INTRA-HOUSEHOLD LABOR ALLOCATION IN COLONIAL NIGERIA

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Abstract. We use a year-long panel of time-use data from colonial Nigeria to show that labor complementarities and strategic concerns shaped the time-use decisions of African households. Using quantitative and ethnographic approaches, we show that health shocks imposed time costs that followed the gender division of labor. The labor of others did not automatically compensate for this. Whether individuals could respond by recruiting substitutes depended on social standing, urgency of work, and type of illness. Labor was coordinated between spouses. Child labor was coordinated with parental work, aided childcare, and allowed children to build skills and resources.

1. Introduction

Many important economic choices concerning resource allocation, production, and labor supply are made within households. Understanding how households arrive at these decisions is essential for understanding the behavioral and distributional consequences of economic policies (Alderman et al., 1995; Mazzocco, 2007), for correctly estimating levels of social inequality (Lise and Seitz, 2011), and for understanding whether households can achieve efficient allocations (Bobonis, 2009; Rangel and Thomas, 2005). From these motivations, a large literature has emerged that tests between alternative models of the household, and that estimates the technologies of home production, consumption, and labor supply.[1] In this paper, we contribute to this literature by using a unique data source to examine the roles of labor complementarities and strategic concerns in household time allocation in an example from African history.

From 1939 to 1940, the anthropologist Jack Harris visited the Igbo village of Amankwu, in colonial Nigeria. He collected information on the daily activities of a sample of villagers over the course of a year. We use these reports to create panel data on time use covering more than 6,000 person-days. The reports also provide a rich body of descriptive evidence on individuals' motivations. We use these data to test the degree to which labor complementarities and strategic concerns shaped time use decisions.

[1] See Browning et al. (2014) for a review.

In particular, we test whether labor between spouses is complementary and whether similar complementarities exist between parents and children. We use two broad classes of test for complementarity. First, we investigate responses to illness. If labor is substitutable, the healthy spouse or child of an individual facing a health shock should intensify productive activities to make up the work of the sick individual and to maintain household output. We find little evidence of this in the data, with the exception that men's harvesting work increases when their wives are sick. This failure of substitution may be driven by several considerations, including caring labor, the urgency of other individuals' work, lack of urgency of the work lost, or by labor complementarities, i.e. by whether an increase in labor input by one individual raises the marginal product of labor for another individual. We support complementarities as an important part of the explanation using our second broad class of test. We demonstrate that both spouses and parent-child pairs coordinate their activities over and above what would be predicted by the agricultural cycle. In the case of spouses, complementarities arise in part from task specialization within a gender division of labor that households mostly take as given. This is consistent with anthropological descriptions of Igbo agriculture, in which work such as farm clearing, planting, and palm production were cooperative activities in which the actions of one individual facilitated the tasks of others. For children, this is explained both by the complementarity of child labor with adult labor and by the ease with which child care is combined with child labor. The candid narratives in our data add further context.

Second, we test for strategic misallocation in time use. By "strategic misallocation," we mean the allocation of resources such as time or income to uses that have lower returns, but that increase an individual's claim to the resource or its returns. Here, our evidence is primarily ethnographic. On the question of strategic concerns in time allocation, there is no quantitative evidence that individuals strategically reallocate their time to take advantage of a spouse's absence. The descriptive evidence, by contrast, provides multiple examples of strategic time use that may divert time from more productive allocations: for instance, men cultivate women's crops in order to preserve

their bargaining power. Because visible contributions to production create claims over consumption, tasks are wastefully duplicated. Husbands attempt to limit the income-generating activities of their wives as punishment for misbehavior, but are constrained by their wives' social networks and outside options, as well as by the threat of non-cooperation and retaliation within marriage. Responses to illness reveal a similar pattern. The ability to recruit substitute labor depends on an individual's relationships and status within the household. Senior (earlier-married) wives, in particular, are better able to recruit substitutes. The chronically ill, excepting those "too old to work," face greater difficulty replacing their lost time. Individuals in the data view child labor as a way for parents to look after children while accomplishing their work, for children to build human capital and earn small discretionary incomes, and for adopted wards to earn their keep. In many cases, then, children use their labor as a source of autonomy. This strategic behavior is understandable if individuals' bargaining power over the allocation of resources depends on both exogenous characteristics and endogenous choices. Markers of bargaining power in our data include age, social status, health, social networks, and crop-specific labor inputs.

2. Historical background

During the colonial period in Nigeria, the Igbo lived mostly in rural communities with populations ranging from a few hundred to a few thousand (Gailey, 1970: p. 23). They practiced bush-fallow agriculture in which land was cultivated for a period of years before being left fallow to return to bush. Tasks were highly seasonal, with land clearing and preparation concentrated between January and March, planting during March and April, and harvests collected in October and November (Forde, 1937; Martin, 1988). For men, farming was centered on the cultivation of yams, while women planted several crops, including maize, cassava, and cocoyams (Harris, 1940, 1943, 1944). These crops were then owned separately by the husband and wife (Green, 1964; Harris, 1940). Women were responsible for feeding the household, although husbands would help,

particularly from September through November (Green, 1964; Harris, 1940). Women's control over food was cited by anthropologists at the time as a source of influence over men (Forde, 1950; Green, 1964; Harris, 1940).

The principal commercial products were palm oil and palm kernels (Harris, 1942). These were processed from the fruits of wild palm trees, and were harvested year-round, though the greatest yields were achieved between January and May (Martin, 1988). During the rainy season lasting from roughly April to October, when there was a lull in farm tasks, extraction of palm kernels was women's principal work (Uchendu, 1965).

Igbo society was patrilocal; a son remained in his father's compound after his own marriage. The Igbo practiced polygamy, and marriage involved the payment of bride price (Basden, 1921, p. 98). Each of a man's wives would have a separate hut within the compound, forming a matrifocal unit with her children and dependents (Uchendu, 1965, p. 188).

The gender division of labor in agriculture varied by place, but typically men were responsible for clearing, planting, training, harvesting, and storing yams. Women would plant their own crops, weed farms, and carry in the harvest (Forde, 1950; Harris, 1943). Clearing labor was typically performed by cooperative groups of men who would help each other in turn (Green, 1964). Children helped with farming from an early age, and fathers often gave boys yams to plant for themselves (Green, 1964). Men cut palm fruit, tapped and sold palm wine, and sold palm oil prepared by women. Women, in turn, reserved the palm kernels for themselves (Forde, 1950). While men made climbing ropes, mats, baskets, spoons, chairs, and bed-frames for sale (Green, 1964), the production and sale of pottery was overwhelmingly a female task (Forde, 1950). Petty trade was largely a woman's domain, while longer-distance trade was a male pursuit (Green, 1964). Unlike Yoruba women, Green noted that Igbo women would leave their children at home while at market, often in their husbands' care (Green, 1964).

Despite these divisions, there were complementarities between men's and women's tasks. It is not our aim to establish the origins of the gender division of labor. While some tasks may be naturally suited to the comparative advantages of one gender, the division

between men's and women's crops is not constant across West Africa (see, for example, Hoddinot and Haddad (1995, p. 83)). Taking divisions of labor as given, there are several reasons why complementarities might exist. In clearing work, these stemmed from the urgency of performing a large amount of labor over a short time period (Henderson, 1972, p. 163). In planting and weeding, task complementarity was in part due to the technology of intercropping. Among the southern Igbo, men would make holes for planting that women and children would then fill with topsoil and yam seedlings (Uchendu, 1965). Women would also plant their crops on or in between the slopes of the mounds created for yams, and while women planted their crops, men staked the growing yams (Uchendu, 1965). Labor in palm production similarly created complementarities in which tasks performed by women followed in succession from men's tasks (e.g. Basden (1921, p. 160)), in a process that was described as "cooperative" (Green, 1964).

The data we use are based on the field notes of Jack Harris, who produced five publications on the basis of these, listed in the bibliography. Because Harris' academic career was cut short by the Second World War, we are able to use his field notes to draw several novel conclusions. For instance, we use the daily activities for statistical and specific anecdotal data, which Harris did not. Neither did his papers, as our study does, examine the response of time allocation to shocks, day-to-day changes in tasks, or the causes of child work. Indeed, two of his papers focus on issues not relevant here: historical slavery and a breakdown of cash incomes and expenditures for sixteen individuals. A further two are primarily descriptive summaries outlining the basic farm practices of the Igbo and the division of labor by age and gender. These works feature little analysis or discussion of intra-household bargaining or the coordination of labor. The most relevant of Harris' papers to our analysis is his "The position of women in a Nigerian society." This is an eight-page study that provides only a brief and general overview of bargaining between spouses.[2] Our analysis differs from Harris' in both aims

[2] The structure of his paper is as follows: Harris argues that, though the Igbo lack formal political organization, effective mechanisms for the expression of women's importance exist. He describes the community and its sub-divisions, noting that women have separate, parallel courts and councils. He briefly describes what these do. He then notes that women stress their importance as food producers and

and methods, and represents a novel contribution to the study of households in colonial Nigeria. Nevertheless, where we build on Harris' analysis or reach the same conclusions, we cite his work in the text.

3. Conceptual framework

In order to understand the behaviors we observe, we draw on several recent insights from family economics. Our paper is, first, a contribution to the literature on labor complementarity within the household. We use two strategies to look for complementarities. First, we use illness of others in the household. Because illness imposes time costs on individuals, we can follow the approach of Adhvaryu and Nyshadham (2014), who argue that, if labor within the household were substitutable, the labor inputs of others in the household would rise to compensate. Since we find only limited evidence of substitution, illness has a larger adverse effect on the household's productive capacity than if labor were less complementary. Second, we find clear evidence that individuals within the same household coordinate their activities over and above what would be predicted by the annual agricultural cycle. In particular, we examine the degree of complementarity between spouses and between parents and children. Present-day studies find evidence of considerable labor complementarity, both within agricultural households as in Adhvaryu and Nyshadam (2014), and across gender lines more generally as a result of the gender division of labor in adults (De Giorgi, et al.,

child bearers when advocating their own interests -- a point we reiterate below. He describes the different times of the year during which men and women are responsible for feeding the household, and notes that women and men can withhold food during these periods as a bargaining tactic. Men are at a disadvantage, because other food is available during their period of responsibility. He notes that retaliatory measures are limited by fear of divorce. Harris notes that women invoke female ancestors when performing ceremonies and oaths. Women use proxies in land deals, which helps them evade a husband's influence. He notes that women bring no possessions into marriage but can claim some assets on divorce. He then gives five examples of women's power: a dispute in which men attempted to force women to cease their adultery but were frustrated when the women left the men responsible for child care; an instance when women refused to cook until the men met their obligations to repair a bridge and clean a path; women boycotting another woman who had refused to pay a fine; the technique of sitting outside a man's house and singing songs of ridicule until he relents; and the Aba Riots of 1929.

2014). Similar work in economic history has tested the degree to which the labor inputs of individuals respond to the unemployment and wages of their spouses (Bean, 2015; Moehling, 2001).

Our households' choices are better understood if spousal labor is complementary in production, and if child labor is complementary with adult labor. This type of supermodularity can result from task specialization created by the gender division of labor, as described above. Various approaches have modeled this division as the result of a Nash bargaining process or as given by social norms (Browning, Chiappori and Lechene, 2009; Lundberg and Pollak, 1993). The broad assignment of crops to specific genders and the implicit responsibilities for the provision of specific public goods within the households that we observe are consistent with observations from other parts of West Africa (Duflo and Udry, 2004; Udry, 1996). Households in our data largely take these as externally determined.

Second, our paper adds to the literature that tests between alternative models of the household. Much of this literature has focused on comparisons of "unitary" models that treat the household as if consumption and labor supply are decided by the maximization of the rational preferences of a single actor, and "collective" models that assume only that intra-household bargaining results in an outcome that is Pareto efficient. The preference for the collective model over the unitary model is near universal in the literature. In general, tests have focused on rejection of two testable implications of the unitary model: Slutsky symmetry and the irrelevance of exogenous "distribution factors," such as divorce laws, that affect decisions without directly affecting preferences or the budget constraint (Browning et al., 2014).

Several theoretical and empirical results have shown that increases in an individual's bargaining power generally increase that individual's leisure and shift consumption in that individual's favor (Blundell et al., 2005; Chiappori et al., 2002; Duflo, 2003). By contrast, tests of the collective model based on quasi-Slutsky conditions and the proportional impacts of distribution factors have generally failed to reject the model (Browning et al., 2014). An economic history literature on child labor has made similar

observations, noting that child labor often depends on the relative incomes of others in the household (e.g. Humphries, 2013). In our data, the importance of distribution factors favors collective over unitary models, and is visible in the control exercised by senior wives and the more able-bodied over the labor of others, and in the importance of social networks and individuals' outside options in shaping outcomes within the household.

Third, our paper is a contribution to the literature that tests for strategic misallocation by poor households. Existing literature shows that poor households often allocate resources towards unproductive activities for strategic reasons. These include defending property (Field, 2007; Goldstein and Udry, 2008), hiding income (Anderson and Baland, 2002; Jakiela and Ozier, 2015), free-riding on others' efforts (Alger and Weibull, 2010), and concealing assets (Ashraf, 2009). These incentives are particularly strong in West African households like those in our data, where income pooling is incomplete (Duflo and Udry, 2004).

The model presented by Basu (2006) is particularly useful for understanding strategic misallocation within our data. He extends the collective model so that Pareto weights also depend on current and past choices. For example, a woman's decision to work both depends on her influence on household decisions and contributes to her influence on household decisions. By working, she may increase her bargaining power, and so the intra-household sharing rule may depend on household choices. Basu uses this extension to show that multiple equilibria may exist for female labor supply, and that child labor may be a non-linear function of maternal bargaining power.

A feature of endogenous bargaining power that is not present in standard collective models is that households may achieve inefficient outcomes; household members over-engage in activities that improve their weight in the household decision process. These resemble the patterns Udry (1996) describes in Burkina Faso. There, individuals have control of specific plots of land and care more about output on their own plots than maximizing total output. Imperfect information about the contribution of one member to another's activities is a common source of conflict. In our data, the most visible aspect of endogenous bargaining power is that contribution to the cultivation of specific crops

establishes claims over their consumption. In the Ivory Coast, Duflo and Udry (2004) show how a similar system of "separate accounts" leads to a failure of full insurance. In our data, endogenous bargaining power helps us account for wasteful duplication of tasks, men punishing their wives by preventing them from going to market, and senior wives' control over the labor of junior (later-married) wives in polygamous households.

4. Data and analysis

Data

The data we use consists of the daily activities of the members of five male-headed Igbo households in the village of Amankwu, and were collected between February 1939 and February 1940. These field notes have been deposited in the Melville J. Herskovits library at Northwestern University. Each day, one person reports what the members of these households did during that day. Usually, it is the senior man Ezeala who makes these reports. These descriptions are richly detailed, and are frequently interrupted by explanations of why individuals engaged in these activities. We use these testimonies as sources of both quantitative and ethnographic data. A sample record for one day (Monday, 10 July, 1939) is presented in Appendix B. Consistent with the larger set of daily reports, this sample provides details as rich and varied as the timing and intensity of the rain, the content of meals, the specifics of mandatory community ("age-grade") labor, the cost and procedure for ritually avenging theft, and the locations of farms and the specific tasks taking place on each one. Thus, these data offer a window not just into time use and labor allocation, but also into life in colonial Amankwu.

Each household in the data consists of a core group of adults and biological children, as well as wards and boarders related to the core family. We follow Harris' definitions of relationships between household members. Relatives and friends visit sporadically, often contributing their time to the household during their stay. While the households in our data are distantly related, they generally stand alone in terms of labor and resources shared. Although the sample contains time use details on over 60 distinct individuals, there are 37 key household members who appear consistently. Details on these

individuals are given in Appendix A, alongside the number of appearances of each individual in the regression sample. We present a chart of the relationships between the individuals in the regression sample in Table 1. The households are named for the men who head them – Ezeala, Cikia, Mba, Uda, and Egwuonwu.

