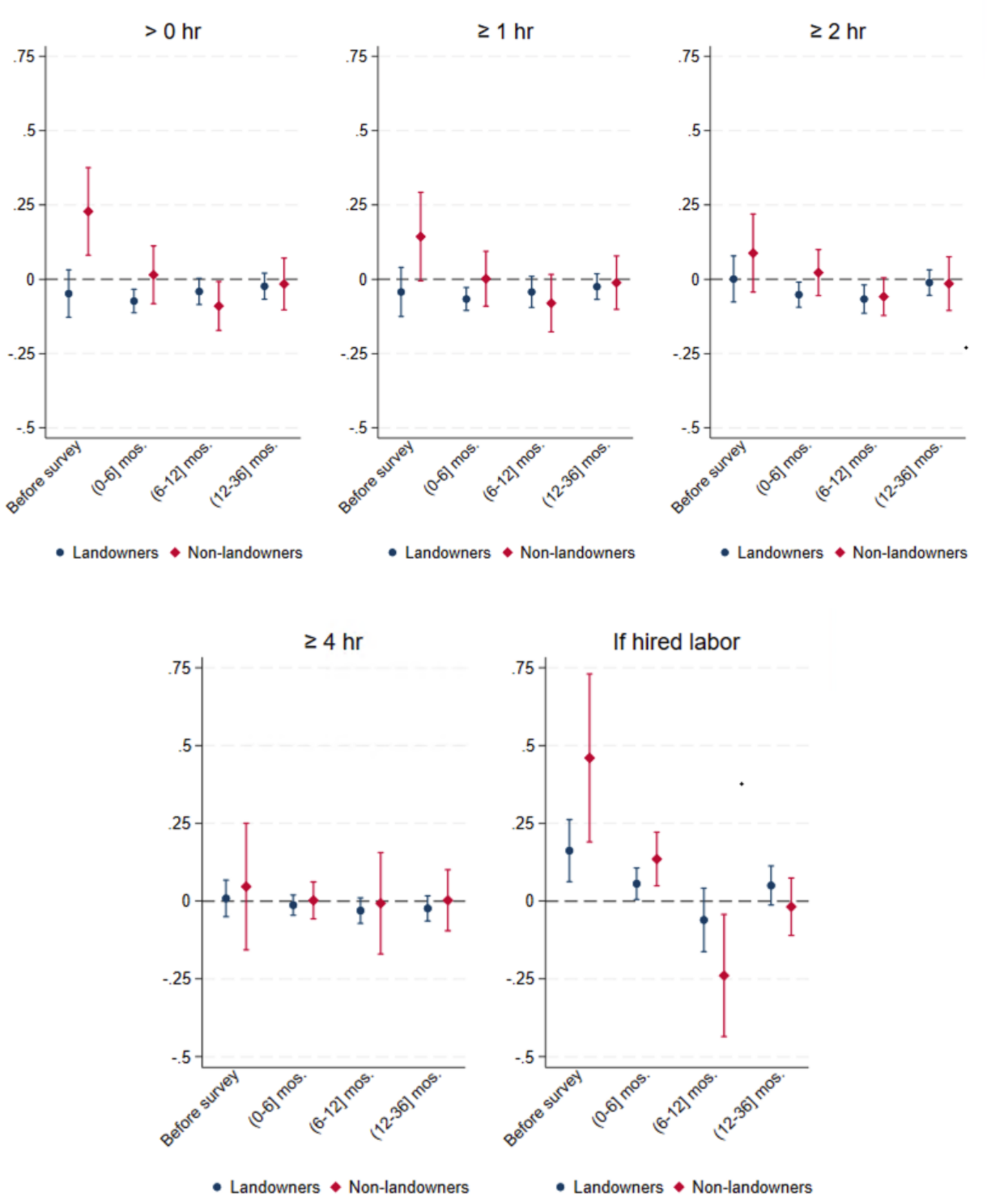
Note: Lines represent 90% confidence intervals. Lines represent 90% confidence intervals. Non-landowners point estimate corresponds to the linear combination *Owner* + *Owner* × *If event in time window*. Table A11 presents the full regression results.

Figure 9: Landmine effects on time spend on agricultural and non-agricultural work by land ownership



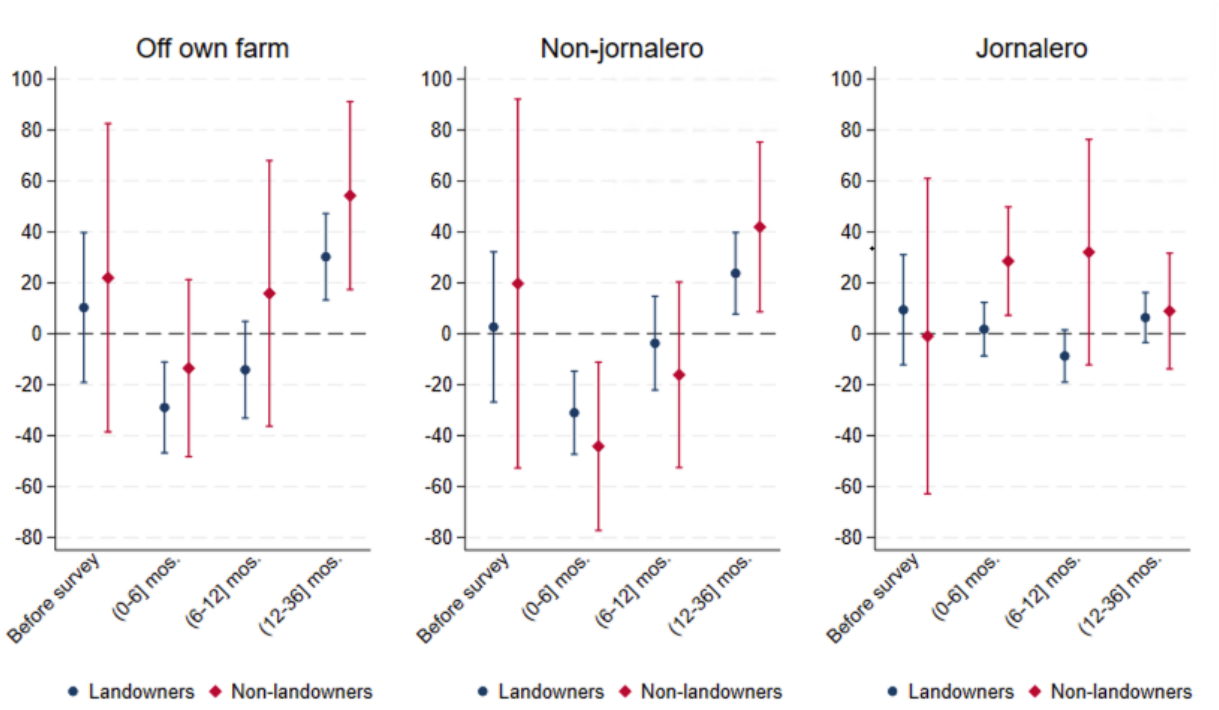
Note: Lines represent 90% confidence intervals. Sample only contains 2013 and 2016 rounds. Non-landowners point estimate corresponds to the linear combination *Owner* + *Owner* × *If event in time window*. Table A12 presents the full regression results.

