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Forced displacement and behavioral change: An empirical study of returnee households in the Nuba Mountains[1]

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HiCN Working Paper 157

October 2013

Abstract: After the end of a civil war that lasted for more than two decades, in 2005 hundreds of thousands of displaced people started returning to their communities of origin in the Nuba Mountains of Sudan. We use unique data gathered shortly after the end of the conflict in eight villages to describe the characteristics of the returnees vis-a-vis those of non-displaced households. We find important differences between them. Returned households have fewer assets than those who stayed during the conflict and are less involved in the production of cash crops. Even though returnees seem to face worse economic conditions, we find evidence that they tend to perform better on different health indicators, including a lower probability of disease-related mortality in their families. We explore the hypothesis that behavioral changes related to the experiences during displacement can explain the latter result. In particular, we use a detailed set of variables related to hygiene and sanitary habits and show that returnees are more likely to adopt these measures. We further attempt to provide causal evidence of this hypothesis using instrumental variable estimations as a way to deal with the potential bias induced by self-selection into displacement and return.

Keywords: Forced displacement; behavioral change; conflict; Nuba Mountains; Sudan; Africa.
JEL codes: O15, O12, O55, Q15,

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[1] A previous version of the study was circulated under the title "A socio-economic characterization of returnee households in the Nuba Mountains". We would like to thank CARE International for the authorization to use their data. We also thank the thoughtful comments provided by attendants of the CSAE conference (Oxford, 2013), the "Cooperation or Conflict?" conference organized by Wageningen University (2013), and the 5th European Conference on African Studies (Lisbon, 2013). We have benefited from the excellent assistance of Olena Dudar and Sophie Kazmierczak. All errors remain our own.

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"*The Nubas, an aboriginal mountain people who cared for nothing but their independence*"
Churchill (1899, "The River War")

1 Introduction

One of the most important effects of conflicts is the forced displacement of large civil populations. According to UNHCR, in 2012 more than 45 million people were either internally displaced (IDPs) or crossed an international border and became refugees. When conflicts end, however, many of those who have left their homes return to their place of origin, facing the challenge of rebuilding their lives in post-conflict areas where infrastructure and other public goods are scarce or nonexistent. In most cases, returnees find that their properties and assets have been destroyed or seized by others.

In the present study we aim to contribute to the analysis of post-conflict recovery using detailed household-level data collected in 2008 during a short-lived interwar period in the Nuba Mountains, Southern Kordofan. This region was one of the most affected during the latest civil war in Southern Sudan, which lasted over two decades and ended with the signing of the Comprehensive Peace Agreement (CPA) in 2005. It is estimated that, in total, close to 4 million people were displaced during the conflict, and that half of them returned to their communities of origin in the first three years after the end of the hostilities. In the state of Southern Kordofan, 25% of the total population consisted of returnee households in 2008, with around 280,000 returnees in the Nuba Mountains area (IOM, 2009).

Previous studies have shown that displacement can have important social and economic consequences on the affected households. Ibáñez and Moya (2010) show that in Colombia displaced households lag behind in terms of their capacity to generate income, smooth consumption, and invest. In Northern Uganda, Fiala (2012) shows that returnee households have lower consumption and asset holdings than the non-displaced comparison group, and that this is the case particularly for the poorest households. Outcomes related to health and nutrition are also affected, as in the case of food consumption and calories intake, which according to Verwimp and Muñoz Mora (2013) are lower for returnees in Burundi.[1]

Nonetheless, the consequences of displacement are not necessarily always negative. For instance, Kondylis (2008) finds that in Rwanda returnees are more productive in agriculture than those who stayed during the conflict. One alternative to explain positive effects is by arguing that returned households are different from those that decided to stay in the IDP camp or in the host community. For instance, Bozzoli, Brück, and Muhumuza (2011) show that households returning to their communities chose different economic activities than those staying in IDP camps in Uganda. Another alternative is that households returning experienced a change in attitude given the exposure to the host community or the assistance of workers from international organizations during displacement. For instance, Hynes, Sheik, Wilson, and Spiegel (2002) find in a large dataset from 52 camps in 7 countries that refugees and IDPs had better reproductive health outcomes

[1] An extensive literature review of the topic is provided by Ruiz and Vargas-Silva (2013).

than the people in their country of origin and in the host community.

In the present study, we compare the social and economic conditions of returnee households vis-à-vis the non-displaced population (henceforth stayers) in eight villages of the Nuba Mountains. Our findings point to important differences between returnee and stayer households on a number of dimensions. While many household characteristics are similar between both groups, we find that the returnees are more likely to have extended family in the village and to posses the right to sell their land (but often subject to the approval of a third party). These results provide evidence that among the motivations driving the decision to return are the expectation of recognition as a member of the community and the support for the claim on the land used before the conflict. Moreover, the results highlight the fact that rights over land was one of the main issues that fueled the propagation of the Southern Sudan civil war to the Nuba Mountains and which remained unresolved after the peace agreement (Komey, 2010; Siddig, El-Harizi, & Prato, 2007).

In line with the abovementioned studies, we find that returned households have fewer assets than those who stayed during the conflict, both in terms of land size and livestock ownership. We also find differences in the composition of agricultural production between the groups, with stayers more involved in the cultivation of cash crops and returnees relying on staples. Even though returnees seem to face worse economic conditions, the data further suggest that they tend to perform better than the rest of the village on a series of health indicators, with less mortality and prevalence of a number of serious diseases common to the area.

We test the heterogeneity of the results along two dimensions. Firstly, communities differ in terms of the group that controlled a specific territory during the war, either the NCP (Government of Sudan) or the SPLM (the rebel group Sudan People's Liberation Movement). We explore potential differences between these two groups of villages and we find that, apart from some exceptions, the coefficient capturing the relationship of the different dependent variables and the returnee status has similar sign and magnitude for both groups, and therefore our results apply to the two types of villages. Secondly, we explore differences according to gender, finding that female-headed returnee households tend to be worse-off than those with a male household head.

To our knowledge, our study is the first that presents an econometric analysis of the post-conflict situation in the Nuba Mountains, since our dataset is one of the few household surveys existing in this remote area, largely isolated from the rest of the world during the most intense years of the conflict. Nevertheless, the uniqueness of our data is tarnished by several shortcomings that reflect the difficulties of systematic data collection in the area. This includes the lack of information about the situation of the households in the sample prior to the events which unleashed their exit from their communities of origin as well as during displacement. On the other hand, the data include information about a rich set of household characteristics at the moment of the survey, which allows us to control for various possible omitted variables which could potentially introduce a bias to our estimates. Nevertheless, another source of potential endogeneity is the fact that unobservable characteristics can drive the decisions of departure during the war as well as return after the end of the conflict. This selection bias implies that the aforementioned differences may not be necessarily taken as the causal effect of displacement and return.