Analysis

We use both quantitative and ethnographic approaches to analyze the data. For our quantitative analyses, we keep the 24 individuals who appear at least once every three days in the record. Across the 328 days during which reports are made for these individuals, we construct dummy variables for whether, on a given day, these individuals engaged in each of a set of activities, such as farming, producing palm oil, caring for children, or being sick.

Summary statistics for these activities are given in Table 2. We acknowledge that activities in our sample are measured with error; for example, the fraction of days in which individuals engage in child care is low. Similarly, individuals do not report eating every day. Rather than focusing on unconditional means, then, we center our attention on correlations within the data, knowing these may be subject to downward attenuation bias.

Despite this concern, the summary statistics contain useful information that can be cross-validated against what is known about the frequency of important economic activities and about the division of labor within the household. Individuals in our sample are sick roughly one day in twenty, and are reported farming on roughly a third of days. A small fraction of this is clearing labor. The bulk is in planting and harvesting. Though these numbers may appear low, they are consistent with other evidence from West Africa. Forde and Scott (1946, p. 94), for example, suggest that 92 man-days are needed to clear a one acre cocoa farm in Western Nigeria, followed by maintenance over four years of non-production requiring 180 man-days total, and 114 man-days needed per year while the farm is in production. Akinbode et al (2011), similarly, suggest that 164 days of family labor per year was typical for rice-farming households in a 2009 sample from Niger State. Stone et al (1990) found 1,599 hours per year was the average per adult

worker on all phases of field and crop processing in a 1985 sample from central Nigeria. Cleave (1974), lastly, summarized a wide set of studies and concluded that adult members of African farm families worked in the fields 120-160 days in the year.

Fafchamps (1993) finds that the average days per hectare of household labor per year across 6 Burkina Faso villages surveyed in 1981-83 ranged from 50 to 109. He explains the low level of labor inputs in his Burkina Faso sample by noting first that the marginal productivity of labor is low and that labor expended preparing large farms may simply lead to labor bottlenecks later in the season, in an environment with incomplete labor markets. This is not an uncommon finding. Guyer (1980), describing data from the 1950s and 1960s, found that men do 66 days of work on cocoa farms and 106 on food farms among the Yoruba, compared to 77 and 33 days among the Beti, while women do 7 and 10 days among the Yoruba and 9 and 174 days among the Beti. Lagemann (1977), similarly, found 203 man-hours per man equivalent per year to be the norm for for farm work in Eastern Nigeria (excluding, however work by women and children). Oladeebo and Okanlawon (2013) suggested that 81 man-days per year was typical for yam cultivation in Oyo state.

Households in our sample report making palm produce roughly one day in twenty. This too is consistent with other observations on Igbo farming and palm production. Forde and Scott (1946) describe Umor in the palm belt. There, clearing labor involved parties of 12 to 30 men (p.47). A man clearing a 3 acre farm would need 4 or more of these parties (p.47). Farms would be weeded 2 or 3 times between May and September (p. 47). A 36 lb tin of palm oil took 3 to 5 days of labor, 2 to 3 of which would be provided by women (p. 51). Archival evidence (National Archives of Nigeria, Enugu, File Abadist 9/1/1362), similarly suggests that harvesting occurred roughly every twenty-four days.

There is a clear gender division of labor in the summary statistics that is reflected in both anthropological accounts and the ethnographic data. Clearing labor skews male, child care is a predominantly female task, planting and harvesting are disproportionately female, and mat-making is a mostly male activity.

We test whether time allocation for adults and children responds to health shocks or to the time allocation decisions of other household members. Our generic regression specification is a linear probability model:

$$y_{it} = \beta x_{it} + \delta_i + \eta_t + \delta_i \times t + \varepsilon_{it} \quad (1)$$

Here, y_{it} is a dummy variable equal to 1 if individual *i* experienced a particular outcome on day *t*. For example, this may be an indicator for having farmed, or for having been sick. x_{it} is an indicator for an event affecting individual *i* on the same day. Examples include whether individual *i* was ill, whether at least one of *i*'s wives was ill, or whether at least one of *i*'s parents performed farm work. These allow us to identify responses to illness shocks and to describe the coordination of time within households. For example, we ask whether person *i* is more likely to engage in farm labor on days a spouse is harvesting palm oil, or whether illness affects an individual's own time allocation decisions.

δ_i is an individual fixed effect. This term captures the greater propensity of some individuals to engage in certain activities throughout the year, and absorbs any time-invariant individual heterogeneity. For example, if a man engages in farm labor less than other men, and has a wife who is sick unusually often, the δ_i will purge any spurious correlation arising from these two facts. Similarly, η_t are fixed effects for each day *t*. These will remove unobserved heterogeneity due to the cycle of work over the year. $\delta_i \times t$ is a set of individual-specific linear time trends, accounting for possible omitted trending variables. ε_{it} is random error. We estimate (1) using ordinary least squares. To account for serial correlation in the residuals, we cluster standard errors by individual.

Ethnographic evidence is also central to our analysis. In particular, narratives provide detail that can be used to more completely explain household time use decisions. Furthermore, we use this evidence to clarify trends and relationships identified in the regressions, and to contextualize the behavior of the individuals in the sample. Anecdotal data sheds light on the motivation behind certain decisions, often explaining the "custom" or circumstances prompting a given action.

5. Complementarity

In this section, we test for labor complementarities by examining responses to illness and coordination of tasks over and above what would be predicted by the agricultural calendar. We supplement these tests with evidence from the ethnographic record. In Table 3, we categorize activities as generally complementary or substitutable based both on our reading of the anthropological literature and on the general patterns observed in the quantitative and ethnographic results.

Illness and time costs

We begin by demonstrating the salience of illness. In Table 4, we find that health shocks are meaningful in that they clearly impose time costs on affected individuals. Several types of labor are reduced in response to adverse health shocks—these include farming, gathering, and palm production. Further, the effects of these shocks differ according to the gender division of labor. Women reduce their market activity, while men are less likely to make mats. Men and women who are ill spend more time resting.

The ethnographic evidence suggests that, more often than not, individuals respond to their own illness by resting and postponing their work. For example, although he talks with Jack Harris that day, Ezeala feels too tired to farm and so decides not to work (20/4/39). In cases where work is pressing or can no longer be postponed, individuals continue to work despite illness. Ezeala, for example, works through his sickness when his tasks are both time-bound and prestigious. Despite a sore in his eye, he fulfils his community obligations by making funeral arrangements for a Ndiagbo woman (26/8/39). In another instance, he hires a farm worker to make up for the lost labor of a sick helper (23/2/39). The difference between this case and other instances when he does not work when ill was likely determined by the agricultural season; the time-bound act of farm clearing typically peaked in late February, since planting began in March. After a long period of rest due to sickness from an injection to treat leprosy, Nwayem can no longer wait to collect food, and so goes to harvest cassava even while still sick (10/2/40). Ofruice, too, does what she can when she injures her leg badly. While she normally

assists at the farm, during her convalescence, she instead watches her mother Ekodu's baby at home (14/9/39, 20/9/39, 23/9/39).[3]

Sick individuals may also find difficulty in seeking care while ill. Although healthy household members do sometimes tend the sick by making remedies (Amabua 29/12/39), administering purges (Ezeala 14/5/39), and bathing them (Egwuonwu 7/8/39-31/8/39), treatment itself is often self-administered. For instance, Akaji is forced to gather leaves to bathe her eyes in treatment of a headache (15/8/39). In Onwamini's case, sickness involves the burden of cooking himself food suitable to his tender stomach, even though Afoca and Alozia are available at that time (29/5/39). This supports our interpretation below that where the labor supply of healthy household members does not increase in response to another's illness, this is mostly due to labor complementarity, rather than due to care for the sick.

Illness and complementarity

Next, we test how one individual's illness affects the time use decisions of others in the household. If labor is complementary rather than substitutable, illness shocks should not increase other household members' propensity to work, particularly in activities making up work for the sick individual. In Figures 1A through 1C, we plot conditional means for adult men and women for three important activities – farming, going to market, and palm production. For farming, a slight increase in work conditional on spousal illness is visible for men, but not for women. For market work, there is a visible decline for men

[3] To test for differences by farming season, we have produced additional quantitative results that we do not report. These results are available on request. We have estimated our main results from Tables 3 through 5 separately for the six months in which individuals report farming most frequently and the six months in which they report it the least frequently. We refer to these as the "high farming" and "low farming" seasons. Results are broadly similar across periods, but some differences are worth noting. Responses of non-farming tasks to own illness are more pronounced in the low-farming season. Women only reduce farming and palm production in response to a husband's illness in the low-farming season. Men significantly reduce farming and palm production in response to same-gender illness in the low-farming season. Coordination with parental work exists in both seasons. For women, going to market increases in response to spousal absence in the high-farming season. Women coordinate with their husbands on palm production in both seasons. These results accord with our main findings that work tends only to be replaced when it is time bound or otherwise prioritized.

conditional on spousal illness, and a visible increase for women. For palm production, there is a visible decline in men's work conditional on spousal illness, and an increase for women. These figures, then, present a mixed pattern consistent with both substitution and complementarity.

Because these patterns in conditional means may be contaminated by individual heterogeneity and seasonality, regression estimates of (1) are presented in Table 4. We find few significant effects. For women, effects are largely negative, albeit insignificant. Women are less likely to engage in certain farming activities when their husbands are sick. There are a few positive effects for husbands. Men are more likely to engage in harvesting while their wives are sick, leading to an overall increase in farm work. This does not preclude complementarity in other tasks that, as we indicate above, anthropologists described as cooperative or in which the tasks performed by one individual made the tasks performed by another easier. For palm production, the effect of a wife's illness is negative, though insignificant. Complementary between the labor of spouses is one explanation of this pattern, though caring labor, the urgency of other individuals' work, and lack of urgency of the work lost exist as additional possibilities. Similarly, efforts by other individuals to continue working at tasks that increase their own bargaining power can explain both failure to substitute for an ill relative and why the reduction in own tasks is often insignificant. Results using the illness shocks of all other-gendered adults within the household are similar (not reported). The loss of male labor in these tasks makes female labor less productive.

Expanding analysis to illness shocks affecting other adults in the household, there is only limited evidence of substitution in same-gendered labor. Results are reported in Table 4. Many responses are statistically insignificant. Men are less likely to harvest, rest, or report being sick if another adult male is sick, though only the first is significant. Women are less likely to rest or report being sick when another adult woman in the household is ill, though again only the first is significant. We report estimates of men's responses to child illness in Table 4.

These patterns are also visible in the ethnographic record. Ezeala, in one example, chooses not to farm due to a cold, but does not seek replacement labor. Furthermore, his relative Afoca and wife Alozia do not divert their activities to help him, and instead continue farming their own crops (15/5/39).

Complementarity and coordination between spouses

In addition to the absence of labor substitution in the face of household illness, we provide further, positive, evidence that complementarities in cross-gender production exist, and so can help explain the lack of labor substitution in response to illness. To this end, we show in Table 6 that there is evidence of substantial coordination of spousal time. Couples engage in the same activities on the same day, especially when engaged in several types of farm work, mat production, and palm production. A similar pattern is apparent in Figure 2B, in which we plot conditional means for farm work, conditional on spousal activity. Two exceptions are childcare, a strongly gendered activity, and going to market, since spouses tend not to sell goods on the same day. Together, these patterns are congruent with the descriptions provided above by anthropologists, who describe work such as farm clearing, planting, and palm production as cooperative activities or as activities in which one individual's efforts aided those of others. Notably, the degree of coordination and thus of labor complementarity is likely underestimated here, due to the fact that in larger and more complex activities such as palm production, gendered complementarities exist both across tasks as well as in tasks that occur over the course of several days or weeks, rather than simultaneously.

Illness and complementarity in child labor

We treat individuals aged 16 or below in the data as "children."[4] We begin by asking whether child labor substitutes for adult labor when a child's parents are sick. Conditional means indicate a clear drop in the probability a child farms if a parent is sick, from roughly 23% to 5%. As these figures may be contaminated by individual heterogeneity

[4] The oldest individuals under this cut-off have ages estimated by Harris to be between 12 and 14.

and seasonality, we estimate (1) on the sample of children, using parental illness as the right-hand-side variable of interest. There are not enough children in the data to estimate these regressions separately for boys and girls. In Table 5, we find little evidence that children replace their parents when they are ill. Children are more likely to rest and less likely to care for other children on days when at least one parent is sick, though neither pattern is significant. They are less likely to go to market. This finding again suggests that labor within the household is complementary, rather than substitutable.

Ethnographic evidence reveals a similar pattern. In many cases, children are reported as pursuing their own activities when their mothers are ill, such as hunting or buying items for themselves (Ikoka & Akoma 11/30/39 & 20/1/40), or as farming on behalf of individuals other than their mothers (Akaji & Mbanta 18/9/39). This failure to make up parental labor occurs despite the fact that these same children are capable of working, and can be found assisting heads of household during the course of everyday work—in the case of Mbanta, even helping his uncle Uda farm on the same day as his sick mother's work goes uncompleted (18/9/39).

We find that child labor does not substitute for the labor of a sick parent, except perhaps under extraordinary circumstances. In our data, there is one clear instance in which child labor exists as a strategy for coping with parental illness and infirmity, and it arises as a long-term rather than a short-term response to permanent adult disability. Mmeziri, the intended wife of Iheukwumere, is brought to live with Iheukwumere's father Egwuonwu before puberty, earlier than is typical for a new bride, because Egwuonwu is too old to work much. His wife has recently died, his daughter Nwangras has recently gone into the fatting house (a period of seclusion before marriage), and his son Iheukwumere is frequently away, leaving no one to cook and work for the household (Introductory/family tree section – File C; 5/7/39). Mmeziri is described as working "harder than anyone else in Ndi Akwu," (Introductory section – File C), and the data bears this statement out. Although the data do not allow us to evaluate how perfectly Mmeziri's labor substitutes for that of an adult male's labor (e.g. by observing farm output and her labor productivity), at the age of 8-10, Mmeziri "actually does all the work

for the family of Egwuonwu" (5/7/39), and shoulders considerably more responsibility than Harris (1943) suggests would be appropriate for her age and sex. Performing even strength-intensive household and farming tasks on her own sets her apart from the children of similar age in the data, such as Akoma, Omenyenya, and Ofruice, who rarely spearhead their household's work. Later, even when Nwangras emerges from the fatting house and Iheukwumere returns from his travels, Mmeziri is described as leading the work while the other two assist (Nwangras 30/9/39, 4/2/40). The ethnographic account makes it clear that Mmeziri's systematic substitution for Egwuonwu's labor is exceptional rather than typical, and that it is driven by Egwuonwu's chronic debility rather than by occasional illness.

Complementarity and coordination between parents and children

As between spouses, parents in the data do appear to coordinate their labor with that of their children: they tend to engage in the same tasks on the same days. This is especially the case in farming, where conditional means show that children have a 33% chance of farming on days their parents also farm, a probability which drops to roughly 13% on days their parents do not farm. As these figures may be contaminated by individual heterogeneity and seasonality, In Table 5, we show regression results. Children are more likely to engage in farming or palm production on the days their parents also perform these tasks. In addition to the complementarity between adult and child labor, children are easier to supervise if they are brought along while their parents work; light child work in farming and palm production is thus a form of disguised childcare. The need for supervision of child work also explains why we do not see them replace the labor of a sick parent.

The ethnographic evidence, too, shows that children tend to be present on farms the same days their parents work in farming, although the motivation for this parent-child coordination differs by child age.

Although infants and toddlers are brought to the farm, the coordination of their time with that of their parents is largely driven by childcare demands rather than labor complementarity. Respondents' testimonies suggest that the tasks in which children engaged were not just a proactive matter of child supervision, but in many cases, a necessity prompted by a lack of other suitable childcare options. The entry for Mba's and Ahudiya's yam planting on 18/3/39 states that "Uce and Mary went alone, to sleep and cry. They do not work but the parents like to have them there so that they can keep their eye on them." Once they were at the farm, however, it was thought that even the youngest children might as well work. For example, although it is stated on 18/3/39 that Uce and Mary are only really brought to the farm for supervisory purposes, three days later, it is stated that they accompanied Mba, and while at the farm, helped him "to put yams in the heaps" (21/3/39).

