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

Felipe Parra (Job Market Paper)

Sakina Shibuya

November 20, 2024

Click here for the latest version

Abstract

Antipersonnel landmines instill fear in people living in contaminated areas, disrupting economic activity and altering household decision-making. This paper examines how recent landmine-related events affect rural households' livelihoods. Using administrative records of landmine events combined with spatial household data from the Colombian Longitudinal Survey, we identify incidents near households' residences and employ a fixed effects model to estimate their impact. Our findings indicate that households reduce risky activities, such as agricultural labor and healthcare-seeking, following recent landmine events. Specifically, individuals are 16% less likely to work in long-term agricultural jobs and 12% less likely to work on their own fields if a nearby landmine event occurred shortly before the planting season. These households are also more likely to hire external agricultural workers, likely substituting for their own labor. Furthermore, exposed adults are less inclined to seek formal preventative healthcare. However, responses differ by liquidity constraints: while wealthier households reduce agricultural labor, liquidity-constrained households turn to agricultural day labor to offset income losses from reduced work in other agricultural and non-agricultural occupations. This study sheds light on the unequal risk-bearing capacities of rural households in conflict zones.

*Parra (corresponding author): University of Wisconsin-Madison (parraescobar@wisc.edu). Shibuya: University of Wisconsin-Madison (sshibuya2@wisc.edu). 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, 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

Antipersonnel landmines are common in warfare worldwide, being presently used in at least 13 conflict-affected countries (International Campaign to Ban Landmines, 2023). These weapons are favored by state and non-state armed actors globally for their cost effectiveness and efficiency in incapacitating enemy forces. Despite targeting combatants, civilians constitute the majority of casualties. In 2022, landmines contaminated at least 60 countries, with civilians accounting for 85% of victims (International Campaign to Ban Landmines, 2023). Colombia, enduring over three decades of contamination amid a 60-year conflict, exemplifies this tragedy, with 61% of the 12,152 documented victims being civilians.

The effects of landmines extend beyond the physical harm these devices can cause. In areas affected by landmine contamination, fear permeates daily life, causing individuals to avoid activities that increase their risk of encountering these devices. This disruption hinders economic activity and alters household decision-making processes. Over time, the behavioral changes driven by landmine threats have led to significant long-term effects, such as reduced educational attainment (Lekfuangfu, 2022; Merrouche, 2011), poorer health outcomes (Arcand, Rodella-Boitreaud and Rieger, 2015; Camacho, 2008), and increased poverty (Merrouche, 2008; Takasaki, 2020). However, little is known about how the fear induced by landmines shapes household decision-making, particularly shortly after individuals learn about their presence.

In this paper, we examine the effect of landmine-related events on households' livelihoods, specifically labor market decisions and healthcare-seeking behavior, shortly after they occur. We conduct our analysis in Colombia, where non-state armed actors have installed landmines for the past three decades on agricultural land, along walking paths, and next to roads. As a result, households may decide to reduce risky activities—such as agricultural labor and commuting—in order to minimize the likelihood of encountering landmines. We begin by investigating how households adjust their labor allocation outside their own farms in response to recent and nearby landmine events. We consider both agricultural jobs, such as day labor (hereafter referred to as *jornaleros*[1]) and long-term occupations, as well as non-agricultural work conducted at home or elsewhere. Next, we examine how labor on households' farms changes following landmine events by analyzing the time spent on agricultural tasks and the hiring of agricultural workers. Lastly, we explore whether households alter their preventative healthcare-seeking behavior, a potentially risky activity since rural households in Colombia often need to travel to municipal capitals to receive medical care.

[1] A *jornalero* is a daily laborer involved directly in agricultural production, typically paid a fixed daily wage or piece rate. These jobs tend to offer lower wages and are more sporadic compared to both agricultural and non-agricultural non-*jornalero* jobs.

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.

The primary challenge in identifying the causal effect of landmines on economic behavior arises from the correlation between conflict intensity and the location and timing of landmine events. Non-state armed actors frequently deploy landmines to safeguard their troops, protect strategic assets, and hinder official forces' movements. In addition, the use of landmines tends to increase during periods of heightened conflict. Consequently, landmine events are more likely to occur in areas contested by armed groups and during times of intensified conflict. As a result, landmine events are correlated with both observed and unobserved characteristics of the areas where households reside.

To address this challenge, we leverage a unique aspect of antipersonnel landmines: their exact location is only known to the installers. We argue that, conditional on the level of landmine contamination and conflict intensity in a given area, the occurrence of landmine events can be considered as plausibly exogenous, as these events are sudden and unpredictable for both civilians and military personnel. Since an area's landmine contamination is unobserved, we account for this by exploiting the longitudinal nature of the household data and incorporating a rich set of fixed effects in our estimations. First, we include individual fixed effects to account for the initial level of landmine contamination near households and individuals' prior beliefs about landmine presence. Second, we introduce year fixed effects to control for nationwide changes that affect all individuals simultaneously, such as shifts in conflict dynamics, economic trends, and national policies. Third, we incorporate a detailed set of baseline characteristics, interacted with year fixed effects, to address region-specific conflict dynamics that vary according to the unique attributes of each municipality.

We find that households tend to avoid risky activities after landmine events. Specifically, our results show a reduction in agricultural labor, both on other households' farms and on their own plots. Individuals are 16% less likely to engage in long-term agricultural jobs on other households' farms when a landmine event occurs within 5 km of their residence in the six months prior to the planting season. Similarly, individuals exposed to a landmine event within this time frame are less likely to perform agricultural tasks on their own plots, likely substituting their own labor with external workers. The effects of landmines, however,

diminish over time: exposed individuals increase agricultural labor outside their farms one to three years after a landmine event. In particular, individuals are more likely to work in long-term agricultural jobs on other households' farms when a landmine event has occurred 12 to 36 months before the survey year's planting season. These findings suggest that households' perception of landmine risk fades over time, prompting exposed individuals to resume activities they initially reduced after a landmine event.

Landmine events similarly discourage individuals from seeking preventative healthcare. Our findings indicate that adults are 12% less likely to visit a formal medical professional without being sick following a landmine event in the six months prior to the planting season. Children also show a lower likelihood of visiting formal medical providers, though estimates are less precise. In contrast, adults are more likely to seek alternative medicine following a recent landmine event, possibly due to the closer proximity of alternative medicine providers, which reduces travel distances and lowers transportation costs. While the presence of landmine events may deter individuals from traveling longer distances, the decline in preventative healthcare visits may also be driven by efforts to avoid additional expenses during periods of reduced income.

While these results suggest that households reduce activities that heighten their risk of encountering landmines, we also find evidence that recent landmine events lead exposed individuals to take on agricultural day labor. This finding may appear counterintuitive, as one might expect individuals to avoid risky activities following landmine events, particularly since day labor could increase their likelihood of encountering landmines. However, an alternative explanation is that liquidity-constrained households may engage in risky labor out of necessity—especially if their labor supply in other occupations decreases—in order to smooth consumption, as they have limited access to credit markets. To empirically test this hypothesis, we estimate heterogeneous effects by liquidity constraints, using land ownership as a proxy, as it is closely related to access to credit markets in rural areas.

We find that non-landowners—who are more likely to face liquidity constraints—drive the increase in the probability of working as *jornaleros* following recent landmine events. Specifically, non-landowners are 45% more likely to engage in agricultural day labor if a landmine event occurred in the six months before the planting season, whereas landowners do not adjust their likelihood of working in these jobs if exposed to landmines within the same period. This behavior among liquidity-constrained households likely stems from two factors. First, non-landowners appear to switch from long-term agricultural occupations to *jornalero* work, possibly because the latter can be performed closer to home, thereby reducing commuting risks. Given that households increase their hiring of day laborers after landmine events, they are likely employing nearby individuals who are also exposed to landmine risks.

Second, non-landowners compensate for a drop in labor income from fewer hours in non-agricultural work by taking on *jornalero* jobs.

Finally, we explore several mechanisms that may explain our findings. First, we find that non-landowners reduce their participation in non-agricultural work, particularly in sectors likely to experience a decline in demand after landmine events. Specifically, non-landowners spend less time in wholesale and retail trade occupations, especially in jobs conducted at home, as many individuals in this sector run small shops in their residences. We argue that sales in these shops decrease following landmine events, as nearby individuals face reduced income and mobility. Second, while both landowners and non-landowners hire agricultural workers after landmine events, they appear to do so for different reasons. Landowners reduce the time they spend working on their fields, suggesting they substitute their own labor with external labor. In contrast, non-landowners continue working on their plots, implying they hire agricultural workers to increase agricultural production. This is supported by evidence that non-landowners allocate more land to crop cultivation in their plots following landmine exposure. Third, households appear to become inured to repeated landmine exposure, as only individuals without prior encounters respond to new events. In particular, individuals who did not experience a landmine event 12 to 36 months before the survey year's planting season are less likely to work in long-term agricultural jobs on other households' farms following a landmine event within the six months before the planting season. Conversely, individuals exposed to landmine events in the past one to three years do not adjust their agricultural labor outside their farms following a recent event.

Our paper contributes to three strands of literature. First, we extend the literature on the responses of individuals to violent shocks by considering events geolocated at a much finer level. Previous studies have used self-reported events to measure exposure to violence (Arias, Ibáñez and Zambrano, 2019; Verpoorten, 2009). However, this approach is problematic as respondents may not accurately recall certain events. A larger body of literature has instead used administrative data to construct violence measures at district unit level[2]. Nonetheless, these measures overlook the heterogeneity in exposure to violence within these units. We build on this literature by considering individual exposure to violent shocks, which reveals the heterogeneity in experiences masked by aggregated measures.