We explore the potential channels behind the descriptive differences between returnee households and stayers. In particular, we aim to explain the reasons which could drive the somewhat counterintuitive results in terms of better health indicators for returnee households. Following the recent literature on conflicts and behavioral change (Bellows & Miguel, 2009; Cassar, Grosjean, & Whitt, 2013; Voors et al., 2012), we take advantage of a detailed set of variables related to hygiene and sanitary habits to test the hypothesis that returnees have developed different attitudes. In fact, we find that returnee households are more likely to wash their hands, use mosquito nets, and engage in family planning. We attempt to provide causal evidence of the behavioral change channel by implementing an instrumental variable strategy. Given that historical data and widespread geographical variability are not available, we use variables that capture information about potential pull factors of return as instruments. We take advantage of the fact that returnees are more likely to have the right to sell their land than stayers, which we interpret as evidence that the expectation of recognition of the land ownership is a determinant of the probability of return, while at the same time it is plausibly exogenous to the adoption of sanitary measures. When the sanitary indicators are instrumented, the coefficients associated to the returnee households remain positive and significant, incrementing its magnitude in most cases. This behavioral change is likely to have taken place during displacement, where contact with personnel from international humanitarian organizations and other non-Nuba populations was likely to be intensive, but also after return, given the targeted support of international NGOs.

The rest of the paper is organized as follows. The subsequent section summarizes the main characteristics of the conflict in the Nuba Mountains before and during the period of study. Section 3 introduces and describes the main data to be used in the analysis. Section 4 presents the descriptive results regarding the socio-economic characteristics of the returnees compared to the stayers, while in Section 5 we explore the hypothesis that some of these differences may be explained by behavioral changes. The final section concludes with a summary of the main results and some of their policy implications.

2 The conflict in the Nuba Mountains

2.1 Background

The Nuba Mountains, also called Nuba Hills, are a region located in the state of Southern Kordofan in the southern margins of current Sudan, which, broadly defined, covers over 80,000 km.[2] The area is mainly inhabited by Nuba population, often understood as one people but who in reality comprise of over fifty distinct ethnic communities with a number of diverse languages, dialects, and religious practices (Ylönen, 2009). However, the Nuba are often considered to constitute their own "social space" or "social world" (Komey, 2010) due to the largely shared history of external oppression and subjugation involving violent dispossession and slave-raiding.

Although little is known about their origin, it has been established that the Nuba were

[2]Until the break-up of Sudan and the independence of South Sudan, Nuba Mountains were located in the geographical center of the country.

driven to their current highland region throughout centuries of encroachment of Arabized Muslim nomadic groups. The Nuba practice mainly seasonal rain-fed subsistence farming and animal rearing. Factors such as the climatic conditions, which allow only small harvests even with the adoption of terraced farming methods, intense slave-raiding, and armed conflict have maintained low population density in the Nuba Mountains (Ylönen, 2009). Even though precise statistics are not available, the total Nuba population living in the area today is around two million.

During the time of the Anglo-Egyptian Condominium (1899-1956), the slave-raiding practiced for centuries in the region largely ceased. However, the Nuba were instead subjected to military "pacification" campaigns and subsequently isolated according to the "Southern Policy" aimed at insulating Sudan's southern territories, which the colonizers deemed as inherently culturally distinct from northern Sudanese influences. In the course of decolonization of Sudan, some Nuba intellectuals increasingly began to challenge the institutionalized Arab-Muslim dominated social hierarchy, and formed a political party, the General Union of the Nuba Mountains (GUN), which was eventually purged along with other opposition parties as a result of the 1969 military coup that brought the regime of Jaafar Nimeiri to power.

2.2 The civil war (1983-2005)

The early 1970s were times of relative prosperity and rapid economic development in some parts of Sudan. In the Nuba Mountains mechanized agricultural schemes were introduced and some Nuba found more employment in the area as well as elsewhere in northern Sudan. Yet, the aggressive expansion of mechanized farming threatened Nuba customary land rights and their livelihoods based on subsistence farming. This generated resentment which was heightened by the semi-nomadic Baggara, deprived from their pasturelands by the large-scale mechanized farms, guiding their cattle to Nuba lands and destroying crops. As a result, the relationship between the Baggara and the Nuba deteriorated (Komey, 2010). This situation coincided with a re-strengthening of the Nuba underground political leadership during Nimeiri rule when Sudan had a one-party system. In this context, the Nuba intellectuals continued to be largely excluded from political positions, in part also due to the attitudes of the northern Arab-Muslim politicians, which led to growing frustration among them. This in turn resulted in the formation a number of clandestine groups among Nuba leaders and inspired subversive activities against the state.

After the war in southern Sudan broke out in 1983, some Nuba leaders had become increasingly inclined to join. This was in part due to the long contacts between some Nuba intellectuals and the rebel leaders of the Sudan People's Liberation Movement/Army (SPLM/A) in southern Sudan, which led some of the former to join the war in 1984. By the end of the 1980s, the SPLA-Nuba had fully established in the Nuba Mountains.

In 1989, the National Islamic Front (later the National Congress Party, NCP) took power in an army coup. In the early 1990s, as part of its counter-insurgency campaign which was declared as a jihad, this Islamist government initiated an orchestrated effort to eradicate Nuba culture and Arabize and Islamize the Nuba Mountains. Part of this campaign were targeted attacks on civilians to cause displacement to the government-run IDP camps, known as "peace villages", where conditions of captivity and forced labor prevailed. According to some observers, these peace villages numbered ninety one and contained over 160,000 persons in September 1992, being not much different from concentration camps due to high malnutrition and ill-health, partially mitigated by the presence of international NGOs and UN agencies (Bradbury, 1998, pp. 465, 467). In fact, many Nuba women in these villages became concubines of soldiers guarding the camp and bore children for them. During the most intense periods of the conflict, the Nuba Mountains area was effectively sealed off by NCP, isolating their inhabitants from any support from international organizations.

Overall, the conflict was devastating for the Nuba who fought in relative isolation from the outside world against the much more powerful Sudanese regime. Thousands of Nuba sought refuge, either in northern Sudan or abroad. Yet, the Nuba as a collective survived and in January 2002 a ceasefire agreement was signed for the Nuba Mountains as the first of a series of treaties that led to the Comprehensive Peace Agreement (CPA) in 2005 that brought an end to the war in southern Sudan. As a consequence, the Nuba Mountains were divided between the much larger NCP government controlled and SPLM/A-Nuba administered areas with two distinct administrative, educational, and judicial systems (Ylönen, 2009). The ceasefire agreement and the relative peace enforced through a remarkable cooperation between the former warring parties ended the large-scale violence. Particularly important was the creation of a large multi-agency program (NMPACT) that coordinated the humanitarian efforts of nine UN agencies, 16 international NGOs, and support agencies from the Government of Sudan and the SPLM (Pantuliano, 2008).