Figure 10: Landmine effects on labor input on own farm by land ownership



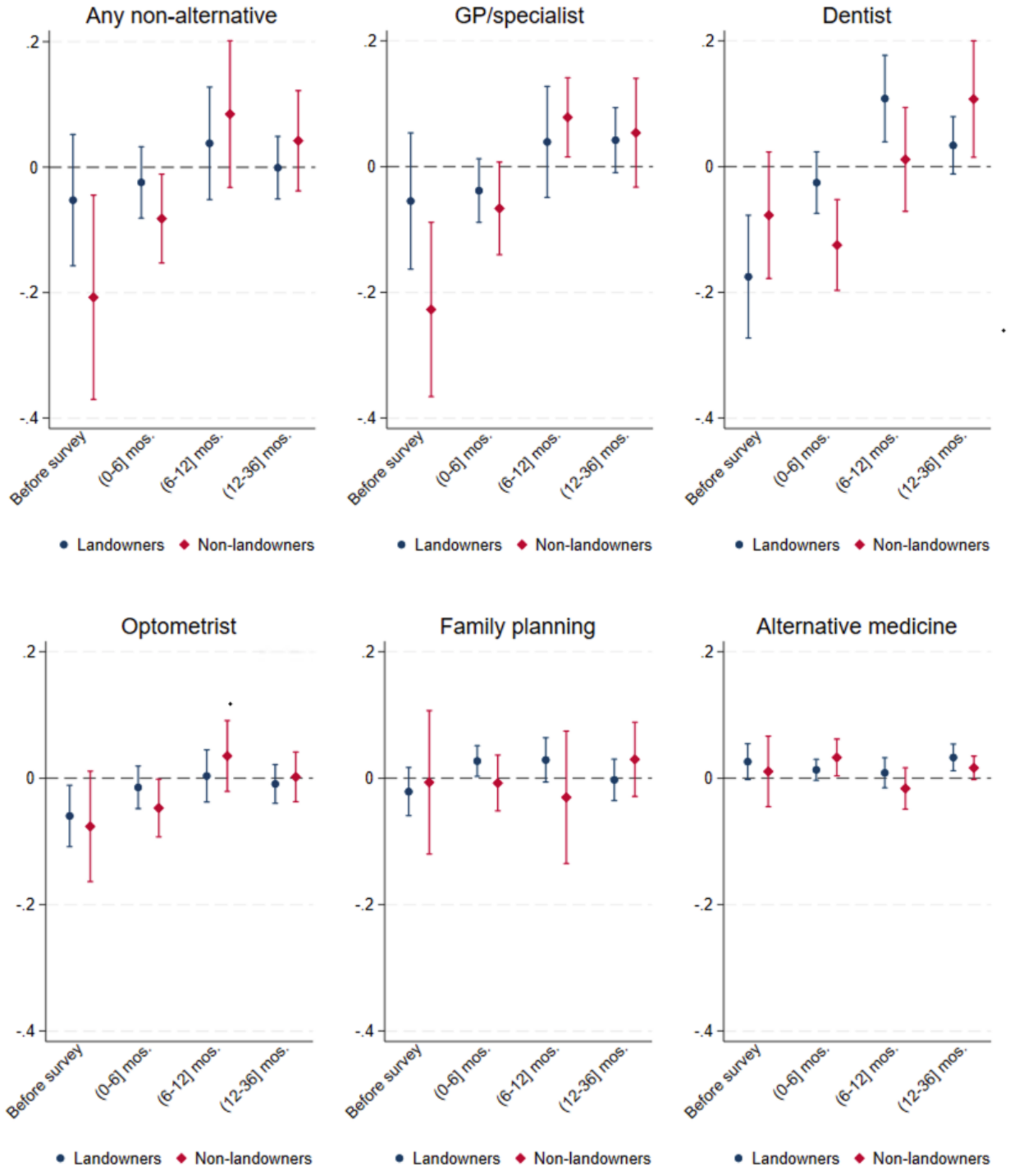
Note: Lines represent 90% confidence intervals. Individual sample is used in first four figures and household sample used in fifth figure. Non-landowners point estimate corresponds to the linear combination *Owner* + *Owner* × *If events in time window*. Table A13 presents the full regression results.

Figure 11: Landmine effects on income by land ownership



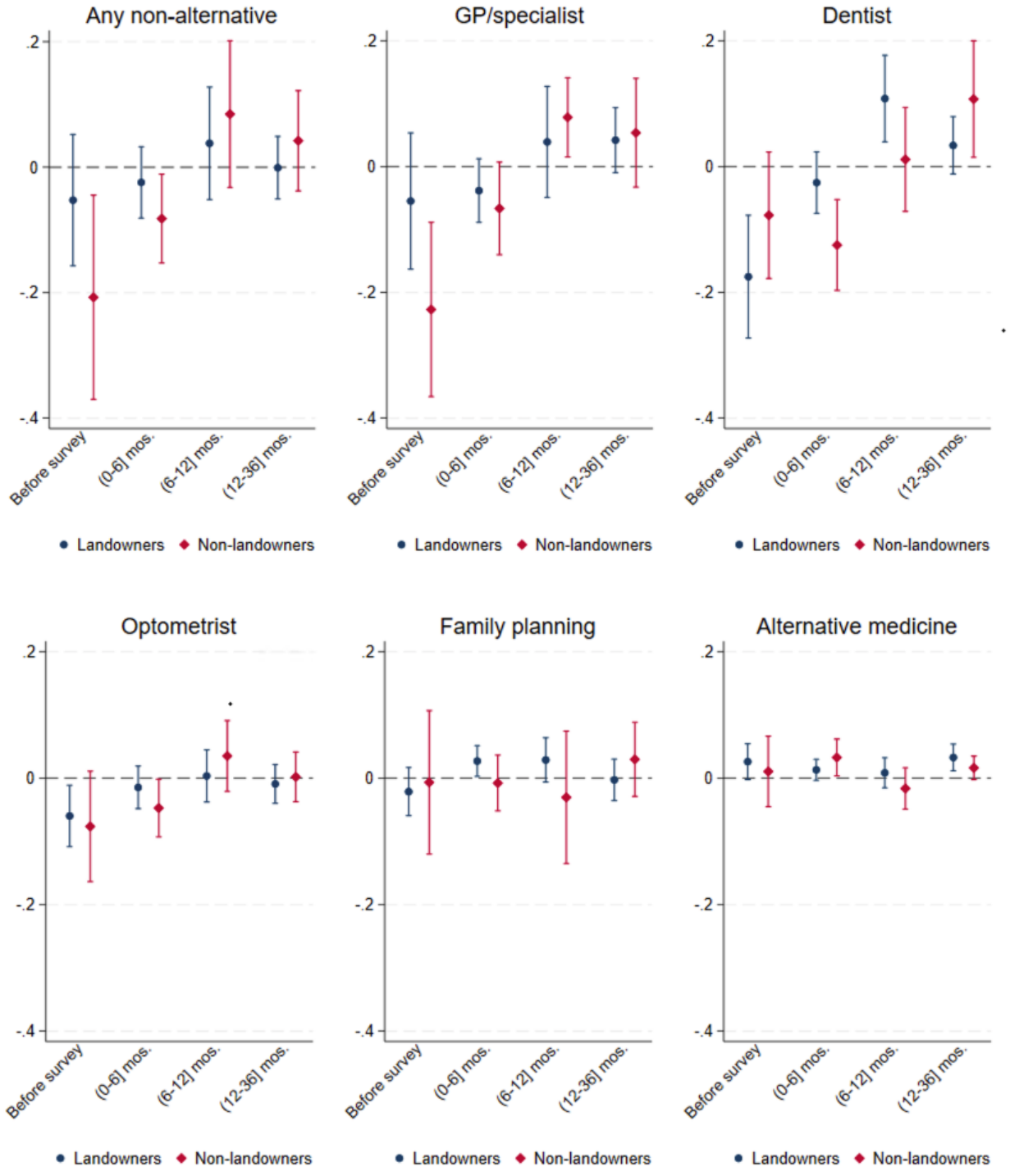
Note: Lines represent 90% confidence intervals. All monetary values expressed in thousands of COP. Non-landowners point estimate corresponds to the linear combination *If events in period* + *Non-owner* × *If events in period* Table A15 presents the full regression results.

Figure 12: Landmine effects on adults' healthcare seeking by land ownership



Note: Lines represent 90% confidence intervals. Non-landowners point estimate corresponds to the linear combination *Owner* + *Owner* × *If events in time window*. Table A18 presents the full regression results.

Figure 13: Landmine effects on children's healthcare seeking by land ownership



Note: Lines represent 90% confidence intervals. Non-landowners point estimate corresponds to the linear combination *Owner* + *Owner* × *If events in time window*. Table A19 presents the full regression results.