Second, our paper contributes to the literature on the effects of landmines on individuals' livelihoods by focusing on the impact of recent exposure to these devices. While previous studies have primarily explored the long-term effects of landmine presence, identifying neg-

[2]These studies have examined the effect of violent shocks on individuals' risk preferences (Brown et al., 2019), education (Brown and Velásquez, 2017; Brück, Di Maio and Miaari, 2019), agricultural production (Adelaja and George, 2019), consumption (Rockmore, 2017), and housing and commodity prices (Besley and Mueller, 2012; Bove and Gavrilova, 2014).

ative outcomes in areas such as education (Lekfuangfu, 2022; Merrouche, 2011), health (Arcand, Rodella-Boitreaud and Rieger, 2015), and poverty (Merrouche, 2008; Takasaki, 2020), research on how individuals respond to recent landmine exposure is limited due to the difficulty of obtaining data during periods of ongoing landmine installation. We address this gap by using data from Colombia prior to the 2016 peace agreement, a time of active conflict marked by continuous placement of antipersonnel landmines. This allows us to examine household behavior immediately after landmine events occur in their vicinity.

Few exceptions exist within these two strands of literature, particularly in studies that explore individuals' responses to violent shocks using individual-level exposure. Callen et al. (2014) and Blumenstock et al. (2024) use geocoded data on violent events to examine the impacts of these shocks on risk preferences and mobile money usage in Afghanistan. Regarding landmines specifically, Vargas et al. (2024) investigate how landmine explosions influence voting behavior in Colombia, using geocoded data to identify blasts near polling stations in the days leading up to elections and finding a reduction in voter turnout. Our paper builds on this emerging body of work by investigating additional outcomes of economic relevance, such as labor market decisions and healthcare-seeking behavior.

Finally, our paper contributes to a recent strand of research studying the local economic effects of demining campaigns (Chiovelli, Papaioannou and Michalopoulos, 2024; Prem, Purroy and Vargas, 2024). While these studies use geocoded data on the location of demining operations, they do not examine individual responses to these clearance efforts. Instead, they focus on outcomes within a specified distance, such as nightlight intensity, standardized test scores, and forest loss. Our study contributes to this literature by investigating how rural residents react to events that make the presence of landmines salient, providing insights into the mechanisms driving the results observed in these studies.

The rest of the paper is organized as follows. Section 2 describes the Colombian armed conflict and the use of landmines by armed actors. Section 3 presents a conceptual framework to understand how farmers respond to landmine events and derives several testable hypotheses. Section 4 discusses the empirical strategy, by describing the landmine events records and household data, as well as the identification strategy that we use to estimate the effect of landmines on rural households' behavior. Section 5 presents the results, and section 6 explores several mechanisms. Finally, section 7 concludes.

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

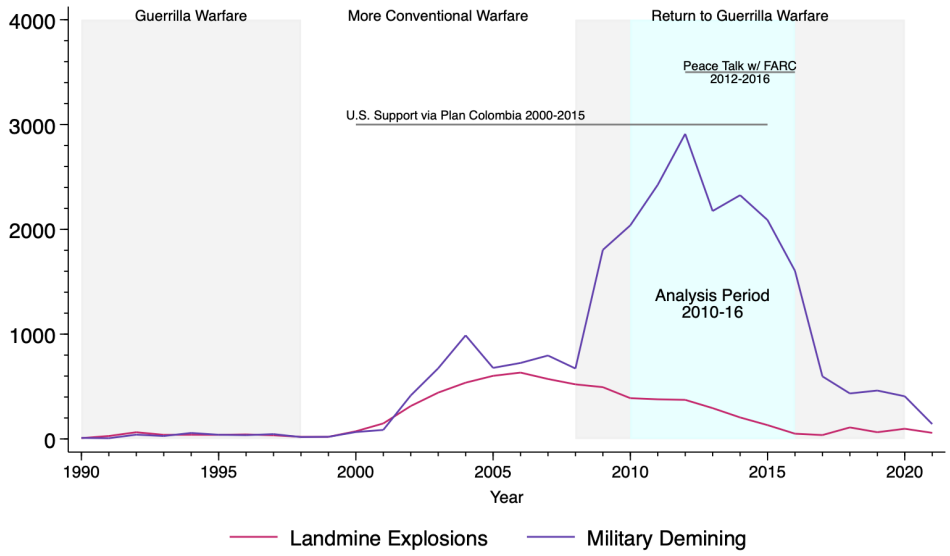
While the war has persisted for over half a century, the wide use of improvised anti-personnel landmines is a relatively new phenomenon that started in the 1990s. Figure 1 shows the evolution of the number of landmine explosions since 1990. Guerrilla groups drastically increased their use of hand-made mines by the end of the 1990s, as it can be seen in a rise in the number of explosions. A dramatic decrease in the number of explosions that starts around 2006 is related more to a decrease in the intensity of the conflict than to a reduction in the use of this weapon. They continued installing them until 2013 when the peace talks with the Colombian 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

Figure 1: Landmine related events and analysis period



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 care 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 walk paths is limited, footpaths that state soldiers use are often those villagers use. These roads go through farming plots, and pass even near houses (lower photo in Figure 2). Guerrillas also often use local schools for meetings and resting at night, as school buildings are often the only large structures in rural villages.

Figure 2: Examples of Improvised Anti-Personnel Landmines in Colombia

Artisanal landmine

Minefield in Valle del Cauca

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.

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[3] 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,

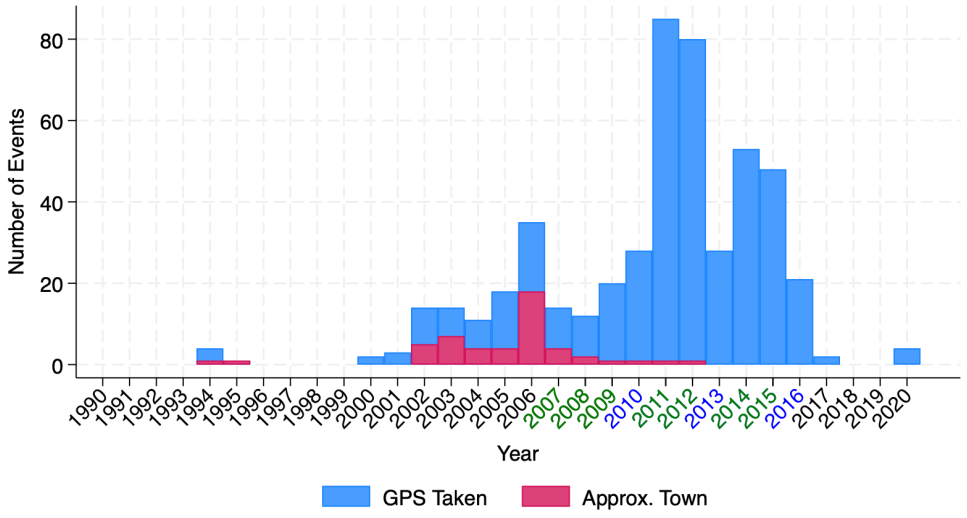
[3]Landmine accidents are undesired events which results in harm, whereas a landmine incident is an event that gives rise to an accident or has the potential to lead to an accident.

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 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.

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

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.

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.

Figure 4: Planting Seasons and Landmine Exposure

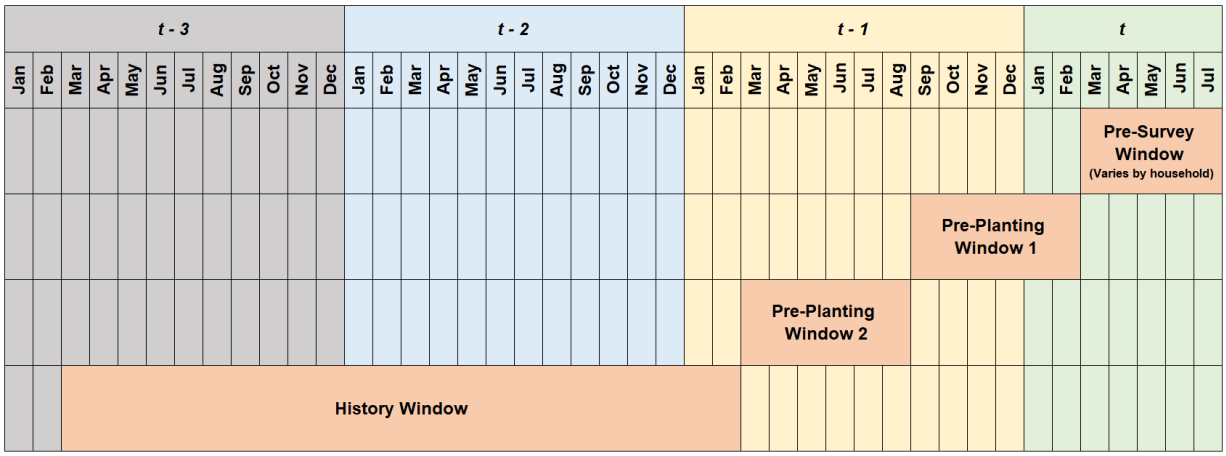


Table 1 presents the proportion of observations in the individual sample exposed to landmine events across all four time windows. The regions surveyed by ELCA were not heavily affected by landmines compared to other parts of the country. In our individual analysis sample, less than 10% of the observations experienced a landmine event in any of the four time windows. Among those affected, the average number of events experienced ranged between one and two across the specified periods. Therefore, our results provide insights into how individuals exposed to landmines react in contexts with medium- or low-intensity conflicts and should be interpreted with caution when extrapolating to contexts with high-intensity conflicts.