For older children, the quantitative results that suggest parent-child labor coordination are supported by ethnographic evidence that these children do not just coordinate their labor with that of their parents, but that they also quite explicitly engage in complementary tasks. This is especially evident in agricultural labor, where child labor appears most frequently. Older children brought to the farm typically help in whatever way they can. This is most often the case in low-strength or auxiliary tasks (Harris, 1943), such as gathering stakes, tending yam tendrils, placing cuttings in dug heaps, or carrying the harvest home (Omenyenya 18/12/39, Akoma 11/7/39, Onwamini 30/8/39 & 8/3/39). Thus, children regularly engage in work that is not only suitable to their limited abilities, but which also frees up parental labor for more strength-intensive or technical tasks.

6. Strategic misallocation

Household form and bargaining concerns can also cause households to allocate time less productively than they might otherwise, for instance, incentivizing individuals to bolster their personal position within the household rather than to maximize the

household's income. We test for strategic behavior by turning to the ethnographic record. Such strategic behavior is evident in male cultivation of female crops, husbands' attempts to limit activities by wives that might generate bargaining power, and in the importance of social status in shaping responses to illness. We supplement these tests with further ethnographic evidence on the work of children.

We look for strategic time allocation quantitatively by testing whether adults systematically alter their activities when a spouse is away from Amankwu in order to take advantage of how their activities will be less observable to the spouse. In Figure 2A, we show suggestive evidence that wives curtail their farm work when their husbands are away – a pattern consistent with either complementarity or strategic diversion of effort to tasks with greater personal returns. As this may, however, be contaminated by individual heterogeneity and seasonality, we also present regression estimates of (1). There is little evidence of this in Table 6. This finding is not surprising, since it is visible contributions to production that increase bargaining power, and since there may be greater incentives to continue one's own work rather than to divert one's time to rest or to benefit the absent spouse. Indeed, although women are more likely to go to market or to rest when their husbands are away, these effects are statistically insignificant. Men are more likely to engage in childcare (a typically female activity) when their wives are away.

Though we have found no quantitative evidence that individuals in the sample take advantage of a spouse's absence to work on their own account, the ethnographic evidence reveals some exceptions. Wives sometimes make out-of-town visits while their husbands are away at court, at market, making social visits of their own, or home resting (Uda & Ejere 5/3/39, 18/4/39, & 29/4/39; Ezeala & Alozia 1/6/39; Uda & Ekeru 10/5/39).

The ethnographic evidence suggests that individuals misuse their time in *visible* ways, duplicating effort and engaging in work in which they lack a comparative advantage. This can be understood using Basu's framework. Individuals can over-supply work in order to increase their bargaining power, or be prevented by a powerful spouse from undertaking activities that would increase their future power. This echoes findings from cooperative game theory concerning the over-provision of effort, and arises from limited commitment

(Browning, 1982, 1983; Browning et al., 2014). For instance, individuals frequently help their spouses farm or prepare food even where the farms and foods in question belong explicitly to the spouse, in part to justify claim to a share of the proceeds or reciprocal help later. Behaviors such as these invalidate a simpler model with purely exogenous distribution factors, since the distribution of output clearly also depends on choices.

Other narrative evidence reveals that individuals do misallocate their time to tasks that make inefficient use of the household's labor in order to meet other aims. For example, Cikia, like "most men," grows the women's crops of coco yam and pepper in order to increase his bargaining power. By growing these, he is no longer at his mistress Eleke and relative Ekodu's "mercy as regards food" (28/3/39). Such evidence is consistent with Harris' broader impressions of bargaining between spouses over food (Harris, 1940), as well as with studies of present-day developing countries such as Mexico, India, and Côte d'Ivoire, which find consistent evidence of incomplete income pooling especially where it is possible to hide income (Attanasio and Lechene, 2002; de Nicola and Giné, 2014; Duflo and Udry, 2004), or in this case, farm or palm wine yields.

Resources are not pooled and shared fully; ideas of "yours" and "mine" are enforced within households, and disputes about food often hinge on the degree to which someone has contributed to its production and therefore has a right to its consumption (Mba & Ahudiya 1-2/10/39; Afoca 7/5/39; Harris, 1940). For instance, one man cites his help in preserving his wife's corn as a reason he should be able to eat it (Mba, 2/10/39). The sharing of resources within the household is often described as a kindness or favor, and not a basic expectation of intra-household resource distribution (Ekodu 28/3/39; Ezeala 15/6/39, 8/7/39, & 9/9/39; Alozia 25/6/39). Indeed, although households cooperate to some degree, Harris notes that "keen competition [and] individual aggressiveness…sometimes at the expense of one's own immediate family" is a feature of Igbo society (Harris, 1942, p. 53), with reciprocity, retaliation, and non-cooperation used as strategies to gain influence over household affairs (Harris, 1940, 1943, 1944).

As a result of such strategic misallocation of time, households miss opportunities to streamline, consolidate, or divide tasks to economize on available labor. For instance,

individuals are seen preparing their own food—often due to illness—even when the task is opposite-gendered or another individual in the household is already cooking for the rest of the family (Onwamini 29/5/39; Ezeala 16/5/39 & 14/2/40). Furthermore, in many cases, a woman will forego other work to care for her sick child, even when another co-wife is already home caring for her own child (Ikoka & Ekeru 1, 16, 23, & 25/6/39). This siloed approach to the affairs of "matrifocal units", even where these units are part of a larger household, is a feature in anthropological work on Igbo polygamy (Henderson and Henderson, 1966, p. 48; Henderson, 1972, p. 412; Okere, 1979, p. 68; Uchendu, 1965, pp. 55 & 188).

Further, this pattern accords with an endogenous bargaining model of intra-household time use. In polygamous households, bargaining power varies with social status and influences time use. Senior wives (or senior women more generally), such as Ikoka, command greater respect, compliance, and assistance, and have fewer instances of intra-household conflict than do junior ones such as Ejere (Ikoka 24/4/39 & 20/5/39; Ejere 29/7/39 & 10/9/39). Early scholarship on the Igbo confirms the position of deference and control accorded senior wives (Basden, 1921, pp. 97-8; Leith-Ross, 1939, p. 126). Dominance over junior women is also evident in the case of Alozia, who exercises power over adult ward Afoca's time use (1/5/39), likely due both to Alozia's seniority and Afoca's financial dependence.

Women's bargaining power also depends on their position versus the men in their household, and varies in response to past actions. That is, it is endogenous in the sense of Basu's model. In acknowledgment that the market is the primary place where women can earn cash incomes, and in retaliation for his wife, Alozia, accidentally spilling palm wine, Ezeala refuses to let her go to market, calling it "a great punishment not to let a woman go" (17/3/39, 14/3/39). However, he worries that because of his punitive action, he will spur Alozia to run away to her parents' home in Ovim (14/3/39), indicating that just as controlling household income share matters, so too does assessing another's social networks and outside options. Harris (1940) highlights Igbo women's successful claims over household assets following divorce, and their use of lovers as proxies in land deals

in order to circumvent their husbands' interference. These patterns reinforce the importance of women's options and support networks as sources of leverage. Given the fragility of marriages and the variety of options available to a woman seeking to "frustrate her husband's control over her", Harris finds that the posturing of the sort employed above by Ezeala rarely moved past threat into action (Harris, 1940, pp. 144-6). Clearly, such strategic misallocation of time, often motivated by intra-household bargaining concerns, was an impediment to the most efficient or productive use of household resources.[5]

Bargaining and illness

The work of sick individuals tends to be replaced when they are infrequently ill, when the duration of the illness is short, and when the person is a central member of the household. Long-term disabilities, infirmity, and pregnancy are treated differently. A man might take on "women's work" for a long period while his wife is expecting, giving birth, and recovering (Harris, 1943). Similarly, other members of the household will often work on behalf of those too old to work. The chronically ill, however, often go without help. Those who suffer frequent and prolonged illness, such as Eleke, Ejere, Ude, Ugwade, and Nwayem, have limited bargaining power and rarely get help in replacing their labor when sick. Alozia, by contrast, does not face such problems. She is rarely sick, is the socially preeminent woman in her household, and has the ready help of Afoca and Onwamini, as well as Ezeala, to whom she is sole wife. When Alozia cuts her finger, her husband, Ezeala, and ward, Onwamini, perform the more strenuous task of clearing her field while she goes to market (1/5/39).

[5] To test for differences between senior wives and other women, we have produced additional quantitative results that we do not report. These results are available on request. We have estimated the results separately for senior wives and other women. The farm work and palm production of women other than senior wives falls in response to spousal illness. Similarly, we find responses to spousal absence mostly for women other than senior wives, who reduce harvesting, and palm production, and increase going to market. Coordination of farm work is mostly evident for women other than senior wives. These results support our main finding that the question of whose work is made up, and who is responsible for making this work up, depends on an individual's social standing within the household.

These patterns are consistent with other results concerning poor households. Dercon and Krishnan (2000) find that women in poor households have especially little bargaining power and so bear the brunt of illness shocks. Liquidity-constrained households in their sample are compelled to allocate scarce resources to those members who are more productive or more likely to survive. Similarly, Pitt et al. (1990) find that household members with better health endowments substitute into heavier work. These individuals, then, have the greatest opportunity cost of time when a less healthy household member becomes sick.

Although many tasks appear to lack urgency, one type of work critical enough to be frequently addressed by the sick is trade—an activity largely undertaken for one's own enrichment rather than on behalf of the household. Sick individuals often have proxies trade on their behalf so as not to miss market days. Alozia sends Onwamini to market with money to buy corn for resale when she is home resting with body pain (21/10/39). Commercial activities also tend to continue despite illness. Cikia taps his *ngwo* (wine palm) despite having a fever (29/1/40, 30/1/40), and goes to market the same day to sell the resulting wine (30/1/40). That such trade-oriented tasks occurred on a rigid external timetable governed by market days and offered immediate payoff likely contributed to their urgency. Indeed, for women, trade was the principal source of cash income and thus enhanced their bargaining power.

Given the gender division of labor, women's productive time, and thus their bargaining power, is especially hard-hit by child illness. Although Ekodu is able to do the home-based work of cracking palm nuts for pay while staying home with her sick child (3/1/40), women tend more often to cease all other work and stay home to care for sick infants (Ikoka 1, 4, 16-18, 23, 25, 28, & 30/6/39, 1/7/39, 13, 15, & 17/11/39; Ekodu 13 & 25-26/6/39; Akaji 27/6/39). These patterns are consistent with the results in Pitt and Rosenzweig (1990), who find that it is predominantly mothers and older sisters who reduce their work effort when a child is ill.

In cases where a young child is ill, the mother stays home even while other household members—including co-wives, daughters, and other junior women—are available (Ikoka

1, 4, 16-18, 23, 25, 28, & 30/6/39, 1/7/39, 13, 15, & 17/11/39; Ekodu 13 & 25-26/6/39). In more than one case, Ikoka stays home caring for her sick child even while her junior co-wife, Ekeru, is already home caring for her own healthy child (1, 16, 23, & 25/6/39), a finding which suggests a desire to retain bargaining power by minimizing dependence on or indebtedness to others, especially competing wives.

The old and infirm are treated differently from the chronically ill. Mmeziri and Iheukwumere help Egwuonwu when he is ill (19/3/39), but they also do the lion's share of the work in Egwuonwu's household even when he is well, because he is repeatedly stated as being "too old" to work, especially in strenuous tasks or harsh weather (13/2/39, 13/17/39, 2/3/39). This stands in contrast to the treatment of others who are frequently or chronically ill. Although Ugwade is often unable to work due to severe flare-ups of venereal disease, her work remains postponed until she is well (12-27/7/39). When her lover, Okoro, beats her in a domestic dispute (7/5/39), Ugwade is unable to work for a week (14/5/39). Although she had been clearing her field (5/5/39) and going to market (6/5/39) immediately prior to her beating, there is no indication that anyone tended to her farm or went to market on her behalf during her recuperation. Similarly, Nwayem, who suffers from leprosy, and Ude, who suffers from gonorrhea, have frequent and prolonged illness but go without help (Nwayem 6-8/11/39 & 23/12/39-6/2/40; Ude 21-23, 25, & 27-28/10/39 & 12-19 & 21-22/12/39). Their isolation in small and semi-independent sub-households, combined with their near-outcast status, means that they have few healthy helpers.

There are a number of reasons for this collection of findings. First, the healthy members of a sick individual's household often have other, more pressing responsibilities. For example, during Ejere's illness, Uda has political responsibilities that make it difficult for him to make up others' work (15/3/39). Further, the state of household relationships also governs who receives help. Uda has time to harvest the healthy Ekeru's coco yams while Ejere is sick, although he offers Ejere no such help (23/3/39). An analogous situation occurs when Eleke is sick; Cikia helps his relative Ekodu harvest her yams, while his mistress Eleke's work goes un-replaced (22/4/39).

Last, Igbo society is gerontocratic. Many of the older persons in the sample, such as Egwuonwu, are officially “elders” whose ceremonial and political duties accord them the deference of the younger household members.

Bargaining and child labor

Intra-household bargaining power also motivated children’s time use—for instance, because children wished to earn independent incomes and thus bolster their position within the household, because a child’s poor standing within the household obligated him or her to work for more powerful household members, or because their parents’ bargaining power dictated how and for whom they worked.

As with adults, in order to maintain their claim over household resources, children were expected to contribute their time to the household. In our data, help in farm work and household errands were means by which children contributed to the household, earned their keep, and reciprocated contributions made by their parents. For example, Akoma cuts palm fruits for his mother, “who helps in his school needs” (13/1/40), and the ward Onwamini is frequently sent on errands by Ezeala (25/1/40, 7/1/40, 11/9/39). Children are also found engaging in activities such as mat-making and palm harvesting in return for their school fees, or as a "token of appreciation" for their parents' help with fees. Children like Omenyenya and Akoma perform farm work, palm harvesting, and mat-making for this reason (Omenyenya 5/8/39, Akoma 13/1/40). Parents express anger and frustration when children refuse to help, which suggests that such chores are expected as a basic household contribution (Introductory section– File C; Cikia 5-6/3/39; Ofruice 25/5/39, 21/6/39, 11/7/39, & 30/1/40; Uce 9/11/39; Omenyenya 28/12/39; Onwamini 18/1/40).

Indeed, although older children may have pursued activities for their own benefit, such as hunting, trade, and recreation, they tended to do so only when they had fulfilled their farming and gathering responsibilities (Ofruice 16/2/39 & 30/8/39, Omenyenya 9/7/39 & 21/10/39, Mmeziri 1/8/39 & 31/10/39, Onwamini 30/3/39 & 10/11/39). In one instance, Uda prevents his son Akoma from going to church so that he may instead farm

on Uda's behalf, scornfully adding that he "only sent Akoma to school to learn books and not to go to church" (10/12/39). Parents cite disobedience and failure to cooperate with farming and household help as grounds for non-payment of school fees and related expenses, as is the case with Cikia and his adoptive son Kalu. Kalu was compelled to quit school for two months when his father "refused to pay his school fees because Kalu refused to work for him" (Introductory section – File C).

The expectations of older children, wards, and the children of frequently sick or absent parents were particularly demanding. Instead of merely accompanying their parents to the farm to assist in peripheral tasks, these children work independently on behalf of their parents, doing the full work of adults: they plant, harvest, and supervise hired workers (Onwamini 5/2/40, Ezeala 11/4/39, Mmeziri 18/3/39, 21/3/39, & 15/5/39). Wards like Onwamini were especially seen as needing to earn their keep, since the social obligation of household heads to support them—and thus these wards' intra-household position—was not as strong as with biological children (Ugwade & Akaji 9/9/39). Such children can be seen managing other smaller children in the performance of farming tasks. During the month when Uda is serving as a member of court, his son Akoma is put in charge of managing his younger siblings and cousins (18, 25, 27, & 29/11/39; 10, 12, 15, 21, 23, & 29/12/39; 6/1/40).