8 Tables

Table 1: Effect of landmine events on being part of the analysis sample

	(1) Appears in 2013	(2) Appears in 2016	(3) Appears in 2016
If events in (0-36] months	0.032	-0.031	-0.034
	(0.022)	(0.029)	(0.025)
Dep Var Mean	0.810	0.676	0.836
Sample	2010	2010	2013
Observations	8,156	8,156	6,588

Notes: Standard errors clustered at the village level in parentheses. Outcome variable are indicators of whether individual was surveyed in 2013 (column 1) and 2016 (columns 2 and 3). In columns 1 and 2, sample is all the individuals surveyed in 2010, and in column 3, sample is all the individuals surveyed in 2013. Independent variable is an indicator of whether individuals experienced a landmine event within 5 km of their residence in the 36 months prior to being surveyed. All specifications include age, years of education, and an indicator of whether individual is male as covariates, and municipality fixed effects. *** 1%, ** 5%, * 10%

Table 2: Proportion of individuals exposed to landmine events

	At Least Once	2010	2013	2016
Before survey	0.028	0.010	0.000	0.024
(0-6] months	0.129	0.073	0.034	0.041
(6-12] months	0.056	0.017	0.022	0.028
(12-36] months	0.130	0.062	0.083	0.089
Since 2002 until 36 mos.	0.237	0.104	0.202	0.219
# Individuals	5,518			

Notes: An individual is considered to be exposed to landmine events if an event occurred within 5 km of the individual's residence in the time period specified.

Table 3: Descriptive statistics for first round of household data

Variable	Obs.	Mean	Standard deviation	Min.	Median	Max.
Demographics						
Age	5,513	44.93	12.22	15	45	94
Education years	5,513	4.28	3.18	0	4	18
Male	5,513	0.485	0.500	-	-	-
Access to land						
Land holdings (ha)	3,213	2.16	4.32	0	0.74	78
Ownership	3,213	0.677	0.468	-	-	-
Labor outcomes						
If worked off own farm	5,513	0.330	0.470	-	-	-
If worked as jornalero	5,513	0.229	0.420	-	-	-
If worked as non-jornalero	5,513	0.164	0.370	-	-	-
If hired jornaleros	3,213	0.362	0.481	-	-	-
Preventative healthcare-seeking						
Non-alternative	5,513	0.611	0.488	-	-	-
Alternative	5,513	0.011	0.105	-	-	-

Notes: All outcomes are at the individual level (household heads + spouses), except households' number of hectares they have access to, whether they own at least one plot, and whether they hire jornaleros.

Table 4: Effects of landmine events on labor allocation outside own farm

	(1) If worked off own farm	(2) If worked jornalero	(3) If worked non-jornalero	(4) Hours worked non-jornalero
If at least one landmine event in the period...				
Before survey	0.024	0.018	0.005	0.688
	(0.040)	(0.041)	(0.039)	(2.126)
(0-6] months	0.012	0.031*	-0.038*	-2.743***
	(0.021)	(0.017)	(0.022)	(0.909)
(6-12] months	0.005	-0.006	0.005	0.986
	(0.031)	(0.027)	(0.029)	(1.778)
(12-36] months	0.027	-0.004	0.045**	1.864**
	(0.026)	(0.022)	(0.018)	(0.739)
Dep Var Mean	0.397	0.195	0.232	8.827
# Units	5,510	5,510	5,510	5,510
# Clusters	224	224	224	224
Observations	16,530	16,530	16,530	16,530

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 5 km from its residence in the specified windows. Sample includes household heads and their spouses when they have one. *If worked off own farm* is whether individuals worked outside the household's agricultural fields in the last week. *If worked jornalero* is whether individuals worked as jornaleros (agricultural day laborers) in the past week. *If worked non-jornalero* is whether individuals had non-jornalero jobs. *Hours worked non-jornalero* is the number of hours worked on non-jornalero jobs per week and is winsorized at the top 1%. The probability values of *If worked jornalero* and *If worked non-jornalero* do not necessarily sum to the value of *If Worked Off Own Farm*, as an individual can engage in both types of jobs simultaneously. All specifications include individual and year fixed effects and municipality characteristics interacted with indicators of each year of the survey. Municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table 5: Effect of landmine events on hours worked in the past week

	Hours worked in the past week		
	(1) Agriculture (non-jornalero)	(2) Non-agriculture (non-jornalero)	(3) Jornalero
If event before survey	0.404	0.568	2.969*
	(2.394)	(1.803)	(1.673)
If event in (0-6] months	-1.929*	-0.484	0.841
	(1.072)	(1.101)	(0.992)
If event in (6-12] months	-0.085	0.434	-1.527
	(1.636)	(1.481)	(1.316)
If event in (12-36] months	2.299***	-0.184	1.620
	(0.805)	(0.796)	(1.218)
Dep Var Mean	3.504	6.305	5.853
# Units	5,510	5,510	5,510
# Clusters	224	224	224
Observations	11,020	11,020	11,020

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 5 km from its residence in the specified windows. Outcome variables correspond to hours worked by individuals in the past week. Sample include household heads and their spouses when they have one. Only the last two rounds of the household survey (2013, 2016) are considered. All specifications include individual and year fixed effects and municipality characteristics at baseline interacted with year FE. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table 6: Effects of landmine events on own farm labor

	If worked on own farm for				(5)
	(1) > 0 hr	(2) ≥ 1 hr	(3) ≥ 2 hr	(4) ≥ 4 hr	If hired labor
If at least one landmine event in the period ...					
Before survey	0.004	-0.009	0.016	0.017	0.212***
	(0.044)	(0.037)	(0.038)	(0.042)	(0.058)
(0-6] months	-0.055**	-0.052**	-0.035	-0.010	0.072**
	(0.024)	(0.024)	(0.026)	(0.020)	(0.028)
(6-12] months	-0.045**	-0.046*	-0.063**	-0.026	-0.085*
	(0.022)	(0.028)	(0.025)	(0.025)	(0.048)
(12-36] months	-0.025	-0.024	-0.013	-0.018	0.034
	(0.026)	(0.026)	(0.027)	(0.026)	(0.038)
Dep Var Mean	0.455	0.424	0.364	0.258	0.335
Sample	Ind.	Ind.	Ind.	Ind.	HH
# Individuals	5,485	5,485	5,485	5,485	3,213
# Clusters	224	224	224	224	224
Observations	16,455	16,455	16,455	16,455	9,639

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 5 km from its residence in the specified windows. In columns 1 through 4, sample includes household heads and their spouses when they have one. *If worked on own farm for ...* is whether household members spent more than 0 hours, or greater than or equal to 1, 2 or 4 hours per day on agricultural tasks on farms that households own. *If hired jornaleros* indicates whether households have hired jornaleros (agricultural day laborers) in the past 12 months. All specifications include individual/household and year fixed effects and municipality characteristics interacted with indicators of each round of the survey. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table 7: Effect of landmine events on adults' healthcare seeking

	Sought medical assistance for preventative care in the past 12 months					
	(1) Any non alternative	(2) GP/ specialist	(3) Dentist	(4) Optometrist	(5) Family planning	(6) Alternative medicine
If at least one landmine event in period...						
Before survey	-0.082*	-0.090*	-0.155***	-0.059**	-0.020	0.020
	(0.048)	(0.051)	(0.051)	(0.026)	(0.022)	(0.017)
(0-6] months	-0.037	-0.043*	-0.050*	-0.022	0.019	0.018**
	(0.030)	(0.026)	(0.026)	(0.018)	(0.014)	(0.008)
(6-12] months	0.043	0.043	0.091**	0.008	0.018	0.005
	(0.045)	(0.045)	(0.038)	(0.023)	(0.016)	(0.014)
(12-36] months	0.010	0.046	0.050**	-0.007	0.005	0.029***
	(0.029)	(0.030)	(0.025)	(0.015)	(0.019)	(0.011)
Dep Var Mean	0.658	0.605	0.400	0.132	0.091	0.030
# Individuals	5,484	5,484	5,484	5,484	5,484	5,484
# Clusters	224	224	224	224	224	224
Observations	16,452	16,452	16,452	16,452	16,452	16,452

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 5 km from its residence in the specified windows. Sample includes household heads and their spouses when they have one. All specifications include individual and year fixed effects and municipality characteristics at baseline interacted with year FE. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table 8: Effect of landmine events on children's healthcare seeking