Table 1: Proportion of individuals exposed to landmine events

	Prop. of obs. exposed	No. of obs. exposed	No. of events (exposed obs.)
Before survey	0.011	190	1.51
(0-6] months	0.049	815	1.29
(6-12] months	0.022	371	1.15
(12-36] months	0.078	1291	2.02
Since 2005 until 36 mos.	0.119	1973	2.89
Observations	16554		

Notes: Observations correspond to the total number of individuals in the sample times the three rounds in the survey. An observation 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.

Outcome Variable Construction

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

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.

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 they number of days each farmer worked in this type of job in the month before being surveyed[4].

Table 2 shows some summary statistics for the labor market outcomes described above. It is not uncommon for farmers to work outside their farms; 40% of the sample held jobs outside their fields. Most of the farmers worked either as *jornaleros* (20% of the sample) or in non-*jornalero* jobs (23%). Among those engaged in other occupations, they typically held positions in agriculture, wholesale and retail trade, construction, transportation, food preparation, and manufacturing. Additionally, farmers spent an average of 38 hours working in these types of occupations. In terms of income derived from these sources, farmers earn less when working as agricultural daily laborers compared to other occupations. Specifically, farmers earn, on average, 45% more when working in other occupations than as agricultural daily laborers. Note that some farmers did not receive any monetary payment for their work either as agricultural daily laborers or in other occupations, suggesting that they may

[4]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.

be compensated with in-kind payments. Finally, nearly one-third of the households in the sample employed workers to assist with agricultural production on their farms.

Table 2: Summary statistics for labor market outcomes

	Obs.	Mean	Std. Dev.	Min.	P25	P50	P75	Max.
If worked off-farm	16530	0.397						
Income Earned[a,b]	6519	409.88	459.09	0	145	316	550	12626
If worked (No Ag. Day Labor)	16530	0.232						
Income earned[a,b]	3797	444.66	536.64	0	130	326	652	12626
Hours worked per week[a]	3829	38.42	22.21	1	20	40	50	156
If worked (Ag. Day Labor)	16530	0.195						
Income earned[a,b]	3199	307.47	247.69	0	137	272	435	7501
If hired agricultural labor	9639	0.335						

[a] Statistics reported for observation who work in the type of job indicated in the heading of the section.
[b] Amounts reported in thousands of COP (December 2018 base)

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. Finally, we look at households' sales from their fields' agricultural production. We have information on the revenue households received from selling the last harvest of each crop they cultivated. For crops that the household had not yet harvested, we recorded zero revenue. Similarly, we calculate the revenue household obtained from selling livestock and animal products they produced over the past 12 months.

Table 3 shows summary statistics of the land outcomes described above. Land ownership is prevalent, with more than two-thirds of the sample owning land. Similarly, access to land is highly widespread, with nearly 90% of the sample having some form of access to land. In terms of size, landowners own an average of 3 hectares, while landholders have access to a very similar amount of land. Additionally, the size of landholdings varies significantly

across the sample, ranging from 3 square meters to 126 hectares, with a median size of one hectare. Farmers typically utilize the land they have access to for agricultural production, allocating an average 2 hectares for this purpose. Most of this land is devoted to cultivations, particularly perennial crops, with a median allocation of 0.05 hectares. Although households do not usually allocate land to livestock raising, we observe some large landholdings dedicated to this purpose.

Table 3: Summary statistics of land ownership, access, and use

	Obs.	Mean	Std. Dev.	Min.	P25	P50	P75	Max.
Land ownership	9639	0.69						
Hectares owned[a]	6619	2.95	5.41	0.0007	0.32	1.28	3.25	111
Access to land	9639	0.89						
Hectares with access to[a]	8619	2.98	6.07	0.0003	0.32	1.09	3.20	126
Ag. Production (hectares)[a]	8619	2.07	4.50	0.00	0.15	0.75	2.20	101
Cultivations (hectares)[a]	8619	0.93	1.70	0.00	0.05	0.38	1.00	40
Perennial crops (hectares)[a]	8619	0.45	1.20	0.00	0.00	0.01	0.35	21
Seasonal crops (hectares)[a]	8619	0.28	0.98	0.00	0.00	0.00	0.25	40
Mixed crops (hectares)[a]	8619	0.20	0.83	0.00	0.00	0.00	0.00	23
Livestock raising (hectares)[a]	8619	1.14	4.01	0.00	0.00	0.00	0.64	100

[a] Statistics reported for observation who work in the type of job indicated in the heading of the section.

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.

Seeking healthcare for preventative reasons is common among farmers; 66% of the sample

visits a medical professional, excluding those specializing in alternative medicine, over the past 12 months. Most farmers see general practitioners or specialists (60%), followed by visits to dentists (40%) and optometrists (13%). Among children, healthcare seeking is even more widespread; 83% of the sample visits a medical professional not specializing in alternative medicine over the past 12 months. Most children see 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.

However, the timing of landmine explosions and military demining, which reveal the existence of landmines to nearby inhabitants, is essentially random, conditional on a place's landmine contamination and conflict intensity. This randomness occurs because neither farmers nor military personnel know the exact location of these devices ex-ante.

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 control for time-invariant farmer characteristics, such as the baseline level of landmine contamination new residences and individuals' prior beliefs about landmine presence. Second, we incorporate year fixed effects, which account for nationwide changes in conflict dynamics. Finally, we include interactions between a battery of 2005 municipality characteristics and year fixed effects to control for municipality-specific trends in conflict intensity. 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:

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

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

In this section, we present the estimated effects of landmine events on farmers' labor market decisions and use of health care services. We also show heterogeneous effects by differing levels of previous exposure to landmine events.

5.1 Effects of landmine events on labor market outcomes

We begin by investigating how landmine events influence individuals' labor market decisions. We estimate the effects of landmine events on five labor market outcomes. The first outcome is whether individuals worked outside the household's agricultural fields in the last week. The second outcome is whether individuals had non-*jornalero* jobs. The third outcome is the number of hours worked on this type of jobs per week. The fourth outcome is whether individuals worked as *jornaleros* in the past week. The fifth and final outcome is whether households hired *jornaleros* in the past 12 months. It is important to note that the second and fourth outcomes do not necessarily sum to the first outcome, as an individual can engage in both types of jobs simultaneously.

Table 4 presents the estimated effect on the labor market outcomes described above. First, we find that landmine events do not seem to affect whether individuals work outside their agricultural plots (column 1). However, we observe that farmers reduce their work in non-*jornalero* jobs soon after the landmine events occur, but increase it one to three years past the events. Column 2 shows that individuals reduce the probability of working in non-*jornalero* jobs by 3.8 percentage points following a landmine event in the six months prior to the planting season. Conversely, they increase this probability by 4.5 percentage points if the landmine events occurred during the 12 to 36 months period. Similarly, column 3 shows that

individuals work 2.7 fewer hours per week in non-*jornalero* jobs following a landmine event in 0 to 6 months time window, but work 1.9 more hours in these occupations if the landmine events occurred in the 12 to 36 months period. The reduction in the number of hours allocated to these occupations is primarily driven by a decline in time spent in agricultural non-*jornalero* jobs[5]. Individuals reduce their agricultural work in these occupations by 1.9 hours per week following a landmine event in the six months prior to the planting season, but increase it by 2.3 hours per week if the events occurred in the past 12 to 36 months (table A1, column 1). In contrast, there is no change in the time worked in non-agricultural jobs following landmine exposure (table A1, column 2). These results suggest that individuals reduce labor outside their home, particularly in agriculture, after nearby landmine events, likely because this activity increases the risk of encountering landmines, as armed actors typically install these devices on agricultural land.

On the contrary, column 4 indicates that individuals increase their work in agricultural day labor following nearby landmine events. Our estimation shows that individuals increase the probability of working as *jornaleros* by 3.1 percentage points if a landmine event occurred in the six months before the start of the planting season. As a result, we observe that exposed individuals tend to engage on sporadic agricultural work outside their household farms, where they earn lower wages, while reducing their involvement in more profitable long-term agricultural work (i.e., in non-*jornalero* jobs). This behavior suggests the presence of liquidity-constrained individuals who continue engaging in risky activities to smooth their labor income. In the next section, we explore the existence of these regimes by examining heterogeneous effects of landmine events by land ownership.

Turning to the labor hiring outcome in column 5, results somewhat mirror the effect on agricultural day labor in column 4. Our estimation shows that individuals are 21.2 and 7.2 percentage points more likely to employ agricultural daily workers if exposed during the pre-survey and 0 to 6 months windows, respectively. We also find that individuals decrease the probability of hiring agricultural workers by 8.5 percentage points if they experienced landmine events in the 6 to 12 months pre-planting period, which matches the direction of the coefficient on agricultural day labor in column 4. This suggests that agricultural workers hired in response to landmine events may be performing the tasks that exposed individuals perceive as risky due to the potential presence of landmines.

[5]Table A1 presents the estimated effect of landmine events on hours worked in the past week in *jornalero* and non-*jornalero* jobs, disaggregated into agricultural and non-agricultural jobs. For this analysis, we only consider the last two rounds of the household survey (2013 and 2016) because respondents reported the number of hours worked in the past week for each job, as well as the economic activity associated with each job. In contrast, in 2010, respondents only reported the total number of hours worked outside their plots in all occupations different than *jornalero*, which does not allow us to disaggregate the number of hours worked by economic sector.