After the 2005 CPA, a massive return to the Nuba Mountains began as many sought to return to their ancestral lands. By 2008-2009, almost 280,000 had returned to the Nuba Mountains and the region hosted approximately 60,000 IDPs (IOM, 2009). The returnees were usually forced to choose sides, depending on the group which controlled the community during the war.

2.3 Recent developments

After the CPA, the state of Southern Kordofan was designated altering governorship between the Sudanese governing party, the NCP, and the SPLM/A until general elections scheduled for 2010 would be held. The CPA granted a popular consultation on the willingness of the population to be part of Sudan or Southern Sudan if the latter becomes independent in a referendum for self-determination. The delay in elections due to the contested population census conducted by the government provided a context for violence which escalated further after the independence of South Sudan in July 2011. The SPLM/A in the Nuba Mountains became one of the main opposition groups capable of staging an armed challenge to the government of Sudan locally, and it engaged in an armed struggle as a central armed wing of the newly formed SPLM/A-North. The relapse into violence in the Nuba Mountains a month before the independence of South Sudan (IRIN, 2011; OHCHR, 2011) marked the closing of the "peace window" and reversed the flow of returnees as thousands of people were once again forced to leave their homes. By the end of 2011 the estimated number of IDPs in Southern Kordofan had reached 200,000 (IDCM, 2011).

The resettlement of the large returnee population was one of the factors that contributed to the restart of the conflict, putting a strain on resources, particularly land, given the marginal development or improvement in the quality of life for the local people after the signing of the CPA, which was largely dependent on the efforts of NGOs (Abdel Rahim, 2010). For instance, many returnees found that their land had been occupied either by other Nubas or used for mechanized agriculture (Damin, 2010). The issue of property rights over land was mainly unresolved by the CPA, and the creation of a commission to deal with this issue (State Land Commission) was never effectively implemented (Pantuliano, 2009), in part due to the dispute of customary rights (supported by the SPLM) versus statutory laws (supported by the NCP).

3 Data

3.1 Data collection

The data were collected by one of the authors between May and June of 2008, as part of an assessment commissioned by CARE International. The selection of villages that participated in the survey was made by targeting those areas with high returnee populations. Eventually, eight villages distributed across the territory in the Nuba Mountains (see Figure 1) were selected on the basis of heterogeneity in terms of ethnic composition (mainly Arab and Nuba tribes) and political authority after the conflict, either SPLM or NCP controlled areas (see Table 1). Based on information of the South Kordofan 2008 census, 10% of the households of each village were randomly selected to participate in the sample. The target interviewee was the household head.

[FIGURE 1 HERE]

[TABLE 1 HERE]

In the final sample, 39% of the households in the data are returnees (Table 1). The subsample of returnees is composed of households that have returned to their community of origin after being IDPs during the conflict (very few were actually international refugees). They usually first sought refuge in the hills around their villages and then in other areas of Sudan. Many of them surrendered to the government or were captured and sent to the *peace villages* in the NCP controlled areas of the Nuba region or in northern Sudan. The data is limited in terms of not being able to provide information about the place where displaced households stayed during the conflict, but the identification of returnees is highly accurate, as the NGO that implemented the survey paid particular attention to this characteristic in order to target its support program.

The data collection was limited by the complications of survey implementation in a post-conflict situation, where mistrust and post-war traumas severely restrict the information that can be requested. In particular, a major drawback of the data is that it is not possible to identify the specific ethnic group, and therefore if the interviewee was Nuba or Arab.[3] Nonetheless, we follow the assumption that in villages denominated as

[3] Another problem of the data collection relate to language gaps, given many of the communities interviewed do not speak or understand Arabic, so it was necessary to rely on translators from the villages.

"former SLPM controlled area" all inhabitants were Nuba and the returnees were Nuba as well. In the case of "former NCP controlled areas", households that declared to be stayers were mostly those that considered themselves as "Arabs" (but also some Nuba that stayed in the NCP controlled areas), while the returnees were most of the time Nuba.[4]

3.2 Descriptive statistics

In the final sample, we have 352 households, 171 in former NCP controlled villages and 181 in villages that were controlled by the SPLM. 40% of the households are returnees in the former and 37% in the latter. Table 2 presents the characteristics of the interviewees (household head). Around half of them were women, which is explained by the fact that many of the households in the sample were *de facto* female headed, either by widows or divorced women (10% of the sample), single women (9% of the sample) or women who declared to be part of a monogamous household, but where the husband was not effectively present for several reasons (27% of the sample). Around half of the interviewees declared to be illiterate, with higher prevalence in SPLM villages, and 90% to be Muslims. There are almost no differences in the basic characteristics of the interviewee between returnees. A t-test comparing the mean of the variables for both groups shows that the differences are not statistically significant at the conventional levels. The only exception is that returnees are less illiterate in SPLM villages and less likely to be polygamous in NCP villages. The latter result provides support to our assumption that most of the stayers in NCP villages were mainly Arabs.

[TABLE 2 HERE]

In the middle panel of Table 2, household characteristics are compared for returnees and stayers. Again, both groups are similar along many dimensions: total number of members in the household, number of babies (less than 5 years old) and kids (between 5 and 14 years old), percentage of educated kids, and the existence of a household member with a salary from agricultural activities (t-tests for differences in these variables were never significant at conventional levels). Nevertheless, some household-level characteristics are differ. More returnees declared that the dwelling where they live was inherited (as opposite to bought or built) and was built with better materials (as measured by the quality of the walls). They also declare to have an extended family in the village. These differences provide *prima facie* evidence about the motivations underlying the decision to return, as households expecting that part of their family stayed in the village and that their rights over assets will be respected are more likely to return. Nevertheless, we cannot rule out other interpretations of the results, for instance that households with more secured property rights are actually those that are more likely to seek asylum outside of the village, or that NGOs and member communities will promote a more secured position for the returnees.

As stated above, rights over land were a main issue during the onset of the conflict and the post-conflict period. The lower panel of Table 2 shows that returnees have a

[4]Ethnic identity is generally not linked to genetic differences, but cultural background. Most of the people that called themselves "Arabs" are decedents of Nuba or other tribes that have adopted Arab cultural practices.

lower average land size. While returnees hold plots of around 2 feddans (approximately 1 hectare) on average, stayers in SPLM villages hold an average plot of 5.5 feddans and those of NCP villages of 9.7 feddans. Even though most of the respondents declared to have the ownership of their land (customary ownership), when it comes to the right to sell the land, returnees seem to have a more secured tenure system, with 58% of households declaring to have this right in former SPLM and 48% in former NCP villages, as opposite to only around one third of the stayers in both type of villages. This fact reinforces the idea that the decision of return is partially driven by the expectation of recovering part of the abandoned assets, probably through the mediation of a relative who stayed in the village during the conflict or by the recognition of a village authority. In fact, an important part of the returnees have the right to sell their land only conditional to the approval of a third party (*Conditional land right* in Table 2).