Thus, parents are seen using their control over the allocation of resources to direct children's time use, consistent with an endogenous bargaining power framework similar to that of Basu. In this model, it is not just that the (more powerful) parent can compel the (less powerful) child to work; the spousal balance of power may also influence how the child's time is allocated. For instance, mothers may be less willing than fathers to encourage child work not only because they may more completely internalize its disutility to the child, but also because they may lack the bargaining power to fully appropriate its returns. We observe behaviors consistent with this. One male household head, Ezeala, largely monopolizes and thus fails to limit the labor of his ward. He occasionally lends the boy's help to his wife, but more often he sets the ward to work for him in tasks such as farming and errands, even using the ward to fulfil his own reciprocal

labor obligations to others when he himself is too busy to go (17/3/39). Similarly, in Cikia's household, whether his mistress Eleke's high status relative to his brother's widow Ekodu is a function of the former's status as mistress or her husband's preference for her, the labor of Ekodu's own children, Kalu and Ofruice, is more frequently commandeered by Cikia to aid Eleke than to help their own mother (Kalu 8/5/39, 13/5/39, & 6/6/39).

Not all child labor is a matter of simple obligation, or of maintaining some static share of household resources: children also work in order to increase their own bargaining power. Moehling (2005), for example, finds that children in the early twentieth century United States who contributed to household income had more influence on household spending patterns. Children with independent incomes also enjoyed better outside options and thus strengthened their bargaining position vis-à-vis their parents. To this end, children frequently work voluntarily in trading and the production of palm produce for sale, which allowed children not only to learn trade and business basics important in adult life, but also to earn independent and discretionary cash income. In an example that is especially telling of the possibility of child labor contributing to a child's autonomy, one child, Cikia, uses money earned working on others' farms (22/2/39, 12/3/39) to secure the financial independence needed to disobey his father (5-6/3/39), and eventually to run away indefinitely (14/5/39).

Of all non-farm activities, children play an especially significant role in palm production, an activity which in turn allows opportunities for children to earn independent income. Girls such as Ofruice, Nwangras, and Elebe often help the senior woman in their household as she cracks and pounds palm nuts for the production and subsequent sale of palm oil (Elebe 14/2/39 & 21/1/40; Ofruice 22 & 24-25/8/39, 17 & 19/1/40). At other times, these girls perform these same activities and keep the proceeds for themselves (Mmeziri 31/5/39 & 17-19/1/40; Nwangras 7/10/39, 13/1/40, 18/1/40, & 7/2/40).

Through such independent activity, children also learned skills that would help them in adulthood (Harris, 1943), a fact which the residents of Amankwu recognized. Uce's

unsuccessful hunting of lizards is described as "learning" (14/2/39). Ofruice has a farm in which she grows small amounts of corn, pepper, okra, and cocoyams. Ezeala describes this as "the way young girls learn to farm" (4/4/39). Onwamini learns to tap palm wine by doing so directly (26/7/39).

Of course, not all child work was voluntary. Children in the data are sometimes "dragged" to work when disobedient (Mba & Omenyenya 28/12/39). Refusal to work is punished in many ways, including beatings and refusal by parents to pay school fees (Eleke & Ofruice 26/5/39; Mba & Omenyenya 28/12/39; Kalu 22/3/39), again suggesting that intra-household bargaining forces and time use choices depended on one-another, both in parent-child and spousal contexts.

In sum, the patterns in child labor we observe demonstrate that decisions over the time use of children were constrained by the complementarity of child and adult labor within the household, economies of scope in the combination of child labor with child supervision, unequal claims within the household over the fruits of child work, and the capacity of children to accumulate bargaining power through their choices. All of these factors may have contributed to suboptimal time allocation and to lower levels of household productivity and income.

7. Robustness

Our baseline analysis codes individual activities as dummies for whether an activity was performed on a certain day. In many cases, however, individuals provide additional information on when they performed an activity and how long it took. We have converted our daily dummies for each activity into measures of time actually used in fractions of a typical ten hour day. Because most activities lack precise information on start and end times, we have had to infer durations from terse descriptions and, in many cases, assume that activities are equally spaced over the day.[6] We report summary statistics for these

[6] In particular, we assign the following hourly durations to each of the following descriptors:

3	A few hours	2	Early afternoon
0.5	A few minutes	2	Early morning

recoded measures of activity in Table 7. We repeat the baseline analysis of Tables 3, 4 and 5 using these recoded measures in Tables 8, 9 and 10. Results are qualitatively similar to our baseline results.

We report a series of robustness exercises in the appendix tables. We use Appendix C to discuss missing data (Table A1). Spouses tend to be missing from the record on the same day, although there is little evidence that the probability that one spouse's activities are reported depend on what the other spouse is doing. Children, by contrast, are less likely to be reported when a parent is also missing from the data, or when a parent is engaged in going to market, hunting, or sick.

We report results with Cameron, Gelbach and Miller (2011) standard errors clustered by both individual and day in Tables A2-A4. These are similar to our baseline estimates. Our main results remain largely unchanged if we include lagged dependent variables in all specifications (not reported).

In the appendix tables, we show that the empirical results are similar when own illness is included as a control (Table A5). Extending illness shocks to cover any illness within the past week, we continue to find that individuals curtail work in response to own illness but do not increase it in response to the illness of a spouse, excepting men harvesting and attending market (Table A7). To capture the effect of illness duration, we also extend the analysis of Table 4 by estimating (1) including both a dummy for whether person *j* is ill and the number of days that person *j* has been ill (not reported). In the own-illness regressions for women, we find that for many activities, work resumes as sickness drags on. For example, a man is less likely to farm on a day he is ill, but this effect diminishes each additional day he is sick. In the sample of women, we find no significant positive coefficients on the length of a husband's illness that would suggest women become more likely to make up for a husband's lost labor the longer he is sick.

1	A short time	3	Evening
1	A while	2	Late afternoon
5	Afternoon	2	Late night
5	All afternoon	5	Morning
10	All day	10	Most of day
5	All morning	8	Night
8	All night	5	Part of the day

We show in the appendix tables that the empirical results are similar when controlling for a child's own illness (Table A6). If we expand definitions of parental time use to cover activities within the past week, we find less evidence of coordination, though coordination in several types of farm work remains (Table A8). Discarding the two children aged 8-10, we continue to find evidence of coordination with parental time in farming (Table A9).

In Table A10, we report results with more aggregated categories of time use. We define "any farm work" as an indicator for farming (or any category such as harvesting) or palm production. We define "non-farm work" as child care, cooking, fetching water, food preparation, gathering, home repair, hunting, making mats, going to market, or road work. We define "any leisure" as beauty, hosting, or recreation. Many of the general patterns visible in more disaggregated categories are still apparent here: work reduces in response to own illness but does not increase in response to spousal illness. For women, responses to spousal illness are negative but insignificant. There is evidence of weak same-gender substitutability in non-farm work for men. Children do not replace sick parents, but rather coordinate their time with their parents. Where results change is in spousal coordination. The tendency to engage in the same activity on the same day uncovered with more disaggregate categories is not apparent here. This is not surprising: the task specialization that allows complementarities to arise will exist within an activity such as palm production, and not from palm production to, say, farm clearing.

We have also aggregated activities as essential (care for own child, any childcare, cooking, care for another's child, eating, farmed, farm clearing, farm harvesting, other farm work, farm planting, fetching water, food preparation, gathering, hunting, latrine, and palm production) and non-essential (all other activities coded in the data). Results for these categories are presented in Table A11. Individuals move from essential to inessential activities when ill; women reduce essential activities when their husbands are ill; children perform more essential work when their parents farm; children coordinate with their parents on essential work, and; spouses coordinate on inessential work.

In addition, we have aggregated activities into eight categories that are less broad than in the previous two exercises. In particular, we have collapsed activities into housework (cooking, fetching water, food preparation, gathering, home repair, and making mats), personal care (bathing, eating), childcare (care for own child, cared for child), leisure (beauty, recreation, resting), market work (palm production, went to market), farming and hunting (all types of farm work, hunting) sick and away (away and sick), and community obligations (visiting, hosting, religious duties, and road clearing). We have presented these results in Table A12. The results suggest that individuals reduce housework, farming and hunting, and community obligations when ill, in favor of personal care and leisure. There is again no evidence of substitution across spouses in farm work or palm production. There is no evidence children substitute for ill parents, though they do coordinate across a range of activities. Spousal coordination in this table is limited to market work.

8. Conclusion

In this paper, we have used anthropological data to show that the structure of African households and the incentives that they faced shaped their time allocation in an historical context. The lack of labor substitution in response to illness, the coordination of labor between spouses, the coordination of labor between parents and children, and the strategic misallocation of labor that we observe are consistent with endogenously-formed bargaining power and with intra-household labor complementarities that stem partly from task specialization given by the gender division of labor. In particular, we have found very little evidence of labor substitution within households. However, there is also little quantitative evidence to suggest any correlation between the illness shocks faced by one adult in the household and the work of other adults. The ethnographic evidence reveals patterns consistent with strategic labor misallocation and shows strong evidence of a largely cultural gender division of labor. We have also found that child labor interacts with adult labor in a complex way: it is complementary with child care, it is partly a

means by which children learn and, for older children, it can contribute to the child's bargaining power within the household.

Our results have implications for African development. Both historical and modern literatures question the capacity of African households to allocate their time efficiently. Historians have debated the amount of slack time African households had available to allocate in response to historical changes in incentives (Austin, 2014), while development economists have argued that household forms prevalent in Africa have prevented households from achieving efficiency in investment, labor allocation, consumption choices, and input use (Duflo and Udry, 2004; Goldstein and Udry, 2008; Udry, 1996). In our data, the lack of labor substitution in response to illness, coupled with the coordination of labor between spouses and between parents and children, made illness especially costly: when one individual falls ill, it compromises the ability of even those who are well to use their time productively. Accordingly in these households, labor complementarity has the potential to amplify household income losses due to health shocks. Strategic misallocation of labor, similarly, constrained the abilities of African households to allocate their time productively, and so limited their efficiency. To wit, households often find healthy adults completely idle when another is sick (e.g. Uda 8/12/39, Cikia 2/8/39), while in others, individuals wastefully duplicate childcare and vegetable cultivation tasks in order to maintain an edge in household bargaining (e.g. Cikia 28/3/1939, Ikoka 23/6/39). Such constraints on labor, whether culturally imposed or stemming from real features of the technology of agricultural production, could contribute to low levels of welfare in these and similar contemporary African households.

Our study has drawn on data from a single Nigerian society in the colonial period. Clearly, then, the details of the technological constrains and cultural forms they took as given will be specific to the context. We believe, however, that our work has broader relevance. In finding that illness shocks are compounded by labor complementarities (Adhvaryu and Nyshadham, 2014), in stressing that household bargaining considerations can produce inefficient outcomes (Jakiela and Ozier, 2015), and in highlighting complexities in the dynamics of child labor (Basu, 2006), we show that the considerations motivating the households in our sample parallel those facing many present-day households operating both in Africa and throughout the developing world.

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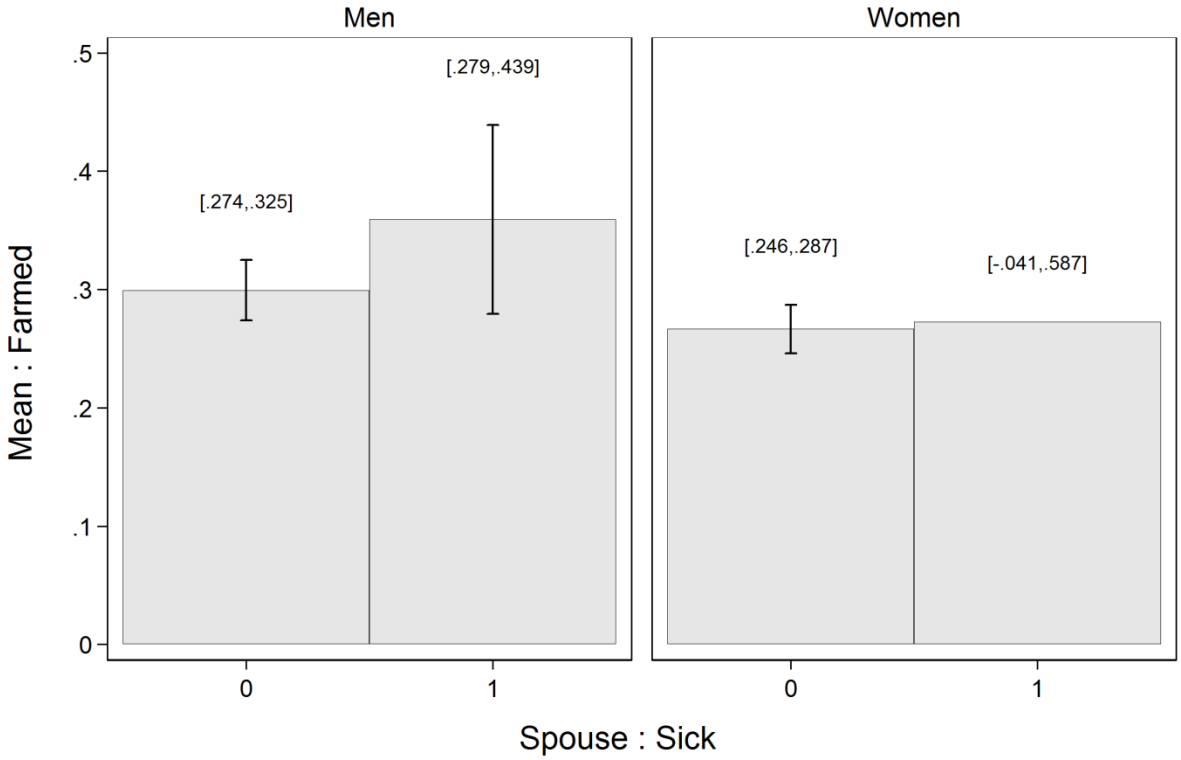
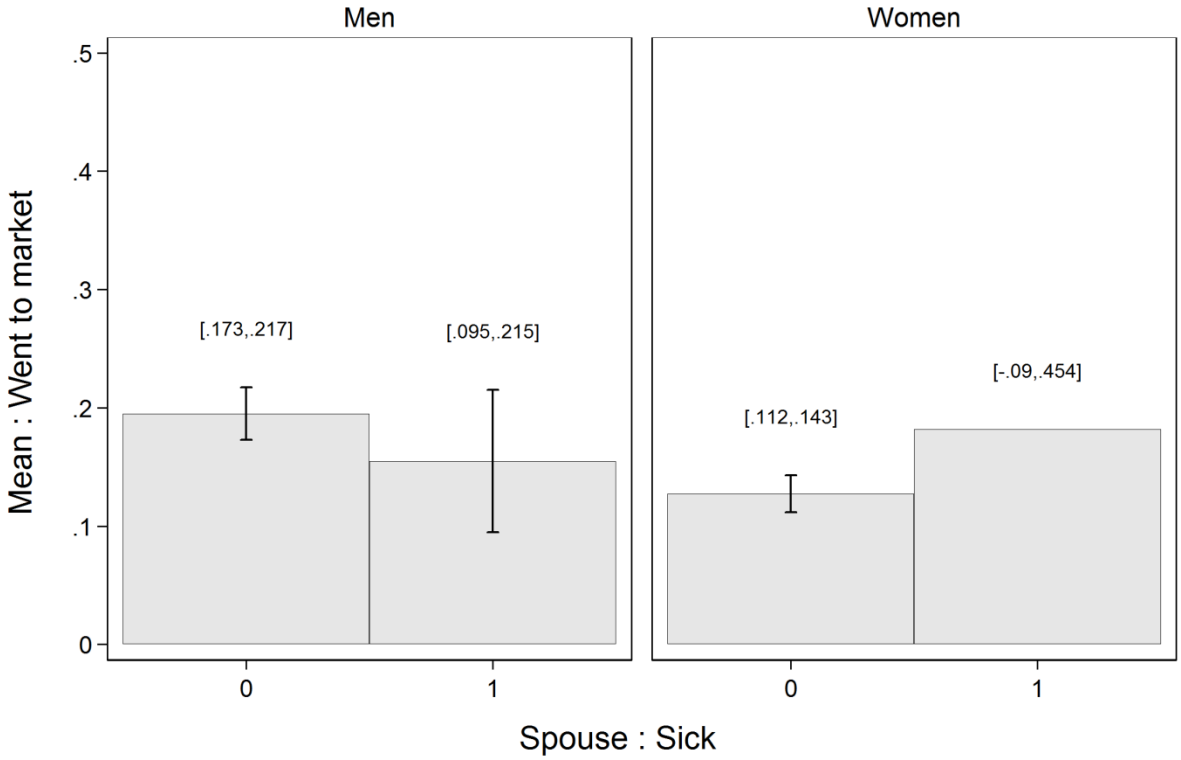
Figure 1A. Responses to spousal illness: Farmed