Table 4: Effects of landmine events on labor market outcomes

	(1) If Worked Off-Farm	(2) If Worked (Non-*jornalero*)	(3) Hrs. Worked (Non-*jornalero*)	(4) If Worked (*Jornalero*)	(5) If Hired Ag. Labor
If event before survey	0.024	0.005	0.688	0.018	0.212***
	(0.040)	(0.039)	(2.126)	(0.041)	(0.058)
If event in (0-6] months	0.012	-0.038*	-2.743***	0.031*	0.072**
	(0.021)	(0.022)	(0.909)	(0.017)	(0.028)
If event in (6-12] months	0.005	0.005	0.986	-0.006	-0.085*
	(0.031)	(0.029)	(1.778)	(0.027)	(0.048)
If event in (12-36] months	0.027	0.045**	1.864**	-0.004	0.034
	(0.026)	(0.018)	(0.739)	(0.022)	(0.038)
Dep Var Mean	0.397	0.232	8.827	0.195	0.335
Sample	Ind.	Ind.	Ind.	Ind.	HH
# Units	5510	5510	5510	5510	3213
# Clusters	224	224	224	224	224
Observations	16530	16530	16530	16530	9639

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. In column 5, sample include households these individuals belong to. Hours worked per week excluding agricultural daily laborers winsorized at the top 1%. 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%

We assess the robustness of our labor market results by varying the buffer sizes used to define proximity to landmine events. Specifically, we re-estimate the model using landmine events occurring within 4 km and 6 km of households' residences. Tables A2 and A3 present the results for these alternative buffer sizes. The findings remain consistent across both definitions, with a few exceptions in the 4 km specification, where some coefficients decrease in magnitude and become marginally insignificant.

We further test whether landmine events occurring outside the 5 km buffer influence households' labor market decisions. Table A4 reports estimates from a specification that includes events occurring within 5 to 10 km (inner ring) and 10 to 20 km (outer ring) of households' residences, in addition to those within 5 km. Our primary results remain robust after accounting for these additional events, although the estimate for the probability of working as a *jornalero* becomes marginally insignificant due to larger standard errors.

Landmine events occurring farther away generally do not significantly affect labor market decisions, with two notable exceptions. First, individuals reduce the hours allocated to non-*jornalero* jobs following events in the inner ring during the six months before the planting season but increase these hours if exposed to such events 12 to 36 months earlier. Second, landmine events in the outer ring discourage individuals from working as *jornaleros*. This pattern suggests a preference for working in fields closer to home, likely because nearby plots are perceived as safer—individuals may have greater awareness of risks in their immediate surroundings—and because shorter distances help avoid extended travel.

In the conceptual framework, we suggest that one of the reasons why individuals may hire agricultural workers after experiencing landmine events is to replace their own work on their fields with external labor. Table 5 explores this hypothesis by estimating the effects of landmine events on whether farmers spend more than 0 to 4 hours per day on agricultural tasks on their own plots. We find that recently exposed individuals are less likely to spend any time on their own farms. Individuals are 5.5 and 4.5 percentage points less likely to spend non-zero number of hours on their own farms if exposed in the 0 to 6 months and 6 to 12 months pre-planting windows, respectively (column 1). The estimates are similar when the time threshold is one hour or more (column 2), but the effects diminish and disappear for the time threshold of two and four hours (columns 3 and 4)[6]. This result suggests that households hire agricultural workers after landmine exposure to avoid performing agricultural activities on their fields, which increases their likelihood of encountering landmines, while attempting to maintain their agricultural production. Additionally, we observe this behavior among individuals who work for shorter periods of time on their plots. Farmers who work more intensively on their fields continue to do so even after experiencing landmine events.

Table 5: Effect of landmine events on time spent in agricultural jobs in household's farms

	Time spent in ag. jobs in HH's farms			
	(1)	(2)	(3)	(4)
	> 0 hr	≥ 1 hr	≥ 2 hr	≥ 4 hr
If events before survey	0.004	-0.009	0.016	0.017
	(0.044)	(0.037)	(0.038)	(0.042)
If events in (0-6] months	-0.055**	-0.052**	-0.035	-0.010
	(0.024)	(0.024)	(0.026)	(0.020)
If events in (6-12] months	-0.045**	-0.046*	-0.063**	-0.026
	(0.022)	(0.028)	(0.025)	(0.025)
If events in (12-36] months	-0.025	-0.024	-0.013	-0.018
	(0.026)	(0.026)	(0.027)	(0.026)
Dep Var Mean	0.455	0.424	0.364	0.258
# Individuals	5485	5485	5485	5485
# Clusters	224	224	224	224
Observations	16455	16455	16455	16455

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. Outcome variables indicate whether the individual spent any time, at least one hour, two hours, or four hours per day in agricultural jobs in the household's farms. 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%

The results so far indicate that, after one to three years have passed since the landmine events, exposed individuals increase their work in occupations other than agricultural day labor. This behavior may suggest that individuals consider that the likelihood of encountering

[6]Our results are robust to varying the size of the buffers to 4 and 6 km (tables A5 and A6).

landmines while conducting certain activities declines over time. We explore this hypothesis by estimating heterogeneous effects of previous exposure to landmine events on labor market outcomes. Specifically, we construct an indicator of whether individuals and households experienced landmine events from 2002 until 36 months before the start of the planting season preceding the survey interview, and interact this indicator with binary variables denoting whether individuals were exposed to landmines during the different time windows.

Table 6 presents the estimated heterogeneous effects of previous exposure on the labor market outcomes described above. We observe that the results documented so far are primarily driven by farmers without previous exposure. Column 2 shows that individuals reduce the probability of working in non-*jornalero* jobs by 6.4 percentage points if exposed to a landmine event in the six months prior to the start of the planting season and did not experience any exposure since 2002. Conversely, landmine events over the same period do not seem to affect whether individuals work in this type of occupations if they experienced landmine events since 2002. Similarly, column 3 shows that farmers without exposure since 2002 decrease the number of hours worked in this type of jobs by 3.6 hours if they experience a landmine event in the 0 to 6 months pre-planting window. In contrast, landmine events within this time window do not impact the number of hours worked in these occupations by farmers with exposure since 2002.

Similarly, column 5 shows that households without exposure since 2002 increase the probability of hiring agricultural workers by 25.6 and 6.4 percentage points if they experienced a landmine event in the pre-survey and 0 to 6 months pre-planting periods, respectively. Conversely, households with exposure since 2002 who experienced a landmine event in the six months before the start of the planting season are as likely to hire agricultural workers as households with previous exposure but who did not experience events during that time window. Nevertheless, we observe farmers with exposure since 2002 increasing the probability of hiring agricultural workers by 18.5 percentage points (55%) if they experience landmine events during the pre-survey window.

These findings suggest that individuals may become inured to landmine events after repeated exposure. Individuals who have encountered landmines in the past may not alter their current perception of the landmine contamination level in their surroundings after a recent event. Consequently, these individuals do not react to new events, as they have likely adapted to dealing with these devices, given their current perception of the likelihood of encountering landmines. In contrast, farmers without previous exposure may alter their perception of landmine contamination in their surroundings, leading them to significantly modify their behavior to avoid encountering landmines during their daily activities.

Thus far, our findings indicate that individuals reduce their engagement in agricultural

Table 6: Heterogeneous effects of landmine events on labor market outcomes by previous exposure since 2002

	(1) If Worked Off-Farm	(2) If Worked (Non-*jornalero*)	(3) Hrs. Worked (Non-*jornalero*)	(4) If Worked (*Jornalero*)	(5) If Hired Ag. Labor
If events before survey	0.054	-0.002	-0.529	0.018	0.256**
	(0.076)	(0.041)	(2.340)	(0.077)	(0.104)
If events in (0-6] months	-0.011	-0.064**	-3.577***	0.029	0.064*
	(0.027)	(0.027)	(1.013)	(0.020)	(0.038)
If events in (6-12] months	0.018	0.061	3.683	-0.047	-0.138**
	(0.052)	(0.050)	(2.722)	(0.036)	(0.065)
If events in (12-36] months	0.037	0.025	0.764	0.004	0.063
	(0.049)	(0.029)	(1.196)	(0.031)	(0.047)
If events since 2002 until 36 mos.	0.008	0.033	1.441	-0.028	-0.041
	(0.032)	(0.022)	(0.877)	(0.026)	(0.031)
If events since 2002 until 36 mos. × ...					
... If events before survey	-0.023	0.040	2.818	-0.011	-0.070
	(0.077)	(0.045)	(2.636)	(0.066)	(0.135)
... If events in (0-6] months	0.070*	0.097***	3.428**	-0.013	-0.004
	(0.038)	(0.037)	(1.471)	(0.030)	(0.053)
... If events in (6-12] months	-0.009	-0.080*	-4.066	0.065*	0.091
	(0.052)	(0.047)	(2.774)	(0.037)	(0.099)
... If events in (12-36] months	-0.035	-0.007	0.181	0.000	-0.026
	(0.058)	(0.039)	(1.507)	(0.038)	(0.047)
Linear combs. (If events in time window + If events since 2002 until 36 mos. × If events in time window)					
Before survey	0.030	0.037	2.289	0.007	0.185**
(0-6] months	0.059*	0.034	-0.149	0.016	0.060
(6-12] months	0.009	-0.018	-0.383	0.018	-0.047
(12-36] months	0.002	0.017	0.945	0.004	0.037
Dep Var Mean	0.397	0.232	8.827	0.195	0.335
Sample	Ind.	Ind.	Ind.	Ind.	HH
# Units	5510	5510	5510	5510	3213
# Clusters	224	224	224	224	224
Observations	16530	16530	16530	16530	9639

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 indicator of whether household experienced landmine events since 2002 until 36 months prior to March 1 of 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 household heads and their spouses when they have one. Hours worked per week excluding agricultural daily laborers winsorized at the top 1%. 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%

work following landmine exposure, both on their own plots and on other households' farms, likely perceiving these activities as risky due to the common practice of armed actors placing landmines on agricultural land. Specifically, individuals reduce work in agricultural occupations, other than day labor, outside their farms and hire more agricultural workers, while spending less time on their fields in response to recent landmine events. However, despite the risks, individuals tend to increase their participation in agricultural day labor after landmine exposure, even though this work offers lower wages compared to other agricultural activities outside the households' fields. We interpret this as evidence of liquidity constraints, where

individuals continue to engage in risky labor activities to secure enough income to smooth their consumption. Additionally, it appears that individuals may become inured to repeated landmine exposure, as their response to new events seems to diminish with prior exposure.