	Sought medical assitance for preventative care in the past 12 months					
	(1) Any non alternative	(2) GP/ specialist	(3) Dentist	(4) Optometrist	(5) Pediatrician	(6) Alternative medicine
If at least one landmine event in period...						
Before survey	-0.067	-0.106	-0.163**	-0.090	-0.057	-0.002
	(0.085)	(0.080)	(0.075)	(0.055)	(0.076)	(0.019)
(0-6] months	0.015	-0.043	-0.047	-0.002	0.015	-0.007
	(0.028)	(0.034)	(0.041)	(0.021)	(0.026)	(0.005)
(6-12] months	-0.002	0.009	0.053	0.109**	0.037	0.021***
	(0.053)	(0.053)	(0.063)	(0.047)	(0.028)	(0.006)
(12-36] months	0.029	0.044	-0.024	0.013	-0.015	0.018
	(0.038)	(0.037)	(0.044)	(0.028)	(0.028)	(0.011)
Dep Var Mean	0.836	0.759	0.583	0.133	0.231	0.011
# Individuals	2,813	2,813	2,813	2,813	2,813	2,813
# Clusters	224	224	224	224	224	224
Observations	8,170	8,170	8,170	8,170	8,170	8,170

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 5 km from its residence in the specified windows. Sample includes children who were 0 to 9 years old in 2010 and were followed in at least two consecutive rounds. All specifications include individual and year fixed effects and municipality characteristics at baseline interacted with year FE. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005.
*** 1%, ** 5%, * 10%

Appendix A. Additional tables

Table A1: Landmine exposure within villages

	(1)	Prop. of exposed inds.		
	Prop. villages with exposure	(2) Minimum	(3) Median	(4) Maximum
Year: 2010				
Before survey	0.036	0.036	0.146	0.852
(0-6] months	0.138	0.028	0.650	1.000
(6-12] months	0.054	0.024	0.113	0.600
(12-36] months	0.125	0.040	0.436	1.000
Year: 2013				
Before survey	0.000	.	.	.
(0-6] months	0.036	0.267	0.767	1.000
(6-12] months	0.027	0.051	0.945	1.000
(12-36] months	0.089	0.118	0.967	1.000
Year: 2016				
Before survey	0.031	0.083	0.667	1.000
(0-6] months	0.054	0.120	1.000	1.000
(6-12] months	0.031	0.083	0.939	1.000
(12-36] months	0.112	0.033	1.000	1.000

Notes: Column 1 reports the proportion of villages with at least one individual exposed to landmines within 5 km of their residence during each time window. Column 2 reports the lowest proportion of exposed individuals observed among villages with at least one exposed individual. Column 3 reports the median proportion of exposed individuals across these villages. Column 4 shows the highest proportion of exposed individuals among these villages.

Table A2: Effects of landmine events on labor allocation outside own farm (4 km buffer)

	(1) If worked off own farm	(2) If worked jornalero	(3) If worked non-jornalero	(4) Hours worked non-jornalero
If at least one landmine event in the period...				
Before survey	0.016	-0.008	0.009	0.858
	(0.040)	(0.044)	(0.043)	(2.424)
(0-6] months	0.003	0.026	-0.042*	-2.651**
	(0.024)	(0.019)	(0.025)	(1.123)
(6-12] months	0.033	0.023	0.009	1.422
	(0.044)	(0.036)	(0.030)	(1.698)
(12-36] months	0.019	0.009	0.017	0.672
	(0.020)	(0.017)	(0.021)	(0.831)
Dep Var Mean	0.397	0.195	0.232	8.827
# Units	5,510	5,510	5,510	5,510
# Clusters	224	224	224	224
Observations	16,530	16,530	16,530	16,530

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 4 km from its residence in the specified windows. Sample includes household heads and their spouses when they have one. *If worked off own farm* is whether individuals worked outside the household's agricultural fields in the last week. *If worked jornalero* is whether individuals worked as jornaleros (agricultural day laborers) in the past week. *If worked non-jornalero* is whether individuals had non-jornalero jobs. *Hours worked non-jornalero* is the number of hours worked on non-jornalero jobs per week and is winsorized at the top 1%. The probability values of *If worked jornalero* and *If worked non-jornalero* do not necessarily sum to the value of *If worked off own farm*, as an individual can engage in both types of jobs simultaneously. All specifications include individual/household and year fixed effects and municipality characteristics interacted with indicators of each year of the survey. Municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table A3: Effects of landmine events on labor allocation outside own farm (6 km buffer)

	(1) If worked off own farm	(2) If worked jornalero	(3) If worked non-jornalero	(4) Hours worked non-jornalero
If at least one landmine event in the period...				
Before survey	-0.044	0.002	-0.059	-1.558
	(0.033)	(0.034)	(0.039)	(1.855)
(0-6] months	0.002	0.027*	-0.048**	-3.085***
	(0.019)	(0.016)	(0.021)	(0.870)
(6-12] months	0.040	0.006	0.037*	1.684
	(0.026)	(0.025)	(0.021)	(1.370)
(12-36] months	0.030	-0.015	0.059***	2.563***
	(0.026)	(0.021)	(0.021)	(0.791)
Dep Var Mean	0.397	0.195	0.232	8.827
# Units	5,510	5,510	5,510	5,510
# Clusters	224	224	224	224
Observations	16,530	16,530	16,530	16,530

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 6 km from its residence in the specified windows. Sample includes household heads and their spouses when they have one. *If worked off own farm* is whether individuals worked outside the household's agricultural fields in the last week. *If worked jornalero* is whether individuals worked as jornaleros (agricultural day laborers) in the past week. *If worked non-jornalero* is whether individuals had non-jornalero jobs. *Hours worked non-jornalero* is the number of hours worked on non-jornalero jobs per week and is winsorized at the top 1%. The probability values of *If worked jornalero* and *If worked non-jornalero* do not necessarily sum to the value of *If worked off own farm*, as an individual can engage in both types of jobs simultaneously. All specifications include individual/household and year fixed effects and municipality characteristics interacted with indicators of each year of the survey. Municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table A4: Effects of landmine events on own farm labor (4 km buffer)

	If worked on own farm for				(5)
	(1) > 0 hr	(2) ≥ 1 hr	(3) ≥ 2 hr	(4) ≥ 4 hr	If hired labor
If at least one landmine event in the period ...					
Before survey	0.020	0.013	0.022	0.014	0.135**
	(0.056)	(0.047)	(0.055)	(0.058)	(0.058)
(0-6] months	-0.030	-0.034	-0.028	-0.006	0.067**
	(0.028)	(0.028)	(0.026)	(0.022)	(0.034)
(6-12] months	-0.060*	-0.069*	-0.068*	-0.031	-0.071
	(0.034)	(0.041)	(0.040)	(0.039)	(0.055)
(12-36] months	-0.059**	-0.044**	-0.040	-0.035*	0.059*
	(0.023)	(0.022)	(0.026)	(0.021)	(0.035)
Dep Var Mean	0.455	0.424	0.364	0.258	0.335
Sample	Ind.	Ind.	Ind.	Ind.	HH
# Individuals	5,485	5,485	5,485	5,485	3,213
# Clusters	224	224	224	224	224
Observations	16,455	16,455	16,455	16,455	9,639

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 4 km from its residence in the specified windows. In columns 1 through 4, sample includes household heads and their spouses when they have one. *If worked on own farm for ...* is whether household members spent more than 0 hours, or greater than or equal to 1, 2 or 4 hours per day on agricultural tasks on farms that households own. *If hired labor* indicates whether households have hired jornaleros (agricultural day laborers) in the past 12 months. All specifications include individual/household and year fixed effects and municipality characteristics interacted with indicators of each round of the survey. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table A5: Effects of landmine events on own farm labor (6 km buffer)