4 Socio-economic characterization of returnee households

In this section we aim to show the main socio-economic characteristics of households that returned to their communities of origin upon the end of the conflict, mostly after the signing of the CPA in 2005. We use stayers, i.e. the households who remained in the village during the conflict, as the reference group. This poses the potential problem of self-selection into displacement and return: it is expected that unobservable characteristics of the households will play a role in both the decision to seek refuge outside the village and, after the end of the conflict, return to their community of origin. Given the already mentioned limitations of our data, in particular the lack of accurate retrospective information, finding an identification strategy that allows causal interpretation to the results is indeed very challenging. Consequently, the findings of this section must be taken as descriptive and the results interpreted as partial correlations and not necessarily causal relations.

4.1 Correlates of returnee status

We first study the household characteristics that are related to the probability of being a returnee, taking the characteristics of stayers as the baseline for comparison, implementing a multivariate model that takes the following form:

$$returnee_{hv} = \alpha_v + X'_{hv}\gamma + u_{hv}, \tag{1}$$

where the dependent variable is a dummy that takes value one if the household h in village v is a returnee, zero if stayer. X is a vector of explanatory variables that are described in Table 2, and u_{hv} is the error term. The estimation is implemented either with a linear probability model (LPM) or a logistic regression, and in all specifications village fixed effects (α_v) are included.

The results of the estimation of Equation 1 for the whole sample are shown in Table 3, while Table 4 shows results separated for the villages controlled by the SPLM and the NCP. Most of the findings from the simple t-tests (Table 2) are confirmed. In general, few household characteristics differ between groups. One exception are the variables for polygamous family and Muslim faith, both negatively correlated to the returnee status. This is further evidence that households returning were Nuba instead of "Arabs". We also find that the composition of the household is different, with returnees having less members but more babies (less than 5 years old), a result driven mainly by households in the NCP villages.

[TABLE 3 HERE]

[TABLE 4 HERE]

The findings of previous studies in terms of returnee households facing worse economic conditions than stayers seem to be replicated in the post-conflict situation of the Nuba Mountains. A first indication of this is that returnees are less likely to have incomes that are not generated by agricultural activities, and this is particularly the case in NCP villages.[5] Another finding pointing towards the same direction is the negative coefficient of the variable land size, which is in line with the descriptive statistics of Table 2. Interestingly, after controlling for other household characteristics, the coefficient associated with land size is smaller in the sample with only SPLM villages, an indication that the assignment of land for returning households was not only a problem in the areas formerly controlled by the Sudanese government.

The idea that among the pull factors for return are the expectation of recognition as a member of the community and the restitution of assets previously owned is further supported by the positive and strongly statistically significant coefficients associated with the variables *Extended Family* and *Right to sell the land*. In the case of the latter, it is also confirmed that returnees mainly have *conditional* rights to sell the land, subject to the approval of a village authority or a relative. As it can be seen in the last two columns of Table 4, this is the case in both NCP and SPLM villages.

4.2 Economic activities in returnee households

Less than 10% of the households in our sample declared to receive income from an activity different than agriculture. This corresponds to the description of the villages of the Nuba Mountains, where the main economic activity relates to agricultural production and animal rearing, in many occasions as a subsistence activity but also as a commercial endeavor. We explore how these economic activities differ between returnee and stayer households using the following model:

$$y_{hv} = \alpha_v + \beta returnee_{hv} + X'_{hv}\theta + e_{hv}, \quad (2)$$

where y_{hv} is one of the economic activities described below, either related to agricultural production or livestock ownership, and the rest of the variables are the same as in

[5] This result is likely to be driven by the village of Kega Timero, which is known to be an important market-place in the area and where many people work as traders.

Equation 1.[6] Whenever y_{hv} is a binary variable, the model is estimated as a linear probability model, and the percentage of predicted variables that are outside the [0,1] interval is reported as a measure of the potential bias of using this method (Horrace & Oaxaca, 2006). In the analysis, we further include interaction effects to explore the heterogeneity of the results in terms of the group which controlled the village during the war and the gender of the household head.

In the first three columns of Table 5 the results of using the number of agricultural varieties (the seven most important were considered) as dependent variable are shown. It is possible to see that, after controlling for household characteristics, the average returnee household produces 0.23 varieties more than the average stayer, a result which is basically driven by households which are located in the areas controlled by the NCP (column 2) and that are male-headed. Nevertheless, when the production of cash crops is considered, using as the dependent variable a binary indicator which takes value one if the household cultivates at least one cash crop variety (which is the case for 60% of the households), it is possible to see in column 4 that returnees are 21% less likely to cultivate them. In terms of the heterogeneity of this result, the coefficients in column 5 show no differences between NCP and SPLM villages, whereas results in column 6 indicate that there are gender differences, since the negative relation is driven by female-headed households, which have 51% less probability of cash crop production, while males actually have a positive coefficient. These results are confirmed in the last three columns of Table 5, with coefficients showing that returnee households are 38% more likely to be cultivating only staple crops, but mainly in the case of female-headed households.

[TABLE 5 HERE]

In Table 6 the results are disaggregated by the different variates cultivated. In the case of staple crops, the two main varieties are sorghum and groundnuts (produced by 88% and 61% of the households respectively). Other staples, cultivated only by few households, were maize and millet. In the case of cash crops, the main products are sesame and beans (produced by 48% and 24% of the households respectively), while less than 10% of households additionally cultivate fruits.[7] The dependent variables used for the estimation of the coefficients in Table 6 are both the quantity produced of each product (labeled in the table as *kilos*) and a a dummy taking value one if a household cultivated the product, zero otherwise (labeled in the table as *yes/no*). It can be seen that only the likelihood of producing each variety, and not the quantities produced, differ between returnees and stayers. In the case of the main cash crops, the results are driven by female-headed households (columns 12 and 16). In the case of staples, male returnees seem to be more likely to cultivate sorghum (column 4), while females more likely to cultivate groundnuts (column 8).

[6] The variable capturing rights to sell the land is not included as a control in order to avoid reduction in sample size given missing values. When this variable is included the main results presented in this section remain unchanged. These results are available upon request.

[7] The definition of cash and staple crop is based on respondent's answers and observation in the field about the use of the agricultural production. Nevertheless, in some cases groundnuts were sold in the market and beans were considered as only for consumption. Unfortunately, we do not have enough household-level information to control for those differences, and therefore we report each product separately.