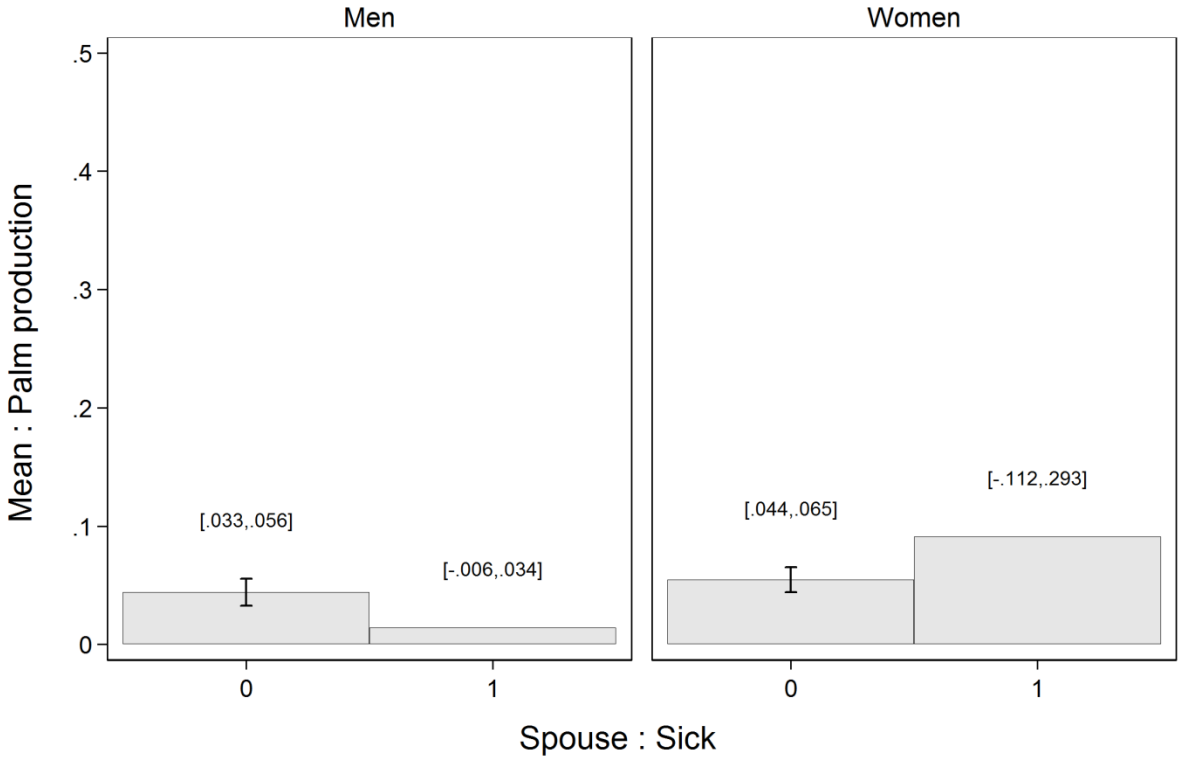
Notes: This figure presents the mean and 95% confidence interval for the mean for the variable "farmed," conditional on whether an individual has a spouse who was sick (1), or not (0). Confidence intervals containing zero not drawn.

Figure 1B. Responses to spousal illness: Went to market



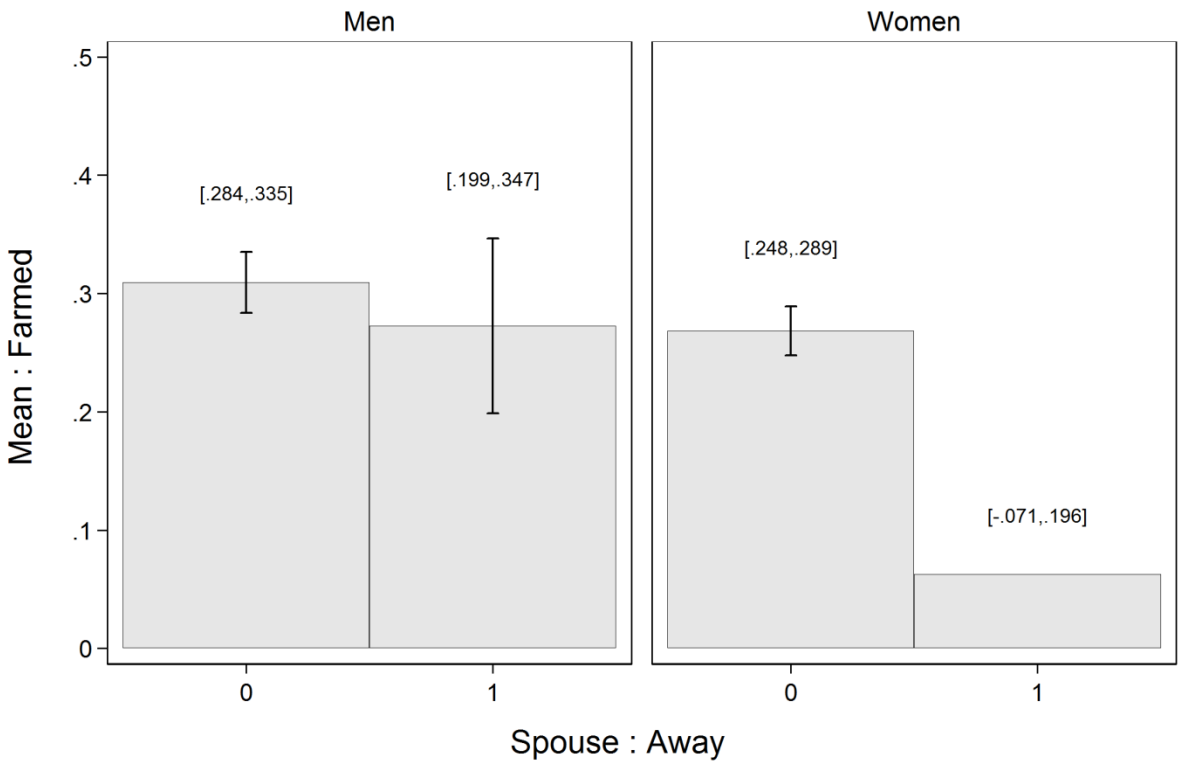
Notes: This figure presents the mean and 95% confidence interval for the mean for the variable "went to market," conditional on whether an individual has a spouse who was sick (1), or not (0). Confidence intervals containing zero not drawn.

Figure 1C. Responses to spousal illness: Palm production



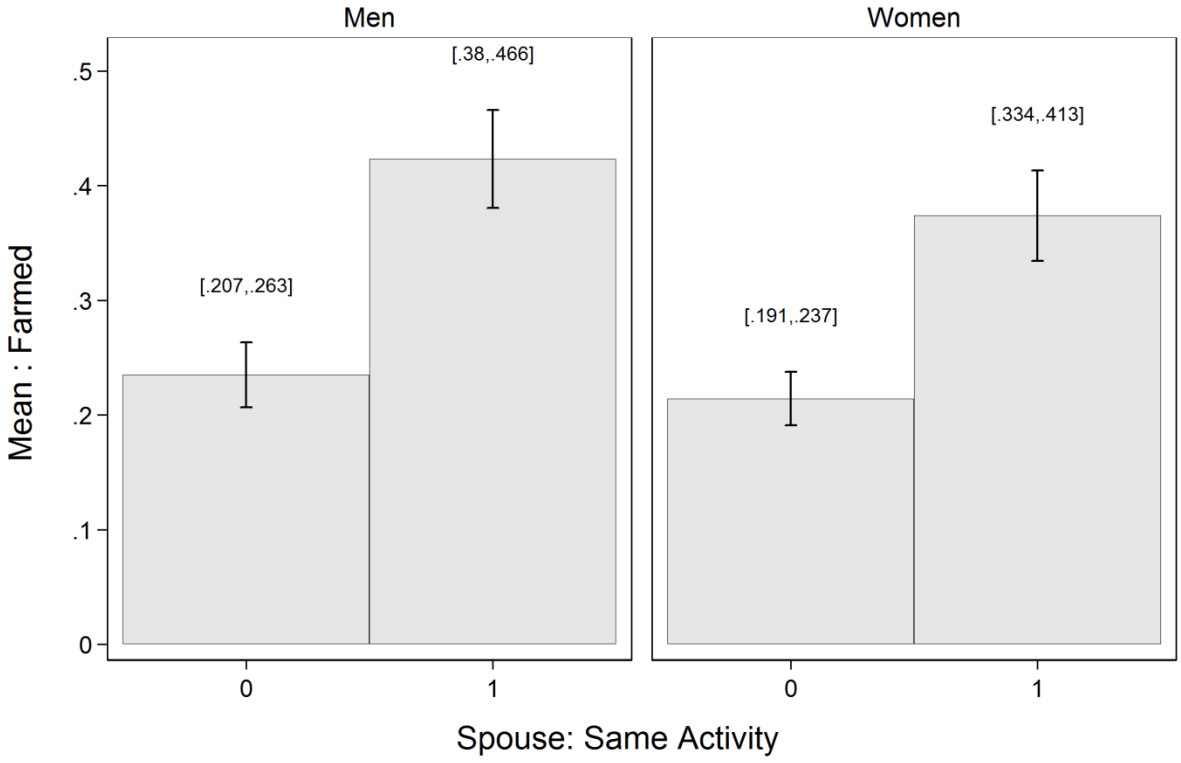
Notes: This figure presents the mean and 95% confidence interval for the mean for the variable "palm production," conditional on whether an individual has a spouse who was sick (1), or not (0). Confidence intervals containing zero not drawn.

Figure 2A. Coordination – Farming and Spousal Absence



Notes: This figure presents the mean and 95% confidence interval for the mean for the variable "farmed," conditional on whether an individual has a spouse who was away from Amankwu (1), or not (0). Confidence intervals containing zero not drawn.

Figure 2B. Coordination – Farming and spouse farmed



Notes: This figure presents the mean and 95% confidence interval for the mean for the variable "farmed," conditional on whether an individual has a spouse who was) also engaged in farming (1), or not (0. Confidence intervals containing zero not drawn.

Table 1: Individuals in regressions and their relationships as coded

Name	*Sex*	*Age*	*Spouses*	*Parents (incl. adoptive)*
			Ezeala	
Afoca	f	23-25		Ezeala
Alozia	f	34-36	Ezeala	
Ezeala	m	35-38	Alozia	
Onwamini	m	12-14		Ezeala
			Cikia	
Cikia	m	42-45	Eleke	
Ekodu	f	30-33		
Eleke	f	35-37	Cikia	
Kalu	m	12-14		Cikia, Ekodu
Ofruice	f	8-10		Cikia, Ekodu
			Mba	
Ahudiya	f	22-24	Mba	
Amabua	f			
Mba	m	24-26	Ahudiya	Amabua
Omenyenya	m	10-10		Amabua
			Uda	
Akaji	f	30-32		
Akoma	m	10-12		Ikoka, Uda
Ejere	f	30-32	Uda	
Ekeru	f	24-26	Uda	
Ikoka	f	32-35	Uda	
Uda	m	50-53	Ejere, Ekeru, Ikoka	
Ugwade	f	29-31		Uda
			Egwuonwu	
Cikia	m	16-18		Egwuonwu
Egwuonwu	m	57-60		
Iheukwumere	m	22-24	Mmeziri	Egwuonwu
Mmeziri	f	8-10	Iheukwumere	

Table 2: Means

	(1) Full Sample	(2) Men	(3) Women		(4) Children	
Cared for child	0.096	0.028	0.148	*	0.069	
Farmed	0.302	0.282	0.327		0.270	
Farm work - clearing	0.028	0.050	0.016	***	0.025	**
Farm work - harvesting	0.129	0.083	0.154	**	0.134	
Farm work - planting	0.064	0.046	0.083	*	0.043	
Gathering	0.111	0.094	0.112		0.135	
Hunting	0.020	0.042	0.001		0.034	
Went to market	0.137	0.153	0.143		0.098	
Palm production	0.049	0.041	0.055		0.045	
Resting	0.263	0.315	0.222		0.288	
Sick	0.054	0.042	0.066		0.042	
Making mats	0.019	0.049	0.001	***	0.019	**
N	6,266	1,893	3,134		1,239	

Notes: All variables are binary 0/1 indicators. Stars indicate statistical significance in a regression of the row variable on a dummy for adult female and a dummy for child, with standard errors clustered by individual. *** Significant at 1%, ** Significant at 5%, * Significant at 10%.

Table 3: Complementarity

	Complementary	Substitutable
Spouse-spouse	Farmed	Went to market
	Farm work – clearing	Farm work - harvesting
	Farm work – planting	
	Palm production	
	Cared for child	
Parent-child	Farmed	Cared for child
	Farm work – clearing	Went to market
	Farm work – planting	Gathering
	Farm work - harvesting	
	Palm production	
	Making mats	

Table 4: Responses to illness

	(1) Cared for child	(2) Farmed	(3) Farm work - clearing	(4) Farm work - harvesting	(5) Farm work - planting	(6) Gathering	(7) Hunting	(8) Making mats	(9) Went to market	(10) Palm production	(11) Resting	(12) Sick
Sick	-0.001	-0.185	0.001	-0.042	-0.018	-0.086	-0.012	-0.042	-0.010	0.007	0.313	1.000
Men (N=1,893)	(0.011)	(0.032)***	(0.020)	(0.024)	(0.011)	(0.022)***	(0.019)	(0.013)**	(0.022)	(0.032)	(0.041)***	(0.000)***
Sick	-0.074	-0.376	-0.028	-0.191	-0.073	-0.130	-0.001	0.005	-0.102	-0.053	0.679	1.000
Women (N=3,134)	(0.054)	(0.024)***	(0.009)**	(0.044)***	(0.018)***	(0.029)***	(0.002)	(0.004)	(0.025)***	(0.016)***	(0.026)***	(0.000)***
Spouse : Sick	0.015	0.061	-0.018	0.067	0.004	-0.018	0.011	-0.018	0.022	-0.046	-0.010	0.012
Men (N=1,388)	(0.016)	(0.028)*	(0.023)	(0.028)*	(0.028)	(0.024)	(0.020)	(0.010)	(0.019)	(0.034)	(0.024)	(0.009)
Spouse : Sick	-0.042	-0.234	-0.015	-0.041	-0.120	-0.002		0.073	-0.061	-0.031	-0.033	0.118
Women (N=1,786)	(0.104)	(0.147)	(0.006)*	(0.112)	(0.065)	(0.025)		(0.037)	(0.068)	(0.015)	(0.062)	(0.036)**
HH: Other Adult Male X Sick	-0.004	-0.038	0.004	-0.076	0.025	-0.008	0.018	-0.016	0.047	-0.027	-0.119	-0.184
Men (N=1,893)	(0.014)	(0.055)	(0.028)	(0.026)**	(0.026)	(0.014)	(0.019)	(0.016)	(0.028)	(0.028)	(0.079)	(0.195)
HH: Other Adult Female X Sick	0.015	0.025	0.004	0.003	-0.003	0.024	0.001	0.003	0.012	-0.009	-0.099	-0.121
Women (N=3,134)	(0.028)	(0.031)	(0.007)	(0.024)	(0.016)	(0.022)	(0.001)	(0.003)	(0.020)	(0.016)	(0.051)*	(0.070)
Children : Sick	-0.020	0.034	0.031	-0.021	0.014	-0.032	-0.007	-0.023	0.001	0.024	0.000	0.016
Men (N=1,082)	(0.055)	(0.037)	(0.020)	(0.015)	(0.014)	(0.022)	(0.020)	(0.017)	(0.039)	(0.013)	(0.046)	(0.006)*

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.