	If worked on own farm for				(5)
	(1) > 0 hr	(2) ≥ 1 hr	(3) ≥ 2 hr	(4) ≥ 4 hr	If hired labor
If at least one landmine event in the period ...					
Before survey	-0.020	-0.044	-0.018	0.019	0.158***
	(0.049)	(0.043)	(0.045)	(0.045)	(0.054)
(0-6] months	-0.070***	-0.069***	-0.059***	-0.033*	0.048*
	(0.023)	(0.022)	(0.022)	(0.019)	(0.027)
(6-12] months	-0.025	-0.023	-0.053	-0.032	-0.052
	(0.032)	(0.031)	(0.033)	(0.032)	(0.032)
(12-36] months	-0.004	-0.011	-0.007	-0.016	0.020
	(0.023)	(0.024)	(0.025)	(0.023)	(0.039)
Dep Var Mean	0.455	0.424	0.364	0.258	0.335
Sample	Ind.	Ind.	Ind.	Ind.	HH
# Individuals	5,485	5,485	5,485	5,485	3,213
# Clusters	224	224	224	224	224
Observations	16,455	16,455	16,455	16,455	9,639

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 6 km from its residence in the specified windows. In columns 1 through 4, sample includes household heads and their spouses when they have one. *If worked on own farm for ...* is whether household members spent more than 0 hours, or greater than or equal to 1, 2 or 4 hours per day on agricultural tasks on farms that households own. *If hired labor* indicates whether households have hired jornaleros (agricultural day laborers) in the past 12 months. All specifications include individual/household and year fixed effects and municipality characteristics interacted with indicators of each round of the survey. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table A6: Effects of landmine events on labor allocation outside own farm (donut analysis)

	(1) If worked off own farm	(2) If worked jornalero	(3) If worked non-jornalero	(4) Hours worked non-jornalero
Inner circle [0-5 km]				
If event before survey	0.044	0.028	0.008	1.092
	(0.044)	(0.043)	(0.042)	(2.033)
If event in (0-6] months	0.003	0.030	-0.046*	-3.440***
	(0.023)	(0.020)	(0.024)	(0.995)
If event in (6-12] months	0.002	-0.001	0.002	0.630
	(0.030)	(0.027)	(0.027)	(1.642)
If event in (12-36] months	0.036	-0.002	0.048**	2.206***
	(0.026)	(0.023)	(0.019)	(0.789)
Inner ring (5-10 km]				
If event before survey	0.019	0.007	0.015	1.138
	(0.033)	(0.019)	(0.031)	(1.158)
If event in (0-6] months	-0.019	-0.007	-0.025	-1.669**
	(0.021)	(0.014)	(0.019)	(0.745)
If event in (6-12] months	-0.041*	-0.025	-0.002	-1.070
	(0.023)	(0.019)	(0.023)	(0.844)
If event in (12-36] months	0.005	-0.011	0.029*	1.324*
	(0.017)	(0.014)	(0.015)	(0.712)
Outer ring (10-20 km]				
If event before survey	0.010	0.004	-0.001	0.241
	(0.019)	(0.013)	(0.017)	(0.733)
If event in (0-6] months	-0.013	-0.024**	-0.004	0.546
	(0.016)	(0.011)	(0.016)	(0.679)
If event in (6-12] months	-0.034	-0.001	-0.037*	-1.874**
	(0.021)	(0.013)	(0.020)	(0.749)
If event in (12-36] months	0.026*	0.010	0.023	1.167*
	(0.015)	(0.013)	(0.015)	(0.634)
Dep Var Mean	0.397	0.195	0.232	8.827
# Units	5,510	5,510	5,510	5,510
# Clusters	224	224	224	224
Observations	16,530	16,530	16,530	16,530

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event (i) within 5 km, (ii) 5 to 10 km, (iii) 10 to 20 km from its residence in the specified windows. Sample includes household heads and their spouses when they have one. *If worked off own farm* is whether individuals worked outside the household's agricultural fields in the last week. *If worked jornalero* is whether individuals worked as jornaleros (agricultural day laborers) in the past week. *If worked non-jornalero* is whether individuals had non-jornalero jobs. *Hours worked non-jornalero* is the number of hours worked on non-jornalero jobs per week and is winsorized at the top 1%. The probability values of *If worked jornalero* and *If worked non-jornalero* do not necessarily sum to the value of *If worked off own farm*, as an individual can engage in both types of jobs simultaneously. All specifications include individual/household and year fixed effects and municipality characteristics at baseline interacted with year FE. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table A7: Effect of landmine events on labor allocation outside own farm by previous exposure

	(1) If worked off own farm	(2) If worked jornalero	(3) If worked non-jornalero	(4) Hours worked non-jornalero
If at least one landmine event in the period...				
Before survey	0.054	0.018	-0.002	-0.529
	(0.076)	(0.077)	(0.041)	(2.340)
(0-6] months	-0.011	0.029	-0.064**	-3.577***
	(0.027)	(0.020)	(0.027)	(1.013)
(6-12] months	0.018	-0.047	0.061	3.683
	(0.052)	(0.036)	(0.050)	(2.722)
(12-36] months	0.037	0.004	0.025	0.764
	(0.049)	(0.031)	(0.029)	(1.196)
Since 2002 until 36 mos.	0.008	-0.028	0.033	1.441
	(0.032)	(0.026)	(0.022)	(0.877)
If events since 2002 until 36 mos. × If events ...				
... Before survey	-0.023	-0.011	0.040	2.818
	(0.077)	(0.066)	(0.045)	(2.636)
... (0-6] months	0.070*	-0.013	0.097***	3.428**
	(0.038)	(0.030)	(0.037)	(1.471)
... (6-12] months	-0.009	0.065*	-0.080*	-4.066
	(0.052)	(0.037)	(0.047)	(2.774)
... (12-36] months	-0.035	0.000	-0.007	0.181
	(0.058)	(0.038)	(0.039)	(1.507)
Linear combs. (If events in time window + If events in time window × Exposed before)				
Before survey	0.030	0.007	0.037	2.289
(0-6] months	0.059*	0.016	0.034	-0.149
(6-12] months	0.009	0.018	-0.018	-0.383
(12-36] months	0.002	0.004	0.017	0.945
Dep Var Mean	0.397	0.195	0.232	8.827
# Units	5,510	5,510	5,510	5,510
# Clusters	224	224	224	224
Observations	16,530	16,530	16,530	16,530

Notes: Standard errors clustered at the village level in parenthesis. Independent variables indicate if household experienced a landmine event within 5 km from its residence in the specified windows. Last four regressors refer to interactions with an indicator of whether household experienced a landmine event since 2002 until 36 months prior to March 1 of the year the household was surveyed. Linear combinations correspond to the estimate of the sum of uninteracted plus interacted term of the same time period. Sample includes heads and their spouses when they have one. Hours worked per week excluding agricultural daily laborers winsorized at the top 1%. All specifications include individual and year fixed effects, and municipality characteristics interacted with indicators for each round of the survey. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table A8: Effects of landmine events on hours of labor allocated outside of own farm by previous exposure

	Hours worked in the past week		
	(1) Agriculture (non-jornalero)	(2) Non-agric. (non-jornalero)	(3) Jornalero
If at least one landmine event in the period...			
Before survey	1.804	0.931	2.243
	(1.966)	(1.793)	(1.596)
(0-6] months	-3.933***	-0.515	1.573
	(1.391)	(1.616)	(1.644)
(6-12] months	5.914**	4.039	-2.993
	(2.841)	(2.685)	(1.893)
(12-36] months	2.566	-0.211	2.268
	(1.861)	(1.244)	(1.548)
Since 2002 until 36 mos.	3.376**	2.095*	1.291
	(1.349)	(1.177)	(1.230)
If events since 2002 until 36 mos. × If events ...			
... Before survey	0.000	0.000	0.000
	(.)	(.)	(.)
... (0-6] months	3.467*	0.036	-1.155
	(2.043)	(2.140)	(2.031)
... (6-12] months	-6.433***	-4.077*	2.003
	(2.468)	(2.318)	(2.111)
... (12-36] months	-0.439	0.082	-0.636
	(2.130)	(1.505)	(1.775)
Linear combs. (If events in period + If events in period × Exposed before)			
Before survey	1.804	0.931	2.243
(0-6] months	-0.466	-0.478	0.418
(6-12] months	-0.519	-0.039	-0.990
(12-36] months	2.127**	-0.129	1.632
Dep Var Mean	3.504	6.305	5.853
# Units	5,510	5,510	5,510
# Clusters	224	224	224
Observations	11,020	11,020	11,020