5.2 Heterogeneity by liquidity constraints

The results from the previous section suggest the presence of liquidity-constrained individuals. Wealthier individuals—those with higher income, asset holdings, and borrowing capacity—may be more willing to reduce any type of off-farm labor they perceive as increasing their likelihood of encountering landmines. In contrast, poorer individuals—who have lower income, fewer assets, and limited borrowing capacity—may face liquidity constraints, leading them to increase off-farm labor after landmine exposure, despite the risks, in order to compensate for potential reduction in income.

We test for the presence of liquidity-constrained individuals by estimating heterogeneous effects by land ownership, as land is the primary asset contributing to wealth in rural areas and is crucial for accessing credit markets. 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.

Table 7 presents the estimated heterogeneous effects on labor market outcomes. First, we observe that landowners reduce their work in non-*jornalero* jobs soon after experiencing the landmine events, but increase it after a substantial amount of time has passed since the events. Column 2 shows that landowners reduce the probability of working in these occupations by 4.2 percentage points if they experienced landmine events during the six months prior to the start of the planting season before the survey interview. Conversely, they increase this probability by 4.6 percentage points if the exposure happened 12 to 36 months preceding the start of the pre-survey planting season. Similarly, column 3 shows that landowners decrease the number of hours in non-*jornalero* jobs by 2.6 hours per week (29%) if they were exposed in the 0 to 6 months pre-planting period, but increase it by 1.7 hours (20%) if the exposure took place in the 12 to 36 months pre-planting window.

Landowners' reduction in off-farm occupations is primarily driven by a decrease in agricultural labor. We find that landowners reduce non-*jornalero* agricultural work by 2 hours per week (a 57% decrease relative to the mean) if exposed to landmines in the 0 to 6 months pre-planting window, but increase it by 2.9 hours (an 83% increase relative to the mean) if they experienced events in the 12 to 36 months period (table A7, column 1). In contrast, landowners' non-agricultural off-farm work does not show a response to landmine exposure (table A7, column 2). This result suggests that landowners, who may not face liquidity

constraints, reduce agricultural off-farm labor after exposure due to the increased risk of encountering landmines associated with such activities.

Similarly, non-landowners reduce their participation in occupations other than agricultural daily labor after exposure. Column 2 shows that non-landowners exposed to landmines in the 0 to 6 months pre-planting period are as likely to work in these occupations as their counterparts who were not exposed during the same window. Nevertheless, column 3 shows that non-landowners decrease the number of hours worked in these occupations by 3.4 hours (a 38% decrease relative to the mean) if exposed in the six months before the start of the planting season.

In contrast to landowners, non-landowners' reduction in off-farm labor is primarily driven by both agricultural and non-agricultural activities. We find that non-landowners decrease non-*jornalero* agricultural work by 1.8 hours per week if a landmine event occurred in the six months prior to the planting season (table A7, column 1). Similarly, non-landowners work 4.1 fewer hours in non-agricultural jobs if exposed to landmines during the same period (table A7, column 2).

We observe contrasting patterns in agricultural day labor: non-landowners are more likely to engage in this type of work after landmine exposure, whereas such events do not significantly affect landowners' likelihood of participating in this occupation. Column 4 shows that non-landowners increase their probability of working as *jornaleros* by 8.8 percentage points following a landmine event within six months prior to the planting season. This finding suggests that non-landowners turn to agricultural day labor to offset income losses resulting from reduced hours in non-*jornalero* jobs.

Two main factors may drive this behavior. First, non-landowners may switch from long-term agricultural jobs to more sporadic ones, as the latter are often located closer to their homes, reducing travel distances. Second, they might opt for agricultural day labor to compensate for income shortfalls, as demand for such jobs tends to increase following landmine events.

Finally, both types of farmers hire more agricultural labor after exposure to landmine events. Column 5 shows that landowners increase the probability of hiring agricultural workers by 16.2 and 5.6 percentage points (a 48% and 17% increase relative to the mean) if exposed to landmines in the pre-survey and 0 to 6 months pre-planting windows, respectively. Likewise, non-landowners are 46 and 13.5 percentage points (a 137% and 40% increase relative to the mean) more likely to hire agricultural workers if exposed to landmine events during the same respective time windows.

Labor income mechanically mirrors the changes in off-farm labor induced by landmine exposure. Landowners' income from working outside the household's farms decreases after

Table 7: Effects of landmine events on labor market outcomes by land ownership

	(1) If Worked Off-Farm	(2) If Worked (Non-*jornalero*)	(3) Hrs. Worked (Non-*jornalero*)	(4) If Worked (*Jornalero*)	(5) If Hired Ag. Labor
If events before survey	0.046	0.007	1.577	0.037	0.162***
	(0.047)	(0.040)	(1.992)	(0.048)	(0.060)
If events in (0-6] months	-0.008	-0.042*	-2.576**	0.012	0.056*
	(0.021)	(0.025)	(1.063)	(0.018)	(0.031)
If events in (6-12] months	-0.009	0.009	0.489	-0.031	-0.060
	(0.036)	(0.033)	(1.710)	(0.029)	(0.062)
If events in (12-36] months	0.037	0.046**	1.739*	0.004	0.050
	(0.027)	(0.021)	(0.940)	(0.022)	(0.038)
Non-owner × ...					
... If events before survey	-0.101	0.005	-5.190	-0.104	0.298*
	(0.083)	(0.084)	(3.272)	(0.091)	(0.174)
... If events in (0-6] months	0.079*	0.018	-0.819	0.076*	0.079
	(0.044)	(0.044)	(1.797)	(0.040)	(0.055)
... If events in (6-12] months	0.080	-0.028	3.491	0.148**	-0.179
	(0.079)	(0.090)	(3.012)	(0.057)	(0.151)
... If events in (12-36] months	-0.046	-0.010	0.440	-0.033	-0.068
	(0.051)	(0.048)	(2.241)	(0.045)	(0.047)
Linear combs. (If events in time window + Non-owner × If events in time window)					
Before survey	-0.055	0.012	-3.613	-0.067	0.460***
(0-6] months	0.071	-0.024	-3.395**	0.088**	0.135**
(6-12] months	0.071	-0.019	3.980	0.117**	-0.239**
(12-36] months	-0.009	0.037	2.178	-0.029	-0.018
Dep Var Mean	0.397	0.232	8.827	0.195	0.335
Sample	Ind.	Ind.	Ind.	Ind.	HH
# Units	5510	5510	5510	5510	3213
# Clusters	224	224	224	224	224
Observations	16530	16530	16530	16530	9639

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. In column 5, sample include households these individuals belong to. Hours worked per week excluding agricultural daily laborers 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%

recent landmine events, especially because there is a drop in income obtained from non-*jornalero* occupations. Specifically, landowners' off-farm labor income earned in the past month declines by 19% if they were exposed to landmine events in the six months prior to the start of the planting season, primarily due to a reduction of 33% in income obtained from working in non-*jornalero* jobs (table A10, columns 1 and 2). Conversely, non-landowners' off-farm labor income remains unchanged after recent exposure, mostly because their *jornalero* income increases while the income obtained from other occupations decreases. In particular, non-landowners earn 49% more as *jornaleros*, whereas their income from other occupations decreases by 47% (table A10, columns 2 and 3).

These findings suggest that individuals' responses to landmine events are influenced by

their wealth, which affect their ability to reduce income-generating activities that increase the likelihood of encountering landmines. Landowners, who are wealthier and less likely to face liquidity constraints, reduce their engagement in agricultural non-*jornalero* occupations, even if this results in a decline in their off-farm labor income. As landowners possess a highly valuable asset in rural areas, which provides them access to credit markets, for example, they are better equipped to manage a reduction in such activities. In contrast, non-landowners are more likely to be liquidity constrained, limiting their capacity to navigate situations with reduced income. Non-landowners are often excluded from formal credit markets, which restricts their borrowing capacity and makes it difficult for them to cope with lower income if they reduce off-farm work. As a result, exposed non-landowners tend to work more as agricultural day laborers—a job that entails risks of encountering landmines and offers lower wages.