[TABLE 6 HERE]

All the results point towards the same direction. Returnees cultivate less cash crops that can generate income to their households, and instead rely on subsistence agriculture. It is likely that this is the case because the cultivation of products like sesame, a highly valued cash crop that can be sold in the form of oil, is more complicated, requiring better quality of soil than the staple crops as well as some sort of improved irrigation system. This finding can be interpreted as a potential poverty trap for returnees, since the lack of initial investments could lead to a permanent concentration in the cultivation of staples. This poverty trap justifies the targeted support of international NGOs to returnees, as long as not only food security but also the improvement in the conditions to produce cash crops is part of these programs.[8]

Even though most of the interviewees described themselves as farmers, animal husbandry is an important activity and often household wealth is measured in terms of cattle and goats. In fact, for many tribes livestock is used as a dowry. We analyze this aspect with two different variables: *Livestock ownership* is a variable taking value 1 if a household declares to own livestock, zero otherwise, while *Livestock at home* takes value 1 if the household has any animals at the moment of the interview, zero otherwise. 44% of the households own livestock according to the former definition, rising to 64% when the latter is considered. The difference between the two variables relates mainly to livestock borrowed from other households, but may also be related to misreport of animal effectively owned.[9] The results of using these variables in the left hand side of Equation 2 are displayed in Table 7. It can be seen that the coefficient associated with returnees is negative and statistically significant for both definitions (columns 1 and 4), indicating that they are less likely to own livestock than stayers. In terms of the heterogeneity of the results, both in NCP and SPLM villages returnees own less livestock, a result which is only valid for the former villages when *Livestock at home* is considered (column 5). As for gender, the negative coefficient is statistically significant only for females when *Livestock ownership* is considered, but the opposite is true when *Livestock at home* is considered (columns 3 and 6). The latter result indicates that animal lending may be more common to female headed-households.

[TABLE 7 HERE]

The results in Table 8 describe the differences in livestock by type of animal. The columns labeled as *number* refer to the quantity of animals of each type held by the household, while *yes/no* is a dummy taking value one if a household has at least one animal of each type, zero otherwise. The main differences are related to cattle and goats, the most common livestock in the region, with returnees having a lower probability of holding both

[8] Within the households in our sample, 65% of returnees declared to have received support from NGOs, while this is the case only for 39% of the stayers. All these households mentioned that the support was mainly through provision of seeds, in particular groundnut, which is less common in the area than sorghum or millet.

[9] The variable *Livestock ownership* is based on the question "Do you have any asset?", where "livestock" was one of the possible answers. In the case of *Livestock at home*, the variable relates to the specific answers about ownership of each type of livestock as well as the observations of the enumerator about animals that were present in the area surrounding the household's dwelling during the interview.

kind of animals (columns 1 and 5). The coefficients in column 2 and 6 indicate that, after controlling for a series of household characteristics, returnees have two cows and eight goats less than the average stayer. Furthermore, none of the returnees own a donkey, an important asset given its use for transportation and agricultural activities, as opposed to 10% of the stayers. The only livestock that returnees are more likely to own are sheep (columns 9 to 12), a difference that is likely to be driven by the support of NGOs that as part of their programs donated one goat or sheep to the returnees in order to secure access to milk for children's consumption. They also donate poultry, a type of livestock where there are no differences in ownership between stayers and returnees (these results are not shown in Table 8).

[TABLE 7 HERE]

These findings are in line with our previous results that show returnees possessing smaller land plots, providing further evidence that households who left the village during the conflict own fewer assets than stayers. This can be related to the fact, already highlighted in previous studies, that their land and livestock were destroyed or seized during the conflict, but, due to the descriptive nature of the results, can also indicate that households who left the village were those previously less endowed.

4.3 Health indicators

So far we have described that returnees face worse economic conditions than those who stayed in the village during the conflict. To go beyond the economic factors, in this subsection we take advantage of the information in our database related to household health indicators, one of the most important indicators of welfare. In particular, households were consulted about the prevalence of common diseases in the area during the year previous to the survey and about mortality associated with them (in this case in the last three years).[10] In order to describe differences between returnees and stayers we use the model presented in Equation 2, using the health indicators as dependent variables and including additional control variables in the vector X_{hv}, namely *Cash crop* and *Livestock at home.*

Table 9 summarizes the main results related to this set of indicators. In the first three columns the variable *Death by disease* is used, which takes value one if a member of the household has died of one of the diseases in the last three years, zero otherwise. It can be seen that the probability of this event is 20% less for returnees, with a lower coefficient in SPLM areas (column 2) and only relevant for female-headed returnee households (column 3). This result is further confirmed when the morbidity in each disease is considered, since the coefficients associated with dummies for malaria, diarrhea, dysentery, skin affections, and respiratory disorders are always negative (columns 4 to 8).

[TABLE 9 HERE]

[10]Since the data is self-reported instead of confirmed by clinic records or tests, measurement error is likely to be an issue. Nonetheless, the enumerators confirmed that the interviewees were most of the time familiar with the symptoms of these diseases, and therefore able to recognize them.

These results indicate that returnees have better health conditions than stayers. Nevertheless, the opposite is found in the case of the variable for prevalence of malnutrition, which is positively related to returnee status (column 9). One explanation for this difference can be related to the results about economic aspects: since returnee households cultivate only staples, have less land, and are less likely to hold animals, food insecurity is more likely to be an issue. When interactions of the variables related to these aspects with the returnee indicator are included, only *Land size*returnee* is statistically significant (column 10) and has a negative sign. Therefore, malnutrition mainly affect the poorer returnee households. Moreover, the observations of the enumerators suggest that, while the other diseases were clearly identified, malnutrition was a more subjective concept for the respondents, due to the fact that it is a relative measure. It is possible that returnees learned to identify malnutrition with medical support during displacement or after return, but for stayers it was a common condition both during and after the war.

While the results related to malnutrition are in line with the findings of studies like Verwimp and Muñoz Mora (2013) in Burundi, the fact that the rest of the indicators provide evidence of better health conditions for returnees is less documented in the literature and, to a certain extent, an unexpected result.[11] In the next section we provide evidence that behavioral change can help to explain these results.

5 Displacement and behavioral change

Recent studies have provided evidence that different experiences associated with war-related events may induce a behavioral change in the affected individuals. In the case of Sierra Leone, Bellows and Miguel (2009) find that individuals involved in intense violent situations during the civil war are more likely to attend community meetings, to join community groups, and to vote. Similarly, Voors et al. (2012) use field experiments in Burundi to show that exposure to conflict is positively related to altruistic behavior. On the other hand, Cassar et al. (2013) find that exposure to violence decreases the willingness to engage in impersonal exchanges after the Tajik civil war.

In line with this literature, in this section we explore the possibility that changes in attitudes -i.e. behavioral change- related to the different experiences during the conflict can explain the fact that the returnee households in the Nuba Mountains have better health indicators than the households that stayed in the village. Since we do not have information about different levels of exposure to violent situations during the war we instead compare the post-conflict attitudes of returnees and stayers, which are likely to have faced different experiences during the war.