Notes: Standard errors clustered at the village level in parenthesis. Independent variables indicate if household experienced a landmine event within 5 km from its residence in the specified windows. Last four regressors refer to interactions with an indicator of whether household experienced a landmine event since 2002 until 36 months prior to March 1 of the year the household was surveyed. Linear combinations correspond to the estimate of the sum of uninteracted plus interacted term of the same time period. Sample includes heads and their spouses when they have one and the two last rounds of the survey. All specifications include individual and year fixed effects, and municipality characteristics interacted with indicators for each round of the survey. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table A9: Effects of landmine events on own farm labor by previous exposure

	If worked on own farm for				(5)
	(1) > 0 hr	(2) ≥ 1 hr	(3) ≥ 2 hr	(4) ≥ 4 hr	If hired labor
If at least one landmine event in the period...					
Before survey	0.018	-0.011	-0.002	-0.009	0.256**
	(0.041)	(0.034)	(0.056)	(0.042)	(0.104)
(0-6] months	-0.032	-0.027	-0.004	0.026	0.064*
	(0.037)	(0.036)	(0.038)	(0.030)	(0.038)
(6-12] months	-0.009	0.010	0.005	0.049**	-0.138**
	(0.029)	(0.031)	(0.037)	(0.020)	(0.065)
(12-36] months	-0.070*	-0.074*	-0.058	-0.046	0.063
	(0.036)	(0.038)	(0.038)	(0.036)	(0.047)
Since 2002 until 36 mos.	0.062*	0.078**	0.059*	0.053*	-0.041
	(0.034)	(0.031)	(0.031)	(0.028)	(0.031)
If events since 2002 until 36 mos. $\times$ If events...					
... Before survey	-0.022	0.004	0.027	0.038	-0.070
	(0.052)	(0.060)	(0.074)	(0.052)	(0.135)
... (0-6] months	-0.031	-0.025	-0.057	-0.073*	-0.004
	(0.055)	(0.051)	(0.053)	(0.039)	(0.053)
... (6-12] months	-0.058	-0.091*	-0.120**	-0.135***	0.091
	(0.043)	(0.049)	(0.055)	(0.042)	(0.099)
... (12-36] months	0.053	0.054	0.060	0.043	-0.026
	(0.047)	(0.045)	(0.043)	(0.038)	(0.047)
Linear combs. (If events in period + If events in period $\times$ Exposed before)					
Before survey	-0.004	-0.008	0.025	0.030	0.185**
(0-6] months	-0.063	-0.052	-0.061	-0.047*	0.060
(6-12] months	-0.067**	-0.081**	-0.115***	-0.086**	-0.047
(12-36] months	-0.017	-0.020	0.003	-0.003	0.037
Dep Var Mean	0.455	0.424	0.364	0.258	0.335
Sample	Ind.	Ind.	Ind.	Ind.	HH
# Units	5,485	5,485	5,485	5,485	3,213
# Clusters	224	224	224	224	224
Observations	16,455	16,455	16,455	16,455	9,639

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 5 km from its residence in the specified windows. Last four regressors refer to interactions with an indicator of whether household experienced a landmine event since 2002 until 36 months prior to March 1 of the year the household was surveyed. Linear combinations correspond to the estimate of the sum of uninteracted plus interacted term of the same time period. Sample includes heads and their spouses when they have one for the first for columns and households in the fifth column. All specifications include individual and year fixed effects, and municipality characteristics interacted with indicators for each round of the survey. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table A10: Descriptive statistics by land ownership

	Owners		Non-owners		Difference	Standard error
	Mean	Standard deviation	Mean	Standard deviation	Owners − Non-owners	
Age	46.98	12.12	40.82	11.34	6.16	0.339
Education years	4.23	3.13	4.38	3.26	-0.14	0.091
Male	0.484	0.500	0.488	0.500	-0.004	0.014
Land holdings (ha)	2.62	4.48	1.18	3.78	1.44	0.161
Credit	0.379	0.485	0.291	0.454	0.088	0.018
Formal credit	0.273	0.445	0.098	0.298	0.174	0.015

Notes: Owners correspond to households who owned at least one plot in 2010, whereas non-owners correspond to those who did not own plots in 2010. Difference between owners and non-owners and its standard error are reported. All outcomes are at the individual level (household heads + spouses), except households' number of hectares they have access to, whether household took a credit, and whether household took a formal credit.

Table A11: Effects of landmine events on labor allocation outside own farm by land ownership

	(1) If worked off own farm	(2) If worked jornalero	(3) If worked non-jornalero	(4) Hrs. worked non-jornalero
If at least one landmine event in the period ...				
Before survey	0.046	0.037	0.007	1.577
	(0.047)	(0.048)	(0.040)	(1.992)
(0-6] months	-0.008	0.012	-0.042*	-2.576**
	(0.021)	(0.018)	(0.025)	(1.063)
(6-12] months	-0.009	-0.031	0.009	0.489
	(0.036)	(0.029)	(0.033)	(1.710)
(12-36] months	0.037	0.004	0.046**	1.739*
	(0.027)	(0.022)	(0.021)	(0.940)
Non-owner × If events ...				
... Before survey	-0.101	-0.104	0.005	-5.190
	(0.083)	(0.091)	(0.084)	(3.272)
... (0-6] months	0.079*	0.076*	0.018	-0.819
	(0.044)	(0.040)	(0.044)	(1.797)
... (6-12] months	0.080	0.148**	-0.028	3.491
	(0.079)	(0.057)	(0.090)	(3.012)
... (12-36] months	-0.046	-0.033	-0.010	0.440
	(0.051)	(0.045)	(0.048)	(2.241)
Linear combs. (If events in period + Non-owner × If events in period...)				
Before survey	-0.055	-0.067	0.012	-3.613
(0-6] months	0.071	0.088**	-0.024	-3.395**
(6-12] months	0.071	0.117**	-0.019	3.980
(12-36] months	-0.009	-0.029	0.037	2.178
Dep Var Mean	0.397	0.195	0.232	8.827
# Units	5,510	5,510	5,510	5,510
# Clusters	224	224	224	224
Observations	16,530	16,530	16,530	16,530

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 5 km from its residence in the specified windows. Sample includes household heads and their spouses when they have one. *If worked off own farm* is whether individuals worked outside the household's agricultural fields in the last week. *If worked jornalero* is whether individuals worked as jornaleros (agricultural day laborers) in the past week. *If worked non-jornalero* is whether individuals had non-jornalero jobs. *Hrs. worked non-jornalero* is the number of hours worked on non-jornalero jobs per week and is winsorized at the top 1%. Households classified on whether they owned land when they were surveyed in 2010. All specifications include individual and year fixed effects and municipality characteristics at baseline interacted with indicators for each survey round. Linear combinations correspond to the estimate of the sum of uninteracted plus interacted term of the same time period. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table A12: Effects of landmine events on agricultural and non-agricultural work by land ownership

	Hours worked in the past week		
	(1) Agriculture Non-jornalero	(2) Non-agriculture non-jornalero	(3) Jornalero
If at least one landmine event in period...			
Before survey	-0.843	2.696	3.471*
	(2.906)	(1.712)	(1.764)
(0-6] months	-2.040*	0.601	-0.762
	(1.211)	(1.349)	(1.106)
(6-12] months	0.531	-0.271	-3.152**
	(1.919)	(1.271)	(1.300)
(12-36] months	2.903***	-0.402	2.315*
	(0.834)	(0.891)	(1.279)
Non-owner × If events...			
... Before survey	5.501*	-10.227**	-4.530
	(3.113)	(4.628)	(4.420)
... (0-6] months	0.211	-4.652**	7.326***
	(1.902)	(2.027)	(2.168)
... (6-12] months	-4.484	4.916	10.094***
	(2.773)	(3.710)	(3.110)
... (12-36] months	-3.208*	0.770	-2.643
	(1.666)	(2.268)	(2.141)
Linear combs. (If events in period + Non-owner × If events in period ...)			
Before survey	4.658**	-7.531	-1.059
(0-6] months	-1.828	-4.052**	6.565***
(6-12] months	-3.953	4.645	6.942*
(12-36] months	-0.305	0.368	-0.328
Dep Var Mean	3.504	6.305	5.853
# Units	5,510	5,510	5,510
# Clusters	224	224	224
Observations	11,020	11,020	11,020