5.3 Effects on healthcare seeking behavior

Accessing healthcare services in Colombia often involves traveling to population centers. In order to obtain medical assistance, individuals travel to the municipal capitals, as health facilities are usually located in these urban centers[7]. Since commuting to these places can increase individuals' chances of being affected by landmines, they would decrease their visits to medical professionals. To explore this possibility, we estimate the effects on landmine events on the use of medical care by adults and children in this section.

Table 8 presents the estimates for household heads and their spouses on the probability of seeking medical assistance for preventative care (i.e., visits to medical professionals without being sick). We find that farmers decrease the use of formal medical care (columns 1 to 5) after recent exposure to landmine events, but increase the use of alternative medicine (column 6). Adults who experienced a landmine event just before being surveyed are 8.2 percentage points (a 12% decrease relative to the mean) less likely to visit a formal medical professional at least once a year[8]. Adults especially reduce the probability of visiting general practitioners or specialists, dentists, and optometrists by 9, 15.5, and 5.9 percentage points, respectively, if they were exposed to landmines during that same period. Moreover, adults partially resume their healthcare seeking behavior some time after experiencing a landmine event. In particular, adults who experienced a landmine event in the 6 to 12 and 12 to 36 month pre-planting windows are 9.1 and 5 percentage points (a 23% and 12% increase

[7]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.

[8]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.

relative to the mean) more likely to seek dental care, respectively. We do not observe adults resuming their visits to general practitioners/specialists and optometrists.

On the contrary, farmers exposed to landmine events increase the likelihood of seeking alternative medicine by 1.8 and 2.9 percentage points (a 60% and 97% increase relative to the mean) if exposed to landmines in the 0 to 6 and 12 to 36 month pre-planting windows. This may be because providers of alternative medicine tend to be residents of their communities, hence are more physically accessible, while providers of formal medicines are less likely to be members of their communities, and more likely to be situated farther away from rural villages[9].

Table 8: Effect of landmine events on adults' 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) Family Planning	(6) Alternative Medicine
If event 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)
If event in (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)
If event in (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)
If event in (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	5484	5484	5484	5484	5484	5484
# Clusters	224	224	224	224	224	224
Observations	16452	16452	16452	16452	16452	16452

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%

The effects seen on adults are partially observed in children. Table 9 presents the estimates for children who were 0 to 9 years old when surveyed in 2010 because this is the only cohort the survey follows. We find that children who experienced a landmine event before the survey are 16.3 percentage points (a 28% decrease relative to the mean) less likely to visit a dentist. Similarly, children exposed during the same time window reduce the probability of visiting general practitioners or specialists by 10.6 percentage points (a 14% decrease relative to the mean). Although this estimate is statistically insignificant, we might be underpowered to detect the effect. Similar to adults, children seem to resume visits to general practitioners in the medium run, nevertheless, the effect is statistically insignificant but we

[9]Results are robust to buffers of sizes 4 and 6 km (tables A8 and A9).

might be underpowered to observe an effect. Unlike adults, who may postpone their visits to medical practitioners, seeking preventative care for children is crucial for their development and health status (Chung et al., 2006; Hakim and Bye, 2001; Hakim and Ronsaville, 2002). Landmines discourage parents and guardians from taking their children to formal medical care, which may have pervasive consequences for their development.

Table 9: 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 event 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)
If event in (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)
If event in (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)
If event in (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
Individual FE	2813	2813	2813	2813	2813	2813
# Individuals	224	224	224	224	224	224
# Clusters	8170	8170	8170	8170	8170	8170

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. Sample includes children who were 0 to 9 years old in 2010 and were followed in at least the first two 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%

6 Mechanisms

Our analysis thus far suggests that wealthier, land owning individuals work less in agricultural non-*jornalero* jobs following recent exposure to landmine events, while non-land owning individuals decrease their non-agricultural work but increase their involvement in *jornalero* labor. Additionally, both landowning and non-landowning households hire more agricultural labor in response to landmine events. Finally, we find that exposed adults and children seek less preventative healthcare after experiencing landmine events. In this section, we explore several underlying mechanisms.

6.1 Reduced demand and supply for non-agricultural occupations

Goods and services produced in non-agricultural occupations may experience a decline in demand following landmine exposure, leading individuals to reduce the amount of time they spend on those jobs. This effect is more pronounced in certain economic sectors. For example, exposed individuals may demand less accommodation and food services outside their homes due to reduced mobility after experiencing landmine events. This behavior results in lower income for workers and business owners in this sector, prompting them to decrease the amount of work they devote to these activities.

We empirically test this hypothesis by estimating the impact of landmine exposure on the number of hours worked in the past week in off-farm paid jobs across various economic activities. Table 10 presents the estimates of the heterogeneous effects by land ownership of landmine events on time allocated by individuals to different non-agricultural economic sectors. We find that non-landowners' reduction of non-agricultural work primarily comes from a decrease in the time spent in wholesale and retail trade. Specifically, non-landowners decrease by 1.1 hours (a 69% decrease relative to the mean) work in wholesale and retail trade if they experienced a landmine event in the 0 to 6 months pre-planting period (column 3).

To better understand the types of jobs non-landowners engage in less frequently, we analyze the activities individuals perform in the wholesale and retail trade sectors by examining the job descriptions provided by respondents in the survey. First, many individuals primarily manage their own stores, which are usually located in or near their homes, selling groceries and beverages. Second, individuals also sell their agricultural produce, either at their farm or by traveling to nearby market centers. Third, individuals sell products from printed catalogs, which they can do from their homes, or may require them to travel to meet potential clients. Finally, individuals work as salespeople in stores and businesses located in market centers.

Given the activities conducted by individuals in the wholesale and retail trade sector, two potential mechanisms may explain why non-landowners reduce their participation in this particular economic sector. First, the presence of landmines might negatively affect local consumption, as exposed individuals may experience a decline in income or choose to visit nearby shops and urban settlements less frequently. Consequently, local demand for various goods may decrease as markets in low- and middle-income countries tend to be localized (Jensen and Miller, 2018). This severely impacts the wholesale and retail trade sector due to the nature of the activities individuals conduct in this field. For instance, store owners may receive fewer customers, leading to reduced revenue. In response, individuals may allocate less time to these jobs as they earn less income from them. Second, some

activities in wholesale and retail trade require farmers to travel, increasing their likelihood of encountering landmines. Therefore, to avoid this risk, farmers may spend less time on these activities.

Table 10: Effect of landmine events on hours worked in non-agricultural economic activities

	Hours worked in paid off-farm jobs in the past week							
	(1) Manufacturing	(2) Construction	(3) Wholesale & Retail Trade	(4) Transportation	(5) Accommodation & Food Services	(6) Education	(7) Health	(8) Domestic Work
If events before survey	0.175	-0.137	2.515*	0.572	-1.417*	0.423	-0.112	-0.450
	(0.397)	(0.916)	(1.430)	(0.458)	(0.793)	(0.333)	(0.128)	(0.307)
If events in (0-6] months	-0.507	-0.303	0.537	0.652	-0.070	0.134	-0.103	-0.118
	(0.314)	(0.546)	(1.169)	(0.623)	(0.430)	(0.194)	(0.083)	(0.188)
If events in (6-12] months	-0.790*	0.690	-1.789	-0.006	1.128**	0.389	0.024	0.121
	(0.441)	(0.585)	(1.210)	(0.222)	(0.500)	(0.358)	(0.079)	(0.133)
If events in (12-36] months	0.066	0.875*	-0.811	-0.043	-0.207	0.064	-0.051	0.088
	(0.267)	(0.472)	(0.650)	(0.190)	(0.419)	(0.142)	(0.052)	(0.140)
Non-owner × ...								
... If events before survey	0.065	-2.595	-4.740**	-1.168*	-0.192	0.000	0.072	0.049
	(0.484)	(2.202)	(1.970)	(0.701)	(2.004)	(0.354)	(0.058)	(0.621)
... If events in (0-6] months	1.062	-0.024	-1.663	-1.280*	0.300	0.402	0.067	0.132
	(0.768)	(0.933)	(1.347)	(0.692)	(1.095)	(0.366)	(0.054)	(0.774)
... If events in (6-12] months	0.962*	-0.282	6.684***	-0.543	-1.590	-0.661*	0.008	-0.798
	(0.497)	(1.085)	(1.383)	(0.494)	(0.975)	(0.378)	(0.066)	(0.568)
... If events in (12-36] months	-0.162	-1.204	2.176**	-1.002*	-0.112	-1.071	0.069	-0.967
	(0.328)	(0.917)	(0.981)	(0.558)	(1.130)	(0.688)	(0.054)	(1.267)
Linear combs. (If events in time window + Non-owner × If events in time window)								
Before survey	0.240	-2.732	-2.226	-0.596	-1.609	0.423	-0.040	-0.401
(0-6] months	0.555	-0.328	-1.126*	-0.628	0.230	0.536	-0.036	0.015
(6-12] months	0.172	0.408	4.895***	-0.549	-0.462	-0.272	0.032	-0.677
(12-36] months	-0.095	-0.329	1.365	-1.045*	-0.319	-1.008	0.018	-0.879
Dep Var Mean	0.519	1.005	1.624	0.792	0.497	0.314	0.226	0.663
# Units	5510	5510	5510	5510	5510	5510	5510	5510
# Clusters	224	224	224	224	224	224	224	224
Observations	11020	11020	11020	11020	11020	11020	11020	11020

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%

6.2 Replacing own labor in their fields with external labor

We previously argued that, on average, individuals may hire agricultural workers to replace their own labor in their fields after landmine exposure. Table 11 presents the estimates of the heterogeneous effects by land ownership on whether farmers spend more than 0 to 4 hours per day on agricultural tasks on their own plots.