In order to explore the differences in attitudes between returnees and stayers we take advantage of detailed information related to sanitation habits recorded in our data. We think that these habits are important not only because can proxy other changes in attitudes (like risk aversion or time preferences) but also because the important benefits

[11] In the medical literature there are some studies which show improved health conditions for displaced populations. For instance, Hynes et al. (2002) use a large dataset from medical records from 52 camps in 7 countries to show that refugees and IDPs had better reproductive health outcomes than the people in their country of origin and in the host community.

of preventive health care for the household that implement the sanitary measures as well as for the whole community, given their positive externalities in the case of contagious diseases.[12]

5.1 OLS estimations of the change in attitudes

In a similar fashion as in the previous section, we use the variables related to sanitation habits as the left-hand side variable of Equation 2, where the main explanatory variable is the dummy indicating if a household is classified as returnee. We first present the results of a simple OLS estimation and therefore the same caveats as exposed above, in terms of the potential bias of the estimated coefficients given the non-random nature of the displacement and return decisions, should be kept in mind. In the set of controls X_{hv} we use all the household-level variables described in Table 2 and additionally the variables *Cash crop*, *Livestock at home*, and *Death by disease*, as described above. Another additional control is a dummy taking value one if the households received the support of an NGO in the last year (*Support by NGO*).

We use as dependent variables two measures related to different sanitary attitudes of the households: *Disease prevention* is an index that counts the number of measures (from a total of five) taken by each household to prevent the aforementioned common diseases prevalent in the region[13] and *Hand washing* is an index constructed by counting the number of situations (from a total of seven) in which hands are washed, a question which was asked to a female member of the household.[14] Both indexes have been rescaled to assume values between 0 and 1 in order to facilitate interpretation. In Table 9 it is possible to see that the *Sanitary index* (the sum of both indexes) is actually negatively associated with a death caused by the common diseases in the area and also negatively associated to the prevalence of each disease, except for the case of Malaria and Malnutrition, where the relationship is positive.

The results in Table 10 show the OLS estimation of Equation 2 using the different variables related to attitudes as dependent variables. Returnees are indeed more likely to adopt all these attitudes, since all the coefficients associated to the returnee indicator (columns 1, 4, and 7) are positive and statistically significant. While in the case of the *Disease prevention* the the estimated coefficient indicates that the index for returnees is only 3% higher, this increases to 14% in the case of *Hand washing*. Most of these results are unchanged when heterogeneous effects (by gender and NCP or SPLM control of the village) are considered. The only exception is in the case of *Disease prevention*, where the coefficients for NCP villages and female returnees (columns 2 and 3) are not statistically different from zero.

[TABLE 10 HERE]

[12]There is a large literature about the positive externalities of preventive health care. For a recent example see Cohen and Dupas (2010).

[13]The five measures are: Keep clean, use safe drinking water, follow health advice, personal hygiene, and use of mosquito nets.

[14]The seven situations are: When hands are dirty, after using the toilet, before preparing food, before eating food, after eating food, after cleaning children, and before breast feeding.

A common indicator of behavioral change analyzed in previous studies relates to the participation in community based organization (CBO). In order to study if this is also the case in our data, in the last three columns of 10 we show the results of using as dependent variable *CBO membership*, a dummy taking value one if someone in the household is a member of a CBO, zero otherwise. Returnees are indeed 18% more likely to be members of these groups. Another variable suitable to capture behavioral change is related to a question asking if the household has a plan with respect to the number of children they want to have or whether they will have "as many as God gives". While none of the stayers declared to engage in any family planning, 25% of the returnees stated a certain number of children they plan to have.

5.2 Instrumental variable estimations of the change in attitudes

It is not straightforward to explain why returnees take better sanitation measures. One possible explanation is that their attitudes changed while they were displaced outside the village, due to the exposure to different habits in urban areas or through the contact with personnel from NGOs and other international organizations, either in IDP camps or upon their return to the village.[15] Nevertheless, opposite to the behavioral change hypothesis, and given the potential self-selection into displacement and return, it is also possible that unobservable variables jointly determine the adoption of sanitary habits and decisions related to the probability of displacement and return.

We attempt to deal with this issue, and therefore aim to obtain coefficients which can be interpreted in a causal way, by implementing an instrumental variable strategy. As already highlighted, our data is limited in terms of information about the situation of the household members prior as well as during the war, which implies that we can use neither household-level fixed effects nor any identification strategy which requires pre-conflict data. We also have data only for eight geographic locations, and therefore cannot exploit village-level events that may create exogenous variation (as is the case for the identification strategies used by Fiala (2012), Kondylis (2010), and others). Instead, we rely on household-level variables which are contemporaneously captured with the rest of the data which are arguably part of the pull factors of return but are plausibly exogenous to the adoption of sanitary measures when a series of household characteristics are controlled for.

We attempt to find instrumental variables from the analysis of the correlates of returnee status described in Section 4.1, in particular related to the rights over land. Since returnees were absent from their communities for a long period, it is to be expected that their property rights over assets, in particular land, will be less well defined than in the case of households that stayed during the conflict. Nevertheless, in Section 4.1 we have shown that in the case of the Nuba Mountains the situation is actually the opposite, since returnees are more likely to have the right to sell their land, but often subject to the approval of a third party (a relative or a village authority). This is actually the case in both SPLM and NCP controlled villages (Table 4, columns 2 and 4), and therefore it seems to be a fact that goes beyond the dispute of customary versus statutory rights be-

[15] Alternatively, it is possible that households who stayed changed their behavior given their experiences during the war, for instance becoming more risk-seeking (Voors et al., 2012).

tween these two groups (Komey, 2010). The distribution of land rights is also unlikely to be related to the action of commissions for land restitution, which were not implemented at the time the data was collected (Pantuliano, 2009). Instead, we interpret this positive association as a proxy of a pull factor for returning to the community of origin, with the expectation of recovering part of the land held before the conflict as a determinant of the probability of return.

At the same time, we find it plausible that the rights over land are exogenous to the adoption of hygiene attitudes, therefore constituting a good candidate for an instrumental variable. In the appendix we show that even if the exclusion restriction is partially violated, the the sign of the estimated coefficients still can be interpreted in a causal way.[16] This exclusion restriction is less likely to hold in the case of the economic activities described in Section 4 as well as in the case of the variable *CBO membership*, because it is likely that households with less defined rights over land will try to be part of associations demanding an improvement of this condition.

In Table 11 we present the first stage results when two definitions of the rights over land are used as the excluded instrument, namely *Right to sell land* (RL), a variable taking value one if the respondent declares to have the right to sell their land, and *Conditional land right* (CR), a variable taking value one if the right to sell the land is conditional on the approval of a third party (in this case, we always use the variable *Unconditional land right* as a control in the regressions, and therefore the excluded dummy is the case when there are no rights to sell the land). The results correspond to different specifications of Equation 1, which now is the reduced form equation. For each instrument we present three sets of results, depending on the number of control variables included: either no controls (*NO*), the set of household characteristics described in Table 2 (*HH*), or a comprehensive set of controls (*ALL*) which includes the latter variables plus some other variables described in previous estimations, namely *Cash crop*, *Livestock at home*, *Death by disease*, *CBO membership*, and *Support by NGO*.