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 5 km from its residence in the specified windows. Outcome variables correspond to hours worked by individuals in the past week. Sample include household heads and their spouses when they have one. Only the last two rounds of the household survey (2013, 2016) are considered. All specifications include individual/household and year fixed effects and municipality characteristics at baseline interacted with year FE. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table A13: Effects of landmine events on labor input on own farm by land ownership

	If worked on own farm for				(5)
	(1) > 0 hr	(2) ≥ 1 hr	(3) ≥ 2 hr	(4) ≥ 4 hr	If hired labor
If events before survey	-0.048	-0.043	0.001	0.009	0.162***
	(0.048)	(0.050)	(0.047)	(0.036)	(0.060)
If events in (0-6] months	-0.073***	-0.066***	-0.052**	-0.013	0.056*
	(0.024)	(0.023)	(0.026)	(0.020)	(0.031)
If events in (6-12] months	-0.041	-0.043	-0.067**	-0.030	-0.060
	(0.027)	(0.032)	(0.029)	(0.025)	(0.062)
If events in (12-36] months	-0.023	-0.025	-0.011	-0.023	0.050
	(0.026)	(0.026)	(0.026)	(0.025)	(0.038)
Non-owner × ...					
... If events before survey	0.276***	0.186	0.087	0.038	0.298*
	(0.102)	(0.118)	(0.099)	(0.121)	(0.174)
... If events in (0-6] months	0.088	0.068	0.074*	0.015	0.079
	(0.059)	(0.055)	(0.044)	(0.034)	(0.055)
... If events in (6-12] months	-0.049	-0.038	0.008	0.024	-0.179
	(0.063)	(0.069)	(0.046)	(0.104)	(0.151)
... If events in (12-36] months	0.008	0.013	-0.004	0.026	-0.068
	(0.054)	(0.054)	(0.051)	(0.058)	(0.047)
Linear combinations (If event in period + Non-owner × If event in period...)					
Before survey	0.228**	0.143	0.088	0.047	0.460***
(0-6] months	0.015	0.002	0.022	0.002	0.135**
(6-12] months	-0.090*	-0.080	-0.058	-0.007	-0.239**
(12-36] months	-0.016	-0.012	-0.015	0.003	-0.018
Dep Var Mean	0.455	0.424	0.364	0.258	0.335
Sample	Ind.	Ind.	Ind.	Ind.	HH
# Units	5,485	5,485	5,485	5,485	3,213
# Clusters	224	224	224	224	224
Observations	16,455	16,455	16,455	16,455	9,639

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 5 km from its residence in the specified windows. Sample includes household heads and their spouses when they have one. In columns 1 through 4, sample includes household heads and their spouses when they have one. *If worked on own farm for...* is whether household members spent more then 0 hours, or greater than or equal to 1, 2 or 4 hours per day on agricultural tasks on farms that households own. *If hired labor* indicates whether households have hired jornaleros (agricultural day laborers) in the past 12 months. Individuals classified based on whether they belong to a household that does not own land when surveyed in 2010. Linear combinations correspond to the estimate of the sum of uninteracted plus interacted term of the same time period. All specifications include individual/household and year fixed effects and municipality characteristics interacted with indicators for each round of the survey. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table A14: Effects of landmine events on land use by land ownership

	Number of hectares allocated to				
	(1)	(2)	(3)	(4)	(5)
	Cultivations	Perennial	Seasonal	Mixed	Livestock raising
If events before survey	-0.002	-0.215	0.091	0.098	0.096
	(0.167)	(0.346)	(0.078)	(0.206)	(0.256)
If events in (0-6] months	-0.117*	-0.110	0.028	-0.003	-0.063
	(0.065)	(0.069)	(0.034)	(0.038)	(0.122)
If events in (6-12] months	-0.022	0.044	-0.038	0.015	-0.211
	(0.075)	(0.226)	(0.064)	(0.165)	(0.172)
If events in (12-36] months	0.085	0.075	0.004	-0.013	-0.201*
	(0.091)	(0.075)	(0.040)	(0.052)	(0.111)
Non-owner × ...					
... If events before survey	0.555**	0.360*	0.008	0.185	0.362
	(0.268)	(0.200)	(0.100)	(0.302)	(0.428)
... If events in (0-6] months	0.206**	0.176**	0.029	-0.003	0.162
	(0.087)	(0.071)	(0.049)	(0.059)	(0.190)
... If events in (6-12] months	-0.391**	-0.329**	-0.022	-0.066	0.136
	(0.168)	(0.138)	(0.077)	(0.190)	(0.222)
... If events in (12-36] months	0.028	-0.047	0.022	0.070	0.088
	(0.130)	(0.078)	(0.045)	(0.096)	(0.222)
Linear combinations					
Before survey	0.553	0.146	0.098	0.283**	0.458
(0-6] months	0.089	0.066	0.057	-0.006	0.098
(6-12] months	-0.413**	-0.285	-0.060**	-0.051	-0.075
(12-36] months	0.112	0.028	0.026	0.057	-0.112
Dep Var Mean	0.785	0.368	0.218	0.148	0.889
# Units	3,213	3,213	3,213	3,213	3,213
# Clusters	224	224	224	224	224
Observations	9,639	9,639	9,639	9,639	9,639

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 5 km from its residence in the specified windows. All outcomes are measured in hectares at the household level and are winsorized at the top 1%. Individuals classified based on whether they belong to a household that does not own land when surveyed in 2010. Linear combinations correspond to the estimate of the sum of uninteracted plus interacted term of the same time period. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table A15: Effects of landmine events on income by land ownership

	Income earned in the past month		
	(1) Off own farm work	(2) Non-jornalero	(3) Jornalero
If events before survey	10.30	2.67	9.42
	(17.801)	(17.831)	(13.066)
If events in (0-6] months	-28.91***	-30.99***	1.80
	(10.788)	(9.878)	(6.346)
If events in (6-12] months	-14.13	-3.70	-8.74
	(11.504)	(11.131)	(6.200)
If events in (12-36] months	30.21***	23.74**	6.38
	(10.279)	(9.700)	(5.922)
Non-owner × ...			
... If events before survey	11.67	17.02	-10.35
	(37.953)	(36.053)	(37.784)
... If events in (0-6] months	15.41	-13.17	26.69*
	(24.189)	(22.487)	(14.361)
... If events in (6-12] months	29.97	-12.41	40.78
	(36.016)	(25.263)	(25.644)
... If events in (12-36] months	24.03	18.20	2.55
	(24.473)	(22.114)	(13.150)
Linear combs. (If events in period + Non-owner × If events in period...)			
Before survey	21.97	19.69	-0.94
(0-6] months	-13.50	-44.16**	28.48**
(6-12] months	15.84	-16.10	32.03
(12-36] months	54.24**	41.93**	8.93
Dep Var Mean	153.33	93.45	57.87
# Individuals	5,489	5,489	5,489
# Clusters	224	224	224
Observations	16,467	16,467	16,467

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 5 km from its residence in the specified windows. Sample includes household heads and their spouses when they have one. All monetary values are expressed in thousands of Colombian Pesos (base December 2018) and winsorized at the top 1%. Households classified on whether they owned land when they were surveyed in 2010. Linear combinations correspond to the estimate of the sum of uninteracted plus interacted term of the same time period. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table A16: Effect of landmine events on adults' healthcare seeking (4 km buffer)

	Sought medical assistance for preventative care in the past 12 months					
	(1) Any non alternative	(2) GP/ specialist	(3) Dentist	(4) Optometrist	(5) Family planning	(6) Alternative medicine
If at least one landmine event in period...						
Before survey	-0.050	-0.068	-0.138***	-0.058**	-0.007	0.013
	(0.056)	(0.061)	(0.053)	(0.027)	(0.024)	(0.027)
(0-6] months	-0.029	-0.023	-0.046*	-0.014	0.027*	0.025***
	(0.033)	(0.027)	(0.024)	(0.019)	(0.016)	(0.009)
(6-12] months	0.026	0.042	0.112**	0.036	0.021	0.023
	(0.036)	(0.033)	(0.049)	(0.029)	(0.015)	(0.019)
(12-36] months	-0.026	0.012	0.021	-0.027**	0.017	0.028**
	(0.034)	(0.034)	(0.028)	(0.014)	(0.017)	(0.014)
Dep Var Mean	0.658	0.605	0.400	0.132	0.091	0.030
# Individuals	5,484	5,484	5,484	5,484	5,484	5,484
# Clusters	224	224	224	224	224	224
Observations	16,452	16,452	16,452	16,452	16,452	16,452