Table 5: Child labor

	(1) Cared for child	(2) Farmed	(3) Farm work - clearing	(4) Farm work - harvesting	(5) Farm work - planting	(6) Gathering	(7) Hunting	(8) Making mats	(9) Went to market	(10) Palm production	(11) Resting	(12) Sick
Parents : Sick	-0.106	-0.118	-0.055	-0.058	-0.041	0.027	0.092	-0.005	-0.161	0.065	0.114	0.051
Children (N=953)	(0.087)	(0.116)	(0.045)	(0.052)	(0.031)	(0.057)	(0.073)	(0.022)	(0.067)*	(0.093)	(0.145)	(0.050)
Parents : Farmed	0.050	0.202	0.006	0.102	0.037	0.001	-0.021	0.016	-0.010	-0.012	-0.096	-0.033
Children (N=953)	(0.028)	(0.047)**	(0.029)	(0.015)***	(0.013)**	(0.033)	(0.015)	(0.013)	(0.025)	(0.018)	(0.042)*	(0.015)*
Parents : Palm production	-0.030	-0.031	-0.011	0.029	-0.069	0.080	-0.012	0.002	0.026	0.102	0.029	-0.022
Children (N=953)	(0.023)	(0.070)	(0.029)	(0.087)	(0.030)*	(0.039)	(0.019)	(0.007)	(0.038)	(0.026)**	(0.048)	(0.021)
Parents : Same Activity	-0.165	0.202	0.375	0.102	0.284	0.090	0.068	0.193	0.050	0.102	0.036	0.051
Children (N=953)	(0.092)	(0.047)**	(0.157)*	(0.045)*	(0.029)***	(0.023)**	(0.026)*	(0.052)**	(0.051)	(0.026)**	(0.027)	(0.050)
Parents : Resting	-0.015	-0.044	-0.007	0.005	0.001	0.007	0.005	0.004	-0.014	-0.008	0.019	0.031
Children (N=931)	(0.016)	(0.043)	(0.017)	(0.036)	(0.010)	(0.026)	(0.013)	(0.011)	(0.007)	(0.021)	(0.028)	(0.005)***

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.

Table 6: Coordination between spouses

	(1) Cared for child	(2) Farmed	(3) Farm work - clearing	(4) Farm work - harvesting	(5) Farm work - planting	(6) Gathering	(7) Hunting	(8) Making mats	(9) Went to market	(10) Palm production	(11) Resting	(12) Sick
Spouse : Away	0.075	-0.013	-0.016	0.014	-0.040	0.049	-0.031	0.031	-0.007	-0.002	-0.078	0.008
Men (N=1,388)	(0.023)**	(0.061)	(0.018)	(0.057)	(0.014)**	(0.033)	(0.055)	(0.017)	(0.039)	(0.025)	(0.069)	(0.021)
Spouse : Away	0.115	-0.102	-0.006	-0.098	0.014	-0.057		-0.004	0.130	-0.050	0.192	-0.042
Women (N=1,786)	(0.103)	(0.063)	(0.006)	(0.068)	(0.076)	(0.040)		(0.002)	(0.098)	(0.122)	(0.159)	(0.096)
Spouse: Same Activity	-0.084	0.081	0.321	0.074	0.246	0.069	0.098	0.570	0.024	0.329	-0.006	0.012
Men (N=1,388)	(0.041)	(0.051)	(0.110)**	(0.033)*	(0.042)***	(0.035)	(0.038)*	(0.079)***	(0.055)	(0.106)**	(0.020)	(0.009)
Spouse: Same Activity	-0.085	0.051	0.160	0.055	0.312	0.061		0.031	-0.047	0.524	-0.007	0.118
Women (N=1,786)	(0.074)	(0.048)	(0.073)*	(0.041)	(0.097)**	(0.032)		(0.022)	(0.053)	(0.037)***	(0.033)	(0.036)**

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.

Table 7: Means (Hours based on 10 hour day)

	(1) Full Sample	(2) Men	(3) Women		(4) Children	
Cared for child	0.831	0.170	1.303	*	0.649	
Farmed	1.970	1.969	2.068		1.722	
Farm work - clearing	0.222	0.391	0.126	***	0.204	**
Farm work - harvesting	0.523	0.343	0.616	*	0.563	
Farm work - planting	0.537	0.408	0.677		0.381	
Gathering	0.488	0.331	0.560		0.544	
Hunting	0.123	0.265	0.006		0.201	
Went to market	1.032	0.903	1.236		0.710	
Palm production	0.314	0.217	0.375		0.308	
Resting	1.878	1.990	1.660		2.258	
Sick	0.542	0.421	0.666		0.414	
Making mats	0.092	0.217	0.003	***	0.126	
N	6,266	1,893	3,134		1,239	

Notes: Stars indicate statistical significance in a regression of the row variable on a dummy for adult female and a dummy for child, with standard errors clustered by individual. *** Significant at 1%, ** Significant at 5%, * Significant at 10%.

Table 8: Responses to illness - Activities based on ten hour day

	(1) Cared for child	(2) Farmed	(3) Farm work - clearing	(4) Farm work - harvesting	(5) Farm work - planting	(6) Gathering	(7) Hunting	(8) Making mats	(9) Went to market	(10) Palm production	(11) Resting	(12) Sick
Sick	0.003	-0.150	-0.012	-0.019	-0.019	-0.029	-0.003	-0.015	-0.003	-0.005	0.273	1.000
Men (N=1,893)	(0.004)	(0.023)***	(0.015)	(0.009)*	(0.009)*	(0.008)**	(0.010)	(0.005)**	(0.013)	(0.013)	(0.050)***	(0.000)***
Sick	-0.051	-0.240	-0.023	-0.083	-0.061	-0.065	-0.001	0.000	-0.101	-0.032	0.703	1.000
Women (N=3,134)	(0.043)	(0.026)***	(0.009)**	(0.019)***	(0.014)***	(0.012)***	(0.001)	(0.000)	(0.030)***	(0.012)**	(0.037)***	(0.000)***
Spouse : Sick	0.013	0.050	-0.017	0.027	0.001	0.005	0.011	-0.009	-0.005	-0.017	-0.028	0.013
Men (N=1,388)	(0.014)	(0.017)**	(0.020)	(0.016)	(0.024)	(0.003)	(0.021)	(0.005)	(0.011)	(0.017)	(0.012)*	(0.011)
Spouse : Sick	-0.004	-0.170	-0.005	-0.018	-0.073	0.011		0.008	-0.004	-0.018	0.003	0.117
Women (N=1,786)	(0.081)	(0.083)*	(0.004)	(0.040)	(0.032)*	(0.014)		(0.003)**	(0.042)	(0.009)*	(0.037)	(0.020)***
HH: Other Adult Male X Sick	0.002	0.013	0.002	-0.035	0.032	-0.011	0.018	-0.006	0.040	0.007	-0.087	-0.183
Men (N=1,893)	(0.005)	(0.038)	(0.022)	(0.015)*	(0.025)	(0.006)	(0.014)	(0.007)	(0.016)*	(0.054)	(0.078)	(0.192)
HH: Other Adult Female X Sick	0.007	0.029	0.005	0.004	-0.010	0.007	0.003	0.000	-0.001	-0.012	-0.103	-0.122
Women (N=3,134)	(0.023)	(0.026)	(0.005)	(0.012)	(0.013)	(0.012)	(0.003)	(0.000)	(0.012)	(0.008)	(0.049)*	(0.067)*
Children : Sick	-0.025	0.015	0.001	0.001	0.008	-0.018	-0.029	0.001	0.012	0.012	0.037	0.019
Men (N=1,082)	(0.029)	(0.044)	(0.003)	(0.008)	(0.010)	(0.002)***	(0.018)	(0.007)	(0.031)	(0.010)	(0.051)	(0.016)

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.

Table 9: Child labor - Activities based on ten hour day

	(1) Cared for child	(2) Farmed	(3) Farm work - clearing	(4) Farm work - harvesting	(5) Farm work - planting	(6) Gathering	(7) Hunting	(8) Making mats	(9) Went to market	(10) Palm production	(11) Resting	(12) Sick
Parents : Sick	-0.083	-0.040	-0.027	-0.020	-0.027	0.005	0.063	-0.005	-0.130	0.056	0.167	-0.001
Children (N=953)	(0.073)	(0.075)	(0.022)	(0.016)	(0.025)	(0.019)	(0.043)	(0.018)	(0.044)**	(0.070)	(0.097)	(0.036)
Parents : Farmed	0.063	0.164	0.004	0.029	0.078	0.003	0.001	0.002	-0.001	-0.028	-0.122	-0.045
Children (N=953)	(0.048)	(0.041)**	(0.016)	(0.015)	(0.014)***	(0.021)	(0.019)	(0.008)	(0.028)	(0.015)	(0.077)	(0.029)
Parents : Palm production	-0.003	-0.093	0.011	-0.015	-0.091	0.049	-0.040	0.018	0.007	0.138	0.042	0.050
Children (N=953)	(0.020)	(0.039)*	(0.034)	(0.025)	(0.045)	(0.008)***	(0.018)*	(0.009)	(0.015)	(0.049)**	(0.036)	(0.042)
Parents : Same Activity	-0.188	0.164	0.395	0.084	0.279	0.068	0.029	0.381	0.004	0.138	0.110	-0.001
Children (N=953)	(0.105)	(0.041)**	(0.160)*	(0.064)	(0.038)***	(0.040)	(0.014)	(0.107)**	(0.022)	(0.049)**	(0.045)*	(0.036)
Parents : Resting	-0.075	0.011	-0.007	0.030	0.012	0.013	-0.009	0.005	0.002	-0.019	0.088	0.051
Children (N=931)	(0.039)	(0.029)	(0.017)	(0.011)**	(0.016)	(0.017)	(0.005)	(0.014)	(0.030)	(0.024)	(0.044)	(0.036)

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.

Table 10: Coordination between spouses - Activities based on ten hour day

	(1) Cared for child	(2) Farmed	(3) Farm work - clearing	(4) Farm work - harvesting	(5) Farm work - planting	(6) Gathering	(7) Hunting	(8) Making mats	(9) Went to market	(10) Palm production	(11) Resting	(12) Sick
Spouse : Away	0.017	-0.013	-0.032	0.005	-0.024	0.020	-0.015	0.027	-0.037	0.003	-0.028	-0.001
Men (N=1,388)	(0.004)**	(0.031)	(0.020)	(0.014)	(0.008)**	(0.013)	(0.028)	(0.009)**	(0.030)	(0.013)	(0.045)	(0.014)
Spouse : Away	0.374	-0.133	-0.012	-0.078	-0.026	-0.039		-0.000	0.079	-0.070	0.009	-0.112
Women (N=1,786)	(0.175)*	(0.088)	(0.009)	(0.056)	(0.127)	(0.050)		(0.000)	(0.104)	(0.159)	(0.292)	(0.233)
Spouse: Same Activity	-0.026	0.085	0.456	0.103	0.320	0.050	0.270	0.831	0.028	0.236	-0.014	0.013
Men (N=1,388)	(0.011)*	(0.032)*	(0.141)**	(0.037)**	(0.045)***	(0.017)**	(0.030)***	(0.102)***	(0.030)	(0.108)*	(0.023)	(0.011)
Spouse: Same Activity	-0.080	0.054	0.200	0.080	0.425	0.068		0.012	0.019	0.741	-0.082	0.117
Women (N=1,786)	(0.084)	(0.026)*	(0.104)	(0.038)*	(0.092)***	(0.038)		(0.010)	(0.059)	(0.091)***	(0.029)**	(0.020)***

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.

NOT FOR PUBLICATION

APPENDIX FOR "INTRA-HOUSEHOLD LABOR ALLOCATION IN COLONIAL NIGERIA"

APPENDIX A: LIST OF INDIVIDUALS WHO APPEAR REGULARLY IN THE DATA

Household 1: Ezeala

- Ezeala (Male, 35-38) is the head of household and husband of Alozia. He is in the process of marrying a young second wife in Ndiagbo.
- Alozia (Female, 34-36) is the wife of Ezeala. She has been infertile during her marriage to Ezeala, but bore three children with her previous (deceased) husband.
- Afoca (Female, 23-25) is a relative of Ezeala. He treats her as his daughter. She helps and works for Alozia in return for room and board.
- Onwamini (Male, 12-14) is a half-brother and informally adopted son of Ezeala.

Household 2: Cikia

- Cikia (Male, 42-45) is the head of household and lover of Eleke.
- Eleke (Female, 35-37) is Cikia's mistress. Her husband is deceased.
- Ekodu (Female, 30-33) is a relative of Cikia who has lived with him since her husband's death. She is the mother of Kalu, Ofruice, and a small baby.
- Kalu (Male, 12-14) is the son of Ekodu and an informally adopted son of Cikia.
- Ofruice (Female, 8-10) is the daughter of Ekodu and an informally adopted daughter of Cikia.
- Ada (Female, age unknown) is the daughter by another wife of Ekodu's deceased husband.

Household 3: Mba

- Mba (Male, 24-26) is the head of household and husband of Ahudiya.
- Ahudiya (Female, 22-24) is the wife of Mba. She is mother of Mary, Uce, and a newborn baby.
- Amabua (Female, age unknown) is mother of Mba and Omenyenya. She lives semi-independently near Mba. She is the village elder among women.
- Omenyenya (Male, 10) is son of Amabua and half-brother of Mba.
- Mary (Female, 3) is a daughter of Mba and Ahudiya.
- Uce (Male, 6) is a son of Mba and Ahudiya.
- Nwayem (Female, 30-32) is a sister of Mba, a mother of a young son, and is a leper.

Household 4: Uda

- Uda (Male, 50-53) is the head of household and husband of Ikoka, Ekeru, and Ejere. He is a village elder and court member.
- Ikoka (Female, 32-35) is a wife of Uda. She is mother of Akoma, Wankem, Elebe, and Sunday.
- Ejere (Female, 30-32) is a wife of Uda. She is mother of an infant or young child.
- Ekeru (Female, 24-26) is a wife of Uda. She is mother of the infant Onukafo.
- Elebe (Female, 13-14) is a daughter of Uda and Ikoka. She is recently out of the fattening house, in which she rested and gained weight before marriage.
- Wankem (Female, 6-7) is a daughter of Uda and Ikoka.
- Obasi (Male, 24-26) is a son of Uda. He is a trader at Uzuakoli who returns frequently to help Uda.
- Akoma (Male, 10-12) is a son of Uda and Ikoka.
- Ugwade (Female, 29-31) is a daughter of Uda who has run away from her husband in Isiegbu.
- Ugoma (Female, 35-39) is a wife of Uda's deceased brother. She is fed by Uda, and is mother of a young son.
- Akaji (Female, 30-32) is a wife of Uda's deceased brother. She is mother of Mbanta and another young child.
- Mbanta (Male, 8-10) is a son of Akaji.
- Asehoro (Female, 6-8) is a young granddaughter or niece of Uda.
- Ude (Female, 25) is a daughter of Uda and full sister of Ugwade. She returns to Uda's household to manage Ugwade's farm in Ugwade's absence.
- Onoghare (Female, 5) is a daughter of Ude and her lover.