Table 11: Effect of landmine events on time spent in agricultural jobs in household's farms by land ownership

	Time spent in ag. jobs in HH's farms			
	(1)	(2)	(3)	(4)
	> 0 hr	≥ 1 hr	≥ 2 hr	≥ 4 hr
If events before survey	-0.048	-0.043	0.001	0.009
	(0.048)	(0.050)	(0.047)	(0.036)
If events in (0-6] months	-0.073***	-0.066***	-0.052**	-0.013
	(0.024)	(0.023)	(0.026)	(0.020)
If events in (6-12] months	-0.041	-0.043	-0.067**	-0.030
	(0.027)	(0.032)	(0.029)	(0.025)
If events in (12-36] months	-0.023	-0.025	-0.011	-0.023
	(0.026)	(0.026)	(0.026)	(0.025)
Non-owner × ...				
... If events before survey	0.276***	0.186	0.087	0.038
	(0.102)	(0.118)	(0.099)	(0.121)
... If events in (0-6] months	0.088	0.068	0.074*	0.015
	(0.059)	(0.055)	(0.044)	(0.034)
... If events in (6-12] months	-0.049	-0.038	0.008	0.024
	(0.063)	(0.069)	(0.046)	(0.104)
... If events in (12-36] months	0.008	0.013	-0.004	0.026
	(0.054)	(0.054)	(0.051)	(0.058)
Linear combs. (If events in window + Non-owner × If events in window)				
Before survey	0.228**	0.143	0.088	0.047
(0-6] months	0.015	0.002	0.022	0.002
(6-12] months	-0.090*	-0.080	-0.058	-0.007
(12-36] months	-0.016	-0.012	-0.015	0.003
Dep Var Mean	0.455	0.424	0.364	0.258
# Units	5485	5485	5485	5485
# Clusters	224	224	224	224
Observations	16455	16455	16455	16455

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. Outcome variables indicate whether the individual spent any time, at least one hour, two hours, and four hours per day in agricultural jobs in the his/her household's farms and businesses. 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%

We observe landowners reduce the time they spend working on agricultural jobs in their fields after recent landmine exposure, whereas non-landowners continue working on their fields with the same intensity despite experiencing landmine events. Column 1 shows

landowners are 7.3 percentage points (a 16% decrease relative to the mean) less likely to spend a positive amount of time working on agricultural tasks in their field if exposed to landmine events in the six months before the start of the planting season. Conversely, non-landowners who experienced landmine events in the 0 to 6 months pre-planting period are just as likely to spend any time working on agricultural jobs in their fields as their counterparts without exposure in that same period. The estimates are similar when the time threshold is set at one or two hours (columns 2 and 3), but the effects become null for both landowners and non-landowners when the threshold is four hours. Similar to the overall result, this suggests landmines do not affect individuals who work intensively in their fields but rather impact those who visit their plots less frequently.

6.3 Intensified production for non-landowners

Our findings indicate that both landowning and non-landowning households increase their hiring of agricultural workers after landmine exposure. However, the underlying reasons for this increase seem to differ between the two groups. Landowners appear to hire agricultural workers to replace their own labor in their fields with external labor, whereas non-landowners continue working on their fields themselves while also hiring additional workers. A possible reason for this behavior among non-landowners is their desire to intensify agricultural production on their land to compensate for the reduction in income they face following landmine events.

We explore this mechanism empirically by estimating the heterogeneous effects of landmine events by land ownership on land allocated to different agricultural uses. Table 12 presents the landmine effect on the size of areas allocated to five different types of agricultural production. Non-landowners allocate more land to certain types of agricultural production after recent landmine exposure. Specifically, we find that non-landowners increase land devoted to mixed crops by 0.3 hectares (a 191% increase relative to the mean) if they experienced landmine events during the pre-survey window (column 4). Additionally, non-landowning households who experienced landmine events in the 0 to 6 months pre-planting period increase the area with perennial crops by 0.06 hectares (an 18% increase relative to the mean), although we might be underpowered to detect a statistically significant effect (column 2). Recall that non-landowning households exposed to landmine events during those same periods are more likely to hire agricultural workers and do not reduce the time they spend working on their fields. This suggests that non-landowners expand their cultivated area after recent landmine exposure, which requires the hiring of additional agricultural workers to manage the increased cultivated land.

Table 12: Heterogeneous effects of landmine events on land use by land ownership

	Number of hectares allocated to				
	(1) Cultivations	(2) Perennial	(3) Seasonal	(4) Mixed	(5) 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 combs. (If events in time window + Non-owner × If events in time window)					
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	3213	3213	3213	3213	3213
# Clusters	224	224	224	224	224
Observations	9639	9639	9639	9639	9639

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. Outcome variables indicate whether the individual spent any time, at least one hour, two hours, and four hours per day in agricultural jobs in the his/her household's farms and businesses. 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%

6.4 Other channels

Individuals exposed to landmines may attempt to minimize the distance they travel for daily activities, as armed actors often place landmines on walking paths and near roads, increasing the risk of encountering them during commutes. This behavior can significantly affect activities conducted outside the home, such as working off the household's farm or seeking healthcare. Specifically, after landmine exposure, individuals may reduce their participation in jobs that require commuting and instead prefer work that is closer to home. Additionally, exposed individuals might avoid visiting healthcare professional, as medical centers are often

located in populated areas and municipal capitals.

Unfortunately, we cannot empirically test whether individuals actually reduce their movement in response to landmine events, as the survey data does not provide information on how far and how frequently individuals travel. However, other studies have investigated the impact of landmine events on individuals' movement. For example, Vargas et al. (2024) explores how landmine explosions in Colombia affect people's mobility using raster data from Facebook, which tracks daily movement from June 2021 to March 2022. The study finds that individuals reduce their mobility in the days following a landmine explosion but return to pre-explosion mobility levels within five weeks. These findings suggest that individuals initially reduce their movement after landmine exposure, potentially leading to a decrease in activities typically conducted outside the households' home.

7 Conclusion

This study provides new insights into how rural Colombian households adjust their economic activities and healthcare-seeking behaviors in response to landmine events. We estimate the effects of landmine events on labor market decisions, and analyze heterogeneity along land ownership and previous exposure. We also investigate the landmine effects on the use of medical services for adults and children.

Our findings reveal a complex pattern of adaptation to the persistent threat of landmines. First, farmers reduce work in non-*jornalero* occupations, leading to a decrease in labor income for landowners but not for non-landowners. Farmers without land ownership, who may not be able to afford a decrease in income, increase their work in agricultural day labor after exposure, thereby stabilizes their labor earnings. However, it is unclear why non-landowners make this transition from other occupations outside the household's farm to agricultural daily labor. It may be possible that non-landowners choose to work more as *jornaleros* because this may involve traveling shorter distances, as nearby farmers might be hiring them. Another possibility is that the goods and services produced in these occupations might be less in demand in local markets after exposure, prompting non-landowners in those occupations to seek alternative sources of income to stabilize their earnings. Regardless of the mechanisms, farmers with fewer assets, lower wealth, and limited borrowing capacity are unable to reduce income-generating activities after exposure. Consequently, they must continue some of these activities, despite the risk of encountering landmines.

Another example of the inequality in adaptation to the threat of landmines is observed in hiring behavior. We find that farmers, regardless of land ownership, increase their hiring of agricultural workers shortly after experiencing landmine events. However, the reasons for this

increase differ between landowners and non-landowners. Landowners, who reduce their own agricultural labor after exposure, appear to hire external workers to replace their labor. In contrast, non-landowners, who continue to work on their fields despite landmine events, may increase hiring to intensify agricultural production on their farms. This behavior suggests again that poorer farmers are driven to seek alternative sources of income to compensate for reduced earnings caused by landmine events.

Landmines also have pervasive effects on farmers' well-being, as they diminish their healthcare-seeking behavior. Adults significantly reduce their use of formal medical services following landmine events, partially substituting these services with alternative medicine. Children also experience a decrease in visits to medical professionals, which could have detrimental effects on their development.

In conclusion, this research contributes to a more nuanced understanding of how rural households navigate their lives with landmine exposure. Future research could investigate more aggregate analysis of the effects of landmine presence on the rural labor market.

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."

Chung, Paul J., Tim C. Lee, Janina L. Morrison, and Mark A Schuster. 2006. "Preventive Care for Children in the United States: Quality and Barriers." *Annual Review of Public Health*, 27: 491–515.

Hakim, Rosemarie B., and Barry V Bye. 2001. "Effectiveness of Compliance With Pediatric Preventive Care Guidelines Among Medicaid Beneficiaries." *Pediatrics*, 108(1): 90–97.

Hakim, Rosemarie B., and Donna S Ronsaville. 2002. "Effect of Compliance With Health Supervision Guidelines Among US Infants on Emergency Department Visits." *Archives of Pediatrics & Adolescent Medicine*, 156(10): 1015–1020.

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

Jensen, Robert, and Nolan H Miller. 2018. "Market Integration, Demand, and the Growth of Firms: Evidence from a Natural Experiment in India." *American Economic Review*, 108(12): 3583–3625.

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.

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.