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 4 km from its residence in the specified windows. Sample includes household heads and their spouses when they have one. All specifications include individual and year fixed effects and municipality characteristics at baseline interacted with year FE. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table A17: Effect of landmine events on adults' healthcare seeking (6 km buffer)

	Sought medical assistance for preventative care in the past 12 months					
	(1) Any non alternative	(2) GP/ specialist	(3) Dentist	(4) Optometrist	(5) Family planning	(6) Alternative medicine
If at least one landmine event in period...						
Before survey	-0.117**	-0.109**	-0.112***	-0.048**	-0.003	0.022
	(0.051)	(0.044)	(0.042)	(0.021)	(0.023)	(0.016)
(0-6] months	-0.038	-0.037*	-0.053**	-0.024	0.021	0.017**
	(0.025)	(0.022)	(0.022)	(0.016)	(0.014)	(0.007)
(6-12] months	0.028	0.038	0.032	-0.006	0.008	0.004
	(0.040)	(0.034)	(0.035)	(0.022)	(0.015)	(0.012)
(12-36] months	0.018	0.051*	0.047*	-0.004	-0.006	0.014
	(0.029)	(0.029)	(0.024)	(0.017)	(0.020)	(0.010)
Dep Var Mean	0.658	0.605	0.400	0.132	0.091	0.030
# Individuals	5,484	5,484	5,484	5,484	5,484	5,484
# Clusters	224	224	224	224	224	224
Observations	16,452	16,452	16,452	16,452	16,452	16,452

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 6 km from its residence in the specified windows. Sample includes household heads and their spouses when they have one. All specifications include individual and year fixed effects and municipality characteristics at baseline interacted with year FE. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table A18: Effect of landmine events on adults' healthcare seeking by land ownership

	Sought medical assistance for preventative reasons in the past 12 months					
	(1) Any non alternative	(2) GP/ specialist	(3) Dentist	(4) Optometrist	(5) Family planning	(6) Alternative medicine
If at least one landmine event in period...						
Before survey	-0.053	-0.055	-0.175***	-0.060**	-0.021	0.026
	(0.063)	(0.066)	(0.059)	(0.029)	(0.023)	(0.017)
(0-6] months	-0.024	-0.038	-0.026	-0.015	0.027*	0.013
	(0.034)	(0.031)	(0.030)	(0.020)	(0.015)	(0.010)
(6-12] months	0.038	0.039	0.108***	0.003	0.029	0.008
	(0.054)	(0.053)	(0.042)	(0.025)	(0.021)	(0.014)
(12-36] months	-0.001	0.042	0.034	-0.009	-0.003	0.033**
	(0.030)	(0.031)	(0.028)	(0.019)	(0.020)	(0.013)
Non-owner × If events in ...						
... Before survey	-0.155	-0.172	0.098	-0.017	0.015	-0.016
	(0.138)	(0.124)	(0.085)	(0.056)	(0.073)	(0.037)
... (0-6] months	-0.058	-0.028	-0.099**	-0.033	-0.035	0.019
	(0.049)	(0.052)	(0.049)	(0.032)	(0.026)	(0.021)
... (6-12] months	0.047	0.039	-0.097	0.032	-0.059	-0.025
	(0.099)	(0.071)	(0.059)	(0.038)	(0.074)	(0.021)
... (12-36] months	0.043	0.012	0.074	0.011	0.032	-0.017
	(0.047)	(0.053)	(0.061)	(0.031)	(0.036)	(0.013)
Linear combinations (If events in period + Non-owner × If events in period...)						
Before survey	-0.207**	-0.227***	-0.077	-0.076	-0.007	0.011
(0-6] months	-0.082*	-0.066	-0.125***	-0.047*	-0.008	0.033*
(6-12] months	0.085	0.078**	0.011	0.035	-0.030	-0.016
(12-36] months	0.042	0.054	0.107*	0.002	0.030	0.016
Dep Var Mean	0.658	0.605	0.400	0.132	0.091	0.030
# Units	5,484	5,484	5,484	5,484	5,484	5,484
# Clusters	224	224	224	224	224	224
Observations	16,452	16,452	16,452	16,452	16,452	16,452

Notes: Standard errors clustered at the village level in parentheses. Independent variables indicate if household experienced a landmine event within 5 km from its residence in the specified windows. Individuals classified based on whether they belong to a household that does not own land when surveyed in 2010. Linear combinations correspond to the estimate of the sum of uninteracted plus interacted term of the same time period. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%

Table A19: Effect of landmine events on chilldren's healthcare seeking by land ownership

	Sought medical assistance for preventative reasons in the past 12 months					
	(1) Any non alternative	(2) GP/ specialist	(3) Dentist	(4) Optometrist	(5) Pediatrician	(6) Alternative medicine
If at least one landmine event in period...						
Before survey	-0.086	-0.147*	-0.167**	-0.111	-0.099	0.002
	(0.082)	(0.078)	(0.069)	(0.071)	(0.090)	(0.024)
(0-6] months	0.028	-0.047	-0.028	-0.003	0.027	-0.008
	(0.031)	(0.038)	(0.044)	(0.022)	(0.033)	(0.007)
(6-12] months	0.008	0.040	0.088	0.125**	0.042	0.028***
	(0.053)	(0.056)	(0.066)	(0.057)	(0.034)	(0.008)
(12-36] months	0.018	0.048	-0.049	0.015	-0.035	0.027*
	(0.044)	(0.048)	(0.048)	(0.036)	(0.029)	(0.015)
Non-owner × If events in...						
... Before survey	0.083	0.231	0.068	0.117	0.180*	-0.007
	(0.181)	(0.205)	(0.124)	(0.104)	(0.108)	(0.026)
... (0-6] months	-0.043	0.025	-0.065	0.009	-0.030	0.004
	(0.061)	(0.073)	(0.084)	(0.041)	(0.062)	(0.009)
... (6-12] months	-0.055	-0.176*	-0.168**	-0.091	-0.048	-0.033***
	(0.083)	(0.095)	(0.076)	(0.084)	(0.050)	(0.009)
... (12-36] months	0.038	-0.009	0.082	-0.004	0.076	-0.031*
	(0.074)	(0.080)	(0.071)	(0.056)	(0.055)	(0.017)
Linear combinations (If events in period + Non-owner × If events in period...)						
Before survey	-0.003	0.084	-0.100	0.007	0.081	-0.005
(0-6] months	-0.014	-0.022	-0.093	0.006	-0.003	-0.004
(6-12] months	-0.047	-0.137	-0.081	0.033	-0.006	-0.005
(12-36] months	0.056	0.040	0.033	0.011	0.041	-0.004
Dep Var Mean	0.836	0.759	0.583	0.133	0.231	0.011
# Units	2,813	2,813	2,813	2,813	2,813	2,813
# Clusters	224	224	224	224	224	224
Observations	8,170	8,170	8,170	8,170	8,170	8,170

Notes: Standard errors clustered at the village level in parenthesis. Independent variables indicate if household experienced a landmine event within 5 km from its residence in the specified windows. Individuals classified based on whether they belong to a household that does not own land when surveyed in 2010. Linear combinations correspond to the estimate of the sum of uninteracted plus interacted term of the same time period. Sample includes children who were 0 to 9 years old in 2010 and were followed in at least two consecutive rounds. All specifications include individual and year fixed effects and municipality characteristics at baseline interacted with year FE. Baseline municipality characteristics include average altitude, population density in 2005, distance to the department's capital, homicide rate in 2005, and indicator of landmine events between 1990 and 2005. *** 1%, ** 5%, * 10%