[TABLE 11 HERE]

The first stage results confirm those from Tables 3 and 4 (columns 2 and 5 of Table 11 are indeed the same results as columns 3 and 5 of Table 3). The two definitions of the right to sell the land are positively related to the returnee status, and the coefficients are always significant at the 0.01 level, except in column 5 where the significance is at the 0.05 level. Moreover, the F-test of excluded instruments indicates that the instruments are not weak, since the values are above the threshold of the tabulated critical values proposed by Stock, Wright, and Yogo (2002).

The results of the instrumental variable estimation of *Disease prevention* and *Hand washing*, as well as the OLS estimates for the subsample with valid observations for the right over land variables, are presented in Table 12. Even though the average value of the two indexes in this subsample is almost the same as in the full sample, the OLS estimates

[16] In the appendix we use the methods proposed by Conley, Hansen, and Rossi (2012) to perform inference while relaxing the exclusion restriction, therefore allowing for the instrument to be correlated to a certain degree with the adoption of sanitary measures. We show that the instruments are plausible exogenous in most of the specifications.

of the coefficient capturing the effect for returnees are higher than those in Table 10, and both are still positive and statistically significant. The instrumental variable estimates using the two different instruments (CR and RL) confirm these results, with estimated coefficients that are positive, significant at the 1% level, and higher than the OLS estimates. The latter result can be due to the fact that the OLS estimates were downward biased or can be as well related to a potential attenuation bias associated to measurement error in the explanatory variables.

[TABLE 12 HERE]

After showing that the positive effect of the returnee status on the hygiene indexes is robust to the instrumental variable estimation, we test if this is also the case for each of its components. Table 13 shows the coefficients of the returnee dummy when the components of the *Disease prevention* index are the dependent variables in the different specifications of Equation 2. The OLS estimates for each of the different indicators is positive, except in the case of *Health advise*, which is negative but not statistically significant. When the coefficients are estimated using the land right variables as instruments, most of the coefficients remain positive and the magnitudes tend to increase. The only exception is in the case of *Personal hygiene*, which becomes negative when instrumented. For the sake of space, Table 14 shows the results only for the five most important components of the *Hand washing* index.[17] In this case, all the components of the index are positively correlated with the returnee status, both when OLS as well as instrumental variables are used for the estimation.

[TABLE 13 HERE]

[TABLE 14 HERE]

6 Conclusions

The two-decade long civil war in Sudan was one of the deadliest of the last century. After the signing of the Comprehensive Peace Agreement (CPA) in 2005, millions of displaced persons started returning to their communities of origin, creating a challenge for the post-conflict recovery. In the present study, we have sought to analyze detailed household-level data collected in eight villages of the Nuba Mountains, one of the most affected areas, which was largely sealed off from the rest of the world during the conflict. To the best of our knowledge, this is the first quantitative analysis of the post-conflict situation in the region, since the data were collected during a short-lived "peace window" between the end of the civil war and the beginning of yet another connected conflict.

In our study, we aim to shed light on the situation of the households returning to the villages, and the challenges their reintegration posed to the effective implementation of the peace agreement. Firstly, we find that returnees and stayers are similar along most household characteristics, but returnees are more likely to have an extended family in the

[17] Only less than 10% of the households in the sample declared to wash their hands after cleaning a baby and before breast feeding, the excluded components.

village and have clearer property rights over their land. We interpret these findings so that the expectation of the recognition as a member of the community and of the support for the claim of the assets held before the conflict are important pull factors of the return decision.

We compare the social and economic conditions of returnee households vis-à-vis the non-displaced population and we find important differences on a number of dimensions. In line with previous studies in other post-conflict areas, we find that returned households have fewer assets than those that stayed during the conflict, both in terms of land size and livestock ownership. We also find differences in agricultural production since returnees are less involved in the production of cash crops and more likely to only cultivate staples. The latter result can be understood in light of the investments and better soil quality requirements for the production of cash crops like sesame or beans, with returnees seemingly in a less favorable position in this respect and potentially falling in a poverty trap of permanent concentration in the cultivation of staples. This poverty trap could justify the targeted support of international NGOs to returnees, as long as not only food security but also the improvement in the conditions for the production of cash crops is part of these programs.

Even though returnees tend to face worse economic conditions than stayers, we find evidence that the former tend to perform better on health indicators than the rest of the village, because they are less likely to have a member of the household affected by and deceased due to one of the most prevalent diseases of the area. In order to explain these somewhat counterintuitive results we take advantage of a detailed set of variables related to hygiene and sanitary habits to test the hypothesis that returnees have changed their behavior given their experiences during displacement. In fact, we find that returnee households are more likely to take actions such as wash their hands, use of mosquito nets and engage in family planning. We also find that returnees are more likely to be members of community based organizations.

In terms of the heterogeneity of our results, we find that the differences between returnee households and the rest of the village tend to exist and have similar magnitudes (with few exceptions) in both the areas that were controlled by the Government of Sudan and the SPLM during the war. This is an indication of the severe consequences of the war and the difficulties of reintegration of the returnee population in both areas. This is as well likely to be the case given the coordinated initial humanitarian aid by a large group of international agencies with the NCP and the SPLM (Pantuliano, 2008). Among the unresolved issues after the end of the civil war in the two areas, the rights over land appear as one of the most important (Komey, 2010) since displaced households expected to have their right recognized upon return to their communities, an issue that was not clearly addressed in the CPA as well as during the reconstruction efforts immediately after the conflict (Pantuliano, 2009).

We also explore the heterogeneity of our results with respect to the gender of the household head, since the reintegration of women has been one of the aspects that experts considered as relevant for the failure of the peace process (Abdel Rahim, 2010). Even though in our sample the proportion of female-headed households is not different between returnees and stayers, we find that the economic conditions for the former tend to be worse. Indeed, female-headed returnee households drive the results in terms of differences in agricultural production, particularly in the exclusive cultivation of staple crops, an indicator of the lack of income generating activities in this agricultural region.