Household 5: Egwuonwu

- Egwuonwu (Male, 57-60) is the head of household. His wife is deceased. He is the village's religious elder.
- Iheukwumere (Male, 22-24) is a son of Egwuonwu. He is in the process of marrying Mmeziri.
- Mmeziri (Female, 8-10) is the intended wife of Iheukwumere. She is the de facto manager of the household.
- Cikia (Male, 16-18) is a son of Egwuonwu.

- Nwangras (Female, 13-14) is a daughter of Egwuonwu. She is recently out of the fattening house, and a bride price is currently being paid on her.

The individuals in the regression subsample and the number of times they appear are, by household:

Cikia	Cikia	315
Cikia	Ekodu	316
Cikia	Eleke	276
Cikia	Kalu	110
Cikia	Ofruice	290
Egwuonwu	Cikia	118
Egwuonwu	Egwuonwu	318
Egwuonwu	Iheukwumere	190
Egwuonwu	Mmeziri	280
Ezeala	Afoca	262
Ezeala	Alozia	322
Ezeala	Ezeala	322
Ezeala	Onwamini	293
Mba	Ahudiya	308
Mba	Amabua	278
Mba	Mba	316
Mba	Omenyenya	129
Uda	Akaji	275
Uda	Akoma	137
Uda	Ejere	297
Uda	Ekeru	308
Uda	Ikoka	315
Uda	Uda	314
Uda	Ugwade	177

APPENDIX B: SAMPLE RECORD

Mon. July 10
Afonso.

Ezeala - 7 to 7:30, to bush to cut sticks to rebuild our okoro house. All the man of Amankwu from age grade of about 45-50 years down to 13 -15 years worked on this. Then we continued to work building the house until 2p.m. Then I slept until 6p.m.
Meals:
(1) 9 a.m. Otara stockfish in ofo
(2) 1 p.m. boiled yam with Ihenduri (no meat or fish) also Otara - stockfish in ofo.
(3) 2 p.m. Otara - stockfish in ofo. 1 ear of roasted corn.
(4) 8 p.m. Otara - nnama meat in ofo.
Many showers during day, but no continuous rain.
Alozia - 7 to 4, to Court Farm IIA to plant odudu. Went with Afoca.
Afoca - See Alozia.
Onwamini - Att Ibeku.

Cikia Worked with us until 2 p.m. Then walked around with dibia visiting people.
Ekodu - 8 to 2, to Oboko where her ogo died 3 days ago. This ogo was her dead hsbd's dau (by another wife) hsbd's mother. Brought nothing with her,
just went to sympathise. Then rested.
Eleke - 8 to 2, cracked palm. Then rested.
Kalu - Worked for you all day.
Ofruice - Held Ekodu's child.

Mba Worked on okoro house until 2. Then came to court to listen to case of a friend unti 5 p.m.
Ahudiya - Home all day. 6 or 8 months pregnant, so she feels ill.
Amabua - 7 to 11, to dibia for divining because Uce's fowl has been stolen and she wanted to find out who stole the fowl. Later I saw her with things for sacrifice (I don't know which agbara) so that the thief can be killed. For a case like this she paid 3d.

Uda 7 to 9, directed us in building ikorso house. Then 8 to 3, he went someplace; I know not where.

Ikoka - 7 to 11, to Ako Farm I to plant odudu. Then rested.

Ejere - Still at Mgbele.

Ekeru - Home - child.

Ugwuade - Not seen all day.

Akaji - 7 to 2, lto wee her share of Ako Farm I. Went alone. Then rested.

Egwuonwu Home all day, resting.

Mmeziri - 8 to 12, to Farm I to get leaves for ofo. Then cooked.

Iheukwumere - 7 to 8, put mats on roof of his house, then came to work with us. Then rested.

APPENDIX C: MISSING DATA

In Table A1, we estimate (1) using a dummy variable for whether no activities are reported for individual *i* as the dependent variable. The first panel tests whether men are more likely to be missing from the record depending on the activities of their wives. Though there are significant correlations for hunting and home repair, these are driven by the small numbers of observations for which women engage in these activities. The correlation with whether a wife is missing is large, albeit insignificant. The second panel performs the same exercise for women. They are less likely to be in the data when their husbands are missing.

Whether children are missing does depend on a parent's activity. Children are less likely to be reported when a parent is engaged in going to market, and are less likely to be missing when a parent is sick.

Table A1: Correlates of missing data

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
	Dependent variable: Missing												
Right-hand side variable:	Missing	*Cared for child*	*Farmed*	*Farm work - clearing*	*Farm work - harvesting*	*Farm work - planting*	*Gathering*	*Hunting*	*Making mats*	*Went to market*	*Palm production*	*Resting*	*Sick*
Spousal activity	0.214	-0.030	0.018	-0.044	0.069	-0.045	-0.014	0.155	0.031	-0.008	0.002	0.046	0.032
Men (N=1,640)	(0.109)	(0.027)	(0.017)	(0.034)	(0.049)	(0.033)	(0.030)	(0.024)***	(0.022)	(0.009)	(0.031)	(0.050)	(0.058)
Spousal activity	0.207	0.006	-0.008	-0.027	-0.022	-0.010	0.006	0.062	-0.025	0.011	0.001	0.006	-0.070
Women (N=1,968)	(0.077)**	(0.000)	(0.006)	(0.026)	(0.000)	(0.023)	(0.000)	(0.019)**	(0.000)	(0.000)	(0.030)	(0.000)	(0.000)
Parental activity	0.076	-0.003	-0.011	-0.025	-0.037	-0.021	-0.010	-0.137	-0.010	0.045	-0.034	0.024	0.076
Children (N=1,640)	(0.113)	(0.021)	(0.019)	(0.000)	(0.022)	(0.023)	(0.028)	(0.045)**	(0.029)	(0.016)*	(0.044)	(0.000)	(0.026)**

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.

Table A2: Responses to illness with CGM Standard errors

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Cared for child	Farmed	Farm work - clearing	Farm work - harvesting	Farm work - planting	Gathering	Hunting	Making mats	Went to market	Palm production	Resting	Sick
Sick	-0.001	-0.185	0.001	-0.042	-0.018	-0.086	-0.012	-0.042	-0.010	0.007	0.313	1.000
Men (N=1,893)	(0.012)	(0.032)***	(0.020)	(0.024)*	(0.011)*	(0.022)***	(0.019)	(0.013)***	(0.023)	(0.033)	(0.041)***	(0.000)***
Sick	-0.074	-0.376	-0.028	-0.191	-0.073	-0.130	-0.001	0.005	-0.102	-0.053	0.679	1.000
Women (N=3,134)	(0.055)	(0.024)***	(0.009)***	(0.044)***	(0.018)***	(0.029)***	(0.002)	(0.004)	(0.025)***	(0.016)***	(0.026)***	(0.000)***
Spouse : Sick	0.015	0.061	-0.018	0.067	0.004	-0.018	0.011	-0.018	0.022	-0.046	-0.010	0.012
Men (N=1,388)	(0.017)	(0.029)**	(0.024)	(0.029)**	(0.029)	(0.025)	(0.020)	(0.010)*	(0.020)	(0.035)	(0.024)	(0.010)
Spouse : Sick	-0.042	-0.234	-0.015	-0.041	-0.120	-0.002	0.000	0.073	-0.061	-0.031	-0.033	0.118
Women (N=1,786)	(0.105)	(0.149)	(0.006)**	(0.113)	(0.066)*	(0.026)	(0.000)	(0.038)*	(0.069)	(0.016)**	(0.062)	(0.037)***
HH: Other Adult Male X Sick	-0.004	-0.038	0.004	-0.076	0.025	-0.008	0.018	-0.016	0.047	-0.027	-0.119	-0.184
Men (N=1,893)	(0.014)	(0.055)	(0.029)	(0.026)***	(0.026)	(0.014)	(0.019)	(0.017)	(0.029)	(0.029)	(0.080)	(0.197)
HH: Other Adult Female X Sick	0.015	0.025	0.004	0.003	-0.003	0.024	0.001	0.003	0.012	-0.009	-0.099	-0.121
Women (N=3,134)	(0.028)	(0.031)	(0.007)	(0.024)	(0.016)	(0.022)	(0.001)	(0.003)	(0.020)	(0.016)	(0.051)*	(0.070)*
Children : Sick	-0.020	0.034	0.031	-0.021	0.014	-0.032	-0.007	-0.023	0.001	0.024	0.000	0.016
Men (N=1,082)	(0.056)	(0.038)	(0.020)	(0.015)	(0.014)	(0.023)	(0.021)	(0.017)	(0.040)	(0.014)*	(0.047)	(0.006)***

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.

Table A3: Child labor with CGM Standard Errors

	(1) Cared for child	(2) Farmed	(3) Farm work - clearing	(4) Farm work - harvesting	(5) Farm work - planting	(6) Gathering	(7) Hunting	(8) Making mats	(9) Went to market	(10) Palm production	(11) Resting	(12) Sick
Parents : Sick	-0.106	-0.118	-0.055	-0.058	-0.041	0.027	0.092	-0.005	-0.161	0.065	0.114	0.051
Children (N=953)	(0.090)	(0.121)	(0.046)	(0.054)	(0.032)	(0.059)	(0.076)	(0.023)	(0.069)**	(0.097)	(0.151)	(0.052)
Parents : Farmed	0.050	0.202	0.006	0.102	0.037	0.001	-0.021	0.016	-0.010	-0.012	-0.096	-0.033
Children (N=953)	(0.029)*	(0.049)***	(0.030)	(0.016)***	(0.014)***	(0.034)	(0.016)	(0.014)	(0.026)	(0.019)	(0.044)**	(0.015)**
Parents : Palm production	-0.030	-0.031	-0.011	0.029	-0.069	0.080	-0.012	0.002	0.026	0.102	0.029	-0.022
Children (N=953)	(0.024)	(0.073)	(0.030)	(0.090)	(0.031)**	(0.041)*	(0.019)	(0.007)	(0.039)	(0.027)***	(0.050)	(0.021)
Parents : Same Activity	-0.165	0.202	0.375	0.102	0.284	0.090	0.068	0.193	0.050	0.102	0.036	0.051
Children (N=953)	(0.095)*	(0.049)***	(0.163)**	(0.047)**	(0.031)***	(0.024)***	(0.027)**	(0.054)***	(0.053)	(0.027)***	(0.028)	(0.052)
Parents : Resting	-0.015	-0.044	-0.007	0.005	0.001	0.007	0.005	0.004	-0.014	-0.008	0.019	0.031
Children (N=931)	(0.094)	(0.210)	(0.084)	(0.084)	(0.067)	(0.242)	(0.017)	(0.032)	(0.046)	(0.048)	(0.266)	(0.055)

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.

Table A4: Coordination between spouses with CGM Standard Errors

	(1) Cared for child	(2) Farmed	(3) Farm work - clearing	(4) Farm work - harvesting	(5) Farm work - planting	(6) Gathering	(7) Hunting	(8) Making mats	(9) Went to market	(10) Palm production	(11) Resting	(12) Sick
Spouse : Away	0.075	-0.013	-0.016	0.014	-0.040	0.049	-0.031	0.031	-0.007	-0.002	-0.078	0.008
Men (N=1,388)	(0.023)***	(0.062)	(0.019)	(0.058)	(0.014)***	(0.034)	(0.056)	(0.018)*	(0.040)	(0.025)	(0.071)	(0.021)
Spouse : Away	0.115	-0.102	-0.006	-0.098	0.014	-0.057	0.000	-0.004	0.130	-0.050	0.192	-0.042
Women (N=1,786)	(0.104)	(0.064)	(0.006)	(0.069)	(0.077)	(0.040)	(0.000)	(0.002)*	(0.099)	(0.124)	(0.161)	(0.098)
Spouse: Same Activity	-0.084	0.081	0.321	0.074	0.246	0.069	0.098	0.570	0.024	0.329	-0.006	0.012
Men (N=1,388)	(0.042)**	(0.053)	(0.113)***	(0.034)**	(0.042)***	(0.036)*	(0.038)**	(0.080)***	(0.056)	(0.108)***	(0.021)	(0.010)
Spouse: Same Activity	-0.085	0.051	0.160	0.055	0.312	0.061	0.000	0.031	-0.047	0.524	-0.007	0.118
Women (N=1,786)	(0.075)	(0.049)	(0.074)**	(0.042)	(0.099)***	(0.033)*	(0.000)	(0.023)	(0.054)	(0.038)***	(0.033)	(0.037)***

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.

Table A5: Responses to illness Controlling for Own Illness

	(1) Cared for child	(2) Farmed	(3) Farm work - clearing	(4) Farm work - harvesting	(5) Farm work - planting	(6) Gathering	(7) Hunting	(8) Making mats	(9) Went to market	(10) Palm production	(11) Resting
Spouse : Sick	0.015	0.064	-0.017	0.068	0.004	-0.017	0.012	-0.018	0.023	-0.048	-0.014
Men (N=1,388)	(0.016)	(0.026)*	(0.024)	(0.028)*	(0.028)	(0.025)	(0.021)	(0.010)	(0.020)	(0.035)	(0.022)
Spouse : Sick	-0.031	-0.192	-0.012	-0.018	-0.110	0.015		0.073	-0.050	-0.022	-0.115
Women (N=1,786)	(0.110)	(0.154)	(0.006)	(0.117)	(0.060)	(0.020)		(0.037)	(0.066)	(0.018)	(0.054)*
HH: Other Adult Male X Sick	-0.005	-0.074	0.005	-0.086	0.023	-0.025	0.016	-0.024	0.046	-0.027	-0.063
Men (N=1,893)	(0.016)	(0.030)**	(0.028)	(0.025)**	(0.027)	(0.010)*	(0.020)	(0.018)	(0.030)	(0.029)	(0.040)
HH: Other Adult Female X Sick	0.006	-0.021	0.001	-0.020	-0.012	0.008	0.000	0.004	-0.001	-0.016	-0.018
Women (N=3,134)	(0.023)	(0.029)	(0.006)	(0.023)	(0.017)	(0.020)	(0.001)	(0.004)	(0.019)	(0.014)	(0.025)
Children : Sick	-0.020	0.038	0.031	-0.020	0.014	-0.031	-0.007	-0.022	0.001	0.023	-0.005
Men (N=1,082)	(0.055)	(0.036)	(0.020)	(0.015)	(0.014)	(0.023)	(0.020)	(0.016)	(0.039)	(0.013)	(0.046)

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.

Table A6: Child labor Controlling for Own Illness

	(1) Cared for child	(2) Farmed	(3) Farm work - clearing	(4) Farm work - harvesting	(5) Farm work - planting	(6) Gathering	(7) Hunting	(8) Making mats	(9) Went to market	(10) Palm production	(11) Resting
Parents : Sick	-0.102	-0.111	-0.055	-0.053	-0.039	0.031	0.092	-0.002	-0.157	0.070	0.089
Children (N=953)	(0.085)	(0.121)	(0.044)	(0.057)	(0.033)	(0.058)	(0.073)	(0.022)	(0.066)*	(0.096)	(0.136)
Parents : Farmed	0.048	0.198	0.006	0.099	0.036	-0.001	-0.021	0.015	-0.013	-0.015	-0.080
Children (N=953)	(0.026)	(0.045)**	(0.029)	(0.015)***	(0.012)**	(0.035)	(0.015)	(0.014)	(0.025)	(0.020)	(0.036)*
Parents : Palm production	-0.031	-0.034	-0.011	0.027	-0.070	0.079	-0.012	0.001	0.024	0.100	0.039
Children (N=953)	(0.025)	(0.070)	(0.029)	(0.088)	(0.030)*	(0.041)	(0.018)	(0.007)	(0.038)	(0.024)**	(0.057)
Parents : Same Activity	-0.166	0.198	0.376	0.101	0.283	0.090	0.068	0.191	0.050	0.100	0.016
Children (N=953)	(0.093)	(0.045)**	(0.157)*	(0.046)*	(0.028)***	(0.023)**	(0.026)*	(0.051)**	(0.050)	(0.024)**	(0.026)
Parents : Resting	-0.012	-0.039	-0.007	0.009	0.002	0.009	0.005	0.006	-0.011	-0.005	0.003
Children (N=931)	(0.016)	(0.042)	(0.017)	(0.035)	(0.010)	(0.025)	(0.014)	(0.011)	(0.008)	(0.022)	(0.027)

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.