Appendix A. Additional tables

Table A1: Effect of landmine events on hours worked in the past week

	Hours worked in the past week		
	(1) Agriculture (Non-*jornalero*)	(2) Non-Agric. (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	5510	5510	5510
# Clusters	224	224	224
Observations	11020	11020	11020

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 A2: Effect of landmine events on labor market outcomes (4 km buffer)

	(1) If Worked Off-Farm	(2) If Worked (Non-*jornalero*)	(3) Hrs. Worked (Non-*jornalero*)	(4) If Worked (*Jornalero*)	(5) If Hired Ag. Labor
If event before survey	0.016	0.009	0.858	-0.008	0.135**
	(0.040)	(0.043)	(2.424)	(0.044)	(0.058)
If event in (0-6] months	0.003	-0.042*	-2.651**	0.026	0.067**
	(0.024)	(0.025)	(1.123)	(0.019)	(0.034)
If event in (6-12] months	0.033	0.009	1.422	0.023	-0.071
	(0.044)	(0.030)	(1.698)	(0.036)	(0.055)
If event in (12-36] months	0.019	0.017	0.672	0.009	0.059*
	(0.020)	(0.021)	(0.831)	(0.017)	(0.035)
Dep Var Mean	0.397	0.232	8.827	0.195	0.335
Sample	Ind.	Ind.	Ind.	Ind.	HH
# Units	5510	5510	5510	5510	3213
# Clusters	224	224	224	224	224
Observations	16530	16530	16530	16530	9639

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. In column 5, sample include households these individuals belong to. Hours worked per week excluding agricultural daily laborers winsorized at the top 1%. 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 A3: Effects of landmine events on labor market outcomes (6 km buffer)

	(1) If Worked Off-Farm	(2) If Worked (Non-*jornalero*)	(3) Hrs. Worked (Non-*jornalero*)	(4) If Worked (*Jornalero*)	(5) If Hired Ag. Labor
If event before survey	-0.044	-0.059	-1.558	0.002	0.158***
	(0.033)	(0.039)	(1.855)	(0.034)	(0.054)
If event in (0-6] months	0.002	-0.048**	-3.085***	0.027*	0.048*
	(0.019)	(0.021)	(0.870)	(0.016)	(0.027)
If event in (6-12] months	0.040	0.037*	1.684	0.006	-0.052
	(0.026)	(0.021)	(1.370)	(0.025)	(0.032)
If event in (12-36] months	0.030	0.059***	2.563***	-0.015	0.020
	(0.026)	(0.021)	(0.791)	(0.021)	(0.039)
Dep Var Mean	0.397	0.232	8.827	0.195	0.335
Sample	Ind.	Ind.	Ind.	Ind.	HH
# Units	5510	5510	5510	5510	3213
# Clusters	224	224	224	224	224
Observations	16530	16530	16530	16530	9639

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. In column 5, sample include households these individuals belong to. Hours worked per week excluding agricultural daily laborers winsorized at the top 1%. 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 A4: Effect of landmine events on labor market outcomes at different distances

	(1) If Worked Off-Farm	(2) If Worked (Non-*jornalero*)	(3) Hrs. Worked (Non-*jornalero*)	(4) If Worked (*Jornalero*)	(5) If Hired Ag. Labor
Inner Circle (0-5 km]					
If event before survey	0.044	0.008	1.092	0.028	0.205***
	(0.044)	(0.042)	(2.033)	(0.043)	(0.060)
If event in (0-6] months	0.003	-0.046*	-3.440***	0.030	0.079***
	(0.023)	(0.024)	(0.995)	(0.020)	(0.030)
If event in (6-12] months	0.002	0.002	0.630	-0.001	-0.068
	(0.030)	(0.027)	(1.642)	(0.027)	(0.044)
If event in (12-36] months	0.036	0.048**	2.206***	-0.002	0.029
	(0.026)	(0.019)	(0.789)	(0.023)	(0.038)
Inner Ring (5-10 km]					
If event before survey	0.019	0.015	1.138	0.007	0.015
	(0.033)	(0.031)	(1.158)	(0.019)	(0.044)
If event in (0-6] months	-0.019	-0.025	-1.669**	-0.007	-0.003
	(0.021)	(0.019)	(0.745)	(0.014)	(0.024)
If event in (6-12] months	-0.041*	-0.002	-1.070	-0.025	-0.011
	(0.023)	(0.023)	(0.844)	(0.019)	(0.030)
If event in (12-36] months	0.005	0.029*	1.324*	-0.011	0.020
	(0.017)	(0.015)	(0.712)	(0.014)	(0.022)
Outer Ring (10-20 km]					
If event before survey	0.010	-0.001	0.241	0.004	0.017
	(0.019)	(0.017)	(0.733)	(0.013)	(0.024)
If event in (0-6] months	-0.013	-0.004	0.546	-0.024**	-0.016
	(0.016)	(0.016)	(0.679)	(0.011)	(0.020)
If event in (6-12] months	-0.034	-0.037*	-1.874**	-0.001	-0.028
	(0.021)	(0.020)	(0.749)	(0.013)	(0.024)
If event in (12-36] months	0.026*	0.023	1.167*	0.010	-0.070***
	(0.015)	(0.015)	(0.634)	(0.013)	(0.020)
Dep Var Mean	0.397	0.232	8.827	0.195	0.335
Sample	Ind.	Ind.	Ind.	Ind.	HH
# Units	5510	5510	5510	5510	3213
# Clusters	224	224	224	224	224
Observations	16530	16530	16530	16530	9639

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. In columns 1 through 4, sample includes household heads and their spouses when they have one. In column 5, sample include households these individuals belong to. Hours worked per week excluding agricultural daily laborers winsorized at the top 1%. 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 A5: Effect of landmine events on time spent in agricultural jobs in household's farms (4 km)

	Time spent in ag. jobs in HH's farms			
	(1)	(2)	(3)	(4)
	> 0 hr	≥ 1 hr	≥ 2 hr	≥ 4 hr
If events before survey	0.020	0.013	0.022	0.014
	(0.056)	(0.047)	(0.055)	(0.058)
If events in (0-6] months	-0.030	-0.034	-0.028	-0.006
	(0.028)	(0.028)	(0.026)	(0.022)
If events in (6-12] months	-0.060*	-0.069*	-0.068*	-0.031
	(0.034)	(0.041)	(0.040)	(0.039)
If events in (12-36] months	-0.059**	-0.044**	-0.040	-0.035*
	(0.023)	(0.022)	(0.026)	(0.021)
Dep Var Mean	0.455	0.424	0.364	0.258
# Individuals	5485	5485	5485	5485
# Clusters	224	224	224	224
Observations	16455	16455	16455	16455

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. Outcome variables indicate whether the individual spent any time, at least one hour, two hours, or four hours per day in agricultural jobs in the household's farms. 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 A6: Effect of landmine events on time spent in agricultural jobs in household's farms (6 km)

	Time spent in ag. jobs in HH's farms			
	(1)	(2)	(3)	(4)
	> 0 hr	≥ 1 hr	≥ 2 hr	≥ 4 hr
If events before survey	-0.020	-0.044	-0.018	0.019
	(0.049)	(0.043)	(0.045)	(0.045)
If events in (0-6] months	-0.070***	-0.069***	-0.059***	-0.033*
	(0.023)	(0.022)	(0.022)	(0.019)
If events in (6-12] months	-0.025	-0.023	-0.053	-0.032
	(0.032)	(0.031)	(0.033)	(0.032)
If events in (12-36] months	-0.004	-0.011	-0.007	-0.016
	(0.023)	(0.024)	(0.025)	(0.023)
Dep Var Mean	0.455	0.424	0.364	0.258
# Individuals	5485	5485	5485	5485
# Clusters	224	224	224	224
Observations	16455	16455	16455	16455

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. Outcome variables indicate whether the individual spent any time, at least one hour, two hours, or four hours per day in agricultural jobs in the household's farms. 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 A7: Effect of landmine events on hours worked in the past week by land ownership

	Hours worked in paid off-farm jobs in the past week		
	(1) Agriculture (Non-*jornalero*)	(2) Non-Agric. (Non-*jornalero*)	(3) *Jornalero*
If events before survey	-0.843	2.696	3.471*
	(2.906)	(1.712)	(1.764)
If events in (0-6] months	-2.040*	0.601	-0.762
	(1.211)	(1.349)	(1.106)
If events in (6-12] months	0.531	-0.271	-3.152**
	(1.919)	(1.271)	(1.300)
If events in (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)
... If events in (0-6] months	0.211	-4.652**	7.326***
	(1.902)	(2.027)	(2.168)
... If events in (6-12] months	-4.484	4.916	10.094***
	(2.773)	(3.710)	(3.110)
... If events in (12-36] months	-3.208*	0.770	-2.643
	(1.666)	(2.268)	(2.141)
Linear combs. (If events in time window + Non-owner × If events in time window)			
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	5510	5510	5510
# Clusters	224	224	224
Observations	11020	11020	11020

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 A8: Effect of landmine events on adults' healthcare seeking (4 km)

	Sought medical assitance 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 event 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)
If event in (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)
If event in (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)
If event in (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	5484	5484	5484	5484	5484	5484
# Clusters	224	224	224	224	224	224
Observations	16452	16452	16452	16452	16452	16452

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 A9: Effect of landmine events on adults' healthcare seeking (6 km)

	Sought medical assitance 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 event 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)
If event in (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)
If event in (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)
If event in (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	5484	5484	5484	5484	5484	5484
# Clusters	224	224	224	224	224	224
Observations	16452	16452	16452	16452	16452	16452

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 A10: Heterogeneous effects of landmine events on labor income by land ownership

	Income earned in the past month		
	(1) Off-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.			
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	Ind.	Ind.	Ind.
# Clusters	5489	5489	5489
Observations	224	224	224
N	16467	16467	16467

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%