Table A7: Responses to illness. RHS variables measured over past week.

	(1) Cared for child	(2) Farmed	(3) Farm work - clearing	(4) Farm work - harvesting	(5) Farm work - planting	(6) Gathering	(7) Hunting	(8) Making mats	(9) Went to market	(10) Palm production	(11) Resting	(12) Sick
Sick	0.002	-0.083	0.017	-0.019	-0.007	-0.068	0.022	-0.030	-0.015	-0.003	0.160	1.000
Men (N=1,893)	(0.009)	(0.048)	(0.031)	(0.018)	(0.022)	(0.019)**	(0.021)	(0.011)**	(0.015)	(0.015)	(0.042)***	(0.000)***
Sick	-0.049	-0.115	-0.005	-0.061	-0.018	-0.026	-0.001	0.005	-0.013	-0.018	0.208	1.000
Women (N=3,134)	(0.033)	(0.027)***	(0.005)	(0.026)**	(0.012)	(0.025)	(0.001)	(0.005)	(0.011)	(0.016)	(0.036)***	(0.000)***
Spouse : Sick	-0.017	0.038	-0.011	0.056	0.018	-0.010	0.014	0.025	0.040	-0.013	0.072	0.021
Men (N=1,415)	(0.007)*	(0.025)	(0.018)	(0.011)***	(0.018)	(0.025)	(0.015)	(0.015)	(0.018)*	(0.013)	(0.027)*	(0.031)
Spouse : Sick	0.026	-0.077	-0.000	-0.019	-0.020	0.019		0.030	0.027	-0.043	-0.037	0.060
Women (N=1,826)	(0.043)	(0.075)	(0.021)	(0.051)	(0.092)	(0.047)		(0.018)	(0.033)	(0.024)	(0.119)	(0.118)
HH: Other Adult Male X Sick	0.005	-0.067	-0.022	0.003	-0.009	0.010	0.035	-0.005	0.017	0.004	0.068	-0.007
Men (N=1,893)	(0.006)	(0.072)	(0.036)	(0.033)	(0.052)	(0.026)	(0.025)	(0.021)	(0.020)	(0.025)	(0.059)	(0.166)
HH: Other Adult Female X Sick	0.008	-0.000	-0.005	0.021	-0.000	0.021	-0.000	0.005	0.006	0.005	-0.044	0.026
Women (N=3,134)	(0.023)	(0.021)	(0.006)	(0.016)	(0.014)	(0.016)	(0.000)	(0.005)	(0.016)	(0.018)	(0.020)*	(0.080)
Children : Sick	-0.034	-0.055	-0.008	-0.014	0.004	0.066	0.004	0.044	0.032	0.006	0.025	0.076
Men (N=1,190)	(0.032)	(0.055)	(0.019)	(0.014)	(0.013)	(0.024)*	(0.019)	(0.019)	(0.012)*	(0.008)	(0.045)	(0.097)

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.

Table A8: Child labor. RHS variables measured over past week.

	(1) Cared for child	(2) Farmed	(3) Farm work - clearing	(4) Farm work - harvesting	(5) Farm work - planting	(6) Gathering	(7) Hunting	(8) Making mats	(9) Went to market	(10) Palm production	(11) Resting	(12) Sick
Parents : Sick	-0.001	-0.061	0.014	-0.051	-0.014	-0.059	0.040	-0.004	-0.021	-0.044	0.008	0.001
Children (N=959)	(0.030)	(0.084)	(0.009)	(0.077)	(0.008)	(0.042)	(0.024)	(0.004)	(0.048)	(0.048)	(0.064)	(0.024)
Parents : Farmed	-0.030	0.235	0.019	0.115	0.035	-0.039	-0.042	0.010	0.152	0.007	-0.084	-0.075
Children (N=959)	(0.051)	(0.060)**	(0.015)	(0.024)***	(0.017)	(0.045)	(0.022)	(0.011)	(0.053)**	(0.022)	(0.043)	(0.031)*
Parents : Palm production	-0.031	0.104	-0.009	0.028	0.035	0.030	0.013	-0.011	0.079	0.019	-0.040	-0.014
Children (N=959)	(0.015)	(0.014)***	(0.010)	(0.015)	(0.013)*	(0.012)*	(0.007)	(0.010)	(0.040)	(0.018)	(0.054)	(0.023)
Parents : Same Activity	-0.002	0.235	0.071	0.027	0.074	0.027	0.034	0.072	-0.070	0.019	0.011	0.001
Children (N=959)	(0.028)	(0.060)**	(0.039)	(0.013)*	(0.023)**	(0.022)	(0.016)	(0.031)*	(0.030)*	(0.018)	(0.042)	(0.024)
Parents : Resting	0.075	0.019	0.045	0.000	-0.023	-0.055	0.017	0.015	-0.006	-0.053	-0.003	0.066
Children (N=860)	(0.045)	(0.089)	(0.016)**	(0.074)	(0.025)	(0.042)	(0.021)	(0.030)	(0.022)	(0.037)	(0.042)	(0.038)

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.

Table A9: Child labor. Older Children.

	(1) Cared for child	(2) Farmed	(3) Farm work - clearing	(4) Farm work - harvesting	(5) Farm work - planting	(6) Gathering	(7) Hunting	(8) Making mats	(9) Went to market	(10) Palm production	(11) Resting	(12) Sick
Parents : Sick	0.001	-0.232	-0.072	-0.137	-0.081	0.046	0.167	-0.023	-0.196	0.043	-0.036	-0.035
Children (N=664)	(0.002)	(0.141)	(0.079)	(0.028)**	(0.048)	(0.070)	(0.098)	(0.054)	(0.069)*	(0.165)	(0.109)	(0.052)
Parents : Farmed	0.006	0.143	0.010	0.073	0.020	0.048	-0.038	0.030	-0.014	-0.003	-0.056	-0.012
Children (N=664)	(0.008)	(0.018)***	(0.043)	(0.039)	(0.023)	(0.051)	(0.024)	(0.017)	(0.044)	(0.030)	(0.050)	(0.003)**
Parents : Palm production	-0.002	-0.096	-0.039	0.019	-0.102	0.118	-0.000	0.003	0.036	0.080	-0.026	0.015
Children (N=664)	(0.002)	(0.108)	(0.045)	(0.122)	(0.043)*	(0.048)*	(0.021)	(0.021)	(0.050)	(0.036)	(0.055)	(0.007)
Parents : Same Activity	0.013	0.143	0.491	0.045	0.253	0.082	0.012	0.196	0.025	0.080	0.009	-0.035
Children (N=664)	(0.012)	(0.018)***	(0.144)**	(0.080)	(0.043)**	(0.044)	(0.064)	(0.101)	(0.076)	(0.036)	(0.057)	(0.052)
Parents : Resting	0.003	-0.021	-0.018	0.035	0.003	0.031	-0.002	0.014	-0.015	-0.003	0.008	0.028
Children (N=651)	(0.005)	(0.049)	(0.031)	(0.032)	(0.018)	(0.023)	(0.017)	(0.030)	(0.009)	(0.029)	(0.054)	(0.011)*

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.

Table A10: Aggregated categories

Panel A: Summary Statistics

	(1) Full Sample	(2) Men	(3) Women	(4) Children
Sick	0.054	0.042	0.066	0.042
Any Farm Work	0.345	0.319	0.375	0.311
Any NonFarm Work	0.455	0.379	0.517	0.414
Any Leisure	0.071	0.096	0.054	0.076
N	6,266	1,893	3,134	1,239

Panel B. Responses to illness

	(1) Farm	(2) Nonfarm	(3) Leisure
Sick	-0.196	-0.135	-0.005
Men (N=1,893)	(0.046)***	(0.038)**	(0.015)
Sick	-0.421	-0.371	-0.022
Women (N=3,134)	(0.025)***	(0.068)***	(0.010)*
Spouse : Sick	0.013	-0.007	0.067
Men (N=1,388)	(0.026)	(0.038)	(0.025)*
Spouse : Sick	-0.244	-0.151	-0.012
Women (N=1,786)	(0.145)	(0.116)	(0.012)
HH: Other Adult Male X Sick	-0.069	0.075	-0.035
Men (N=1,893)	(0.072)	(0.037)*	(0.023)
HH: Other Adult Female X Sick	0.013	0.049	0.003
Women (N=3,134)	(0.031)	(0.053)	(0.016)
Children : Sick	0.066	-0.007	-0.013
Men (N=1,082)	(0.047)	(0.054)	(0.026)

Panel C. Child Labor

	(1) Farm	(2) Nonfarm	(3) Leisure
Parents : Sick	-0.040	-0.203	-0.023
Children (N=953)	(0.092)	(0.098)	(0.071)
Parents : Farmed	0.179	0.049	-0.014
Children (N=953)	(0.038)***	(0.049)	(0.023)
Parents : Palm production	0.089	0.075	-0.003
Children (N=953)	(0.044)	(0.103)	(0.018)
Parents : Same Activity	0.183	0.105	0.047
Children (N=953)	(0.053)**	(0.034)**	(0.021)*
Parents : Resting	-0.046	-0.037	0.006
Children (N=931)	(0.053)	(0.028)	(0.009)

Panel D. Coordination

	(1) Farm	(2) Nonfarm	(3) Leisure
Spouse : Away	-0.014	0.044	0.089
Men (N=1,388)	(0.069)	(0.054)	(0.021)**
Spouse : Away	-0.154	0.207	-0.111
Women (N=1,786)	(0.171)	(0.069)**	(0.056)
Spouse: Same Activity	0.095	0.005	0.059
Men (N=1,388)	(0.059)	(0.031)	(0.020)**
Spouse: Same Activity	0.063	-0.011	0.021
Women (N=1,786)	(0.053)	(0.031)	(0.017)

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.

Table A11: Aggregated categories (essential v. not)

Panel A: Summary Statistics

	(1) Full Sample	(2) Men	(3) Women	(4) Children
Sick	0.054	0.042	0.066	0.042
Any Essential Activity	0.608	0.541	0.672	0.550
Any NonEssential Activity	0.615	0.745	0.539	0.609
N	6,266	1,893	3,134	1,239

Panel B. Responses to illness

	(1) Essential	(2) Non-Ess.
Sick	-0.257	0.209
Men (N=1,893)	(0.047)***	(0.045)***
Sick	-0.579	0.476
Women (N=3,134)	(0.054)***	(0.036)***
Spouse : Sick	0.064	-0.031
Men (N=1,388)	(0.046)	(0.038)
Spouse : Sick	-0.397	0.157
Women (N=1,786)	(0.105)**	(0.116)
HH: Other Adult Male X Sick	-0.070	0.032
Men (N=1,893)	(0.084)	(0.066)
HH: Other Adult Female X Sick	0.058	-0.055
Women (N=3,134)	(0.040)	(0.032)
Children : Sick	0.027	0.049
Men (N=1,082)	(0.045)	(0.043)

Panel C. Child Labor

	(1) Essential	(2) Non-Ess.
Parents : Sick	-0.048	0.000
Children (N=953)	(0.127)	(0.133)
Parents : Farmed	0.205	-0.125
Children (N=953)	(0.048)**	(0.065)
Parents : Palm production	0.098	-0.013
Children (N=953)	(0.083)	(0.032)
Parents : Same Activity	0.080	0.057
Children (N=953)	(0.027)**	(0.044)
Parents : Resting	-0.052	0.016
Children (N=931)	(0.055)	(0.043)

Panel D. Coordination

	(1) Essential	(2) Non-Ess.
Spouse : Away	0.068	0.014
Men (N=1,388)	(0.051)	(0.044)
Spouse : Away	-0.013	-0.070
Women (N=1,786)	(0.209)	(0.162)
Spouse: Same Activity	0.084	0.079
Men (N=1,388)	(0.056)	(0.020)**
Spouse: Same Activity	0.027	0.044
Women (N=1,786)	(0.051)	(0.041)

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.

Table A12: Broad categories

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Housework	Personal care	Child care	Leisure	Market work	Farming and hunting	Sick and away	Community obligations
				Panel B. Responses to illness				
Sick	-0.089	0.288	-0.001	0.290	-0.001	-0.199	0.943	-0.160
Men (N=1,893)	(0.015)***	(0.069)***	(0.011)	(0.042)***	(0.047)	(0.043)***	(0.041)***	(0.042)***
Sick	-0.223	-0.008	-0.074	0.657	-0.152	-0.377	0.913	-0.032
Women (N=3,134)	(0.041)***	(0.003)**	(0.054)	(0.028)***	(0.036)***	(0.025)***	(0.046)***	(0.013)**
Spouse : Sick	-0.027	0.036	0.015	0.012	-0.015	0.066	-0.015	0.082
Men (N=1,388)	(0.008)**	(0.039)	(0.016)	(0.028)	(0.037)	(0.035)	(0.025)	(0.036)*
Spouse : Sick	-0.063	0.066	-0.042	-0.042	-0.082	-0.234	0.179	0.069
Women (N=1,786)	(0.075)	(0.018)**	(0.104)	(0.064)	(0.074)	(0.147)	(0.062)**	(0.100)
				Panel C. Child Labor				
Parents : Sick	-0.041	-0.040	-0.106	0.089	-0.096	-0.026	0.051	0.011
Children (N=953)	(0.067)	(0.037)	(0.087)	(0.174)	(0.070)	(0.132)	(0.065)	(0.006)
Parents : Farmed	0.013	-0.006	0.050	-0.108	-0.011	0.181	-0.050	-0.008
Children (N=953)	(0.034)	(0.004)	(0.028)	(0.056)	(0.030)	(0.051)**	(0.038)	(0.023)
Parents : Palm production	0.130	-0.017	-0.030	0.025	0.124	-0.043	-0.114	-0.010
Children (N=953)	(0.060)*	(0.011)	(0.023)	(0.056)	(0.028)**	(0.080)	(0.050)*	(0.012)
Parents : Same Activity	0.099	0.060	-0.165	0.070	0.082	0.144	0.065	0.055
Children (N=953)	(0.011)***	(0.035)	(0.092)	(0.042)	(0.029)**	(0.036)**	(0.065)	(0.016)**
Parents : Resting	0.009	0.007	-0.015	0.025	-0.014	-0.038	0.084	-0.003
Children (N=931)	(0.025)	(0.010)	(0.016)	(0.034)	(0.012)	(0.033)	(0.022)**	(0.008)
				Panel D. Coordination				
Spouse : Away	0.026	0.017	0.075	-0.024	-0.005	-0.041	0.057	0.008
Men (N=1,388)	(0.018)	(0.033)	(0.023)**	(0.075)	(0.036)	(0.048)	(0.072)	(0.022)
Spouse : Away	0.015	0.001	0.115	0.116	0.087	-0.102	-0.030	-0.029
Women (N=1,786)	(0.133)	(0.002)	(0.103)	(0.138)	(0.093)	(0.063)	(0.091)	(0.022)
Spouse: Same Activity	0.023	0.075	-0.084	-0.004	0.164	0.080	0.012	0.032
Men (N=1,388)	(0.018)	(0.063)	(0.041)	(0.014)	(0.065)*	(0.039)	(0.045)	(0.027)
Spouse: Same Activity	0.015	0.021	-0.085	0.001	0.118	0.052	0.064	0.006
Women (N=1,786)	(0.017)	(0.012)	(0.074)	(0.024)	(0.049)*	(0.038)	(0.067)	(0.022)

Notes: *** Significant at 1%, ** Significant at 5%, * Significant at 10%. All regressions are OLS and include person fixed effects, day fixed effects, and person-specific linear time trends. Standard errors clustered by person are reported in parentheses.