Our data provide a rich set of household characteristics at the moment of the survey, which allows us to control for various possible omitted variables that could potentially introduce a bias to our estimates. Nevertheless, another likely source of potential endogeneity is the fact that unobservable characteristics can drive the decisions regarding departure during the war and return after the end of the conflict, as well as influence economic and health outcomes. Since our database is limited in terms of not having pre-conflict information or a sample widespread at the geographic-level, it is difficult to implement a convincing identification strategy to deal with this bias, and therefore most of our results must be taken as descriptive. We attempt to solve this issue for the estimation of the effect of displacement and return in the adoption of sanitary measures using one of the pull factors of return, the right to sell land (a proxy of the expectation of recognition of rights upon return), as an instrumental variable. We find it plausible that this variable satisfies the exclusion restriction, since it is difficult to think about direct ways in which it could influence the adoption of sanitary measures. The instrumental variable results confirm the hypothesis of behavioral change, with returnee households more likely to adopt sanitary measures than stayers. Nonetheless, we hope that further studies will make more comprehensive databases available, both in time and geographic dimension, where better identification strategies can be implemented in order to provide causal analysis of the situation of returnees in the Nuba Mountains and other post-conflict areas.

We expect that our analysis can aid in providing directions for a future post-conflict situation in the Nuba Mountains after the ongoing conflict. Indeed, we have shown that the reintegration of returnees is an important challenges for post-conflict recovery. In this particular case, some of the most relevant questions that remain open for future research are about the situation of the returnees in the new phase of the conflict. Are they likely to be displaced again? Have they joined the rebel groups fighting against the government? Are these situations more likely to happen in former NCP or SPLM controlled areas? We expect that a potential follow-up of the households in our sample could help to shed light on these and other relevant aspects of the seemingly endless conflict in the Nuba Mountains.

While mainly highlighting some of the problems of the return of displaced persons after a conflict, we have also remarked positive aspects of this process. In particular, we have shown that returnees are more likely to engage in sanitary behavior and therefore improve conditions that in turn limit the occurrence of some severe diseases prevalent in the area. These sanitary measures have not only private benefits for the households adopting them but rather tend to create a positive externality to the community. This is a good example of how returnees may introduce not only different habits but, potentially, contributing new ideas and expertise to the reconstruction efforts after a conflict.

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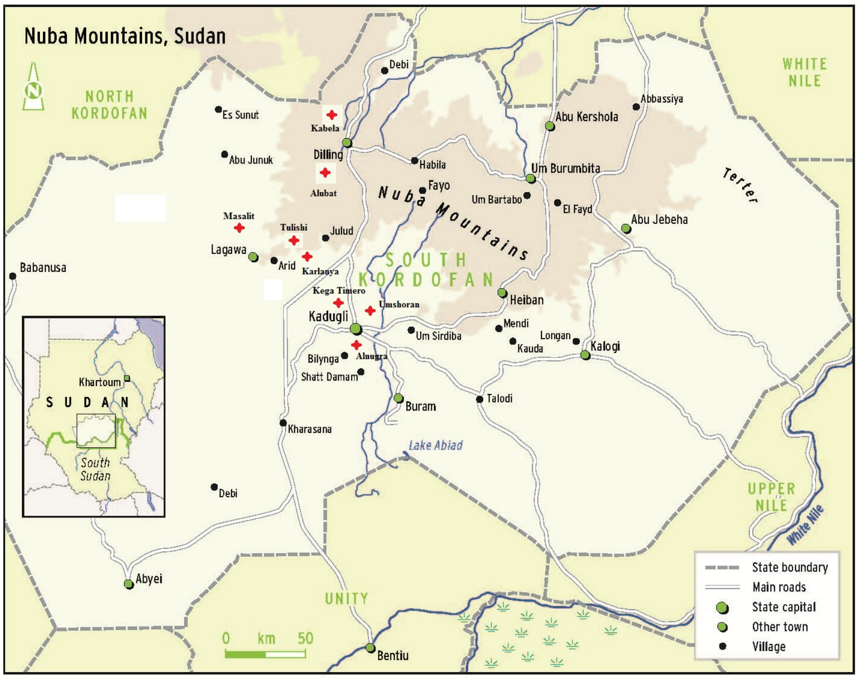
Figure 1: Map of the Nuba Mountains



Note: Crosses indicate the 8 villages in which the data were collected. The map was originally published by HSBA (2008).

Table 1: Villages in the sample

District	Villages	Control during war	Population	Households Census	Households Sample	Returnees
Kadugli	Alnugra	SPLM	5,778	825	61	34%
	Kega timero	NCP	7,500	1,071	98	36%
	Umshoran	SPLM	7,590	640	18	38%
Dilling	Alubat	NCP	1,140	163	16	62%
	Kabela	SPLM	1,700	243	23	43%
Lagawa	Tulishi	SPLM	6,200	886	25	52%
	Karlanya	SPLM			54	39%
	Masalit	NCP	5,000	714	57	33%
Total					352	39%

Note: The information about population and number of households comes from the South Kordofan census 2008 (this information was found to be highly inaccurate when the villages were visited for our data collection). Sample and percentage of returnees comes from our data. The information for Tulishi and Karlanya villages was not disaggregated in the census data, but it is disaggregated in our database.

Table 2: Household characteristics: Returnees and villages controlled by different groups during the war

		SPLM controlled villages			**NCP controlled villages**		
		Returnees	Stayers	t-test	Returnees	Stayers	t-test
		(1)	(2)	(1)=(2)	(3)	(4)	(3)=(4)
Household head	% male	0.431	0.404	0.721	0.516	0.533	0.83
	% young (18-35)	0.278	0.349	0.32	0.313	0.336	0.749
	% adult (36-50)	0.472	0.377	0.21	0.453	0.449	0.954
	% elder (> 50)	0.25	0.274	0.728	0.234	0.215	0.769
	Illiterate	0.556	0.694	0.058	0.453	0.43	0.769
	Muslim	0.903	0.89	0.784	0.906	0.925	0.664
	Polygamous	0.097	0.128	0.524	0.141	0.234	0.142
	Single	0.167	0.22	0.38	0.156	0.084	0.148
	Divorced/widowed	0.125	0.147	0.68	0.094	0.047	0.228
Household	Household members	6.569	6.404	0.765	7.563	9.15	0.118
	Nr. of babies (< 5)	1.431	1.385	0.82	1.875	1.729	0.75
	Nr. of kids (5-14)	2.194	2.101	0.719	2.094	2.617	0.117
	% educated kids	0.57	0.589	0.691	0.692	0.64	0.244
	Inherited house	0.514	0.376	0.068	0.797	0.523	0
	House with firm walls	0.25	0.119	0.022	0.266	0.187	0.229
	Extended family	0.528	0.339	0.012	0.609	0.449	0.042
	Paid agric. workers	0.208	0.235	0.686	0.188	0.19	0.968
	Non agric. income	0.055	0.174	0.018	0.047	0.131	0.077
Land	Land Size	1.979	5.538	0	1.992	9.708	0.206
	Own the land	0.833	0.917	0.085	0.859	0.804	0.358
	Right to sell land	0.583	0.315	0.001	0.484	0.356	0.115
	Unconditional rights	0.25	0.233	0.811	0.266	0.345	0.302
	Conditional rights	0.333	0.082	0	0.218	0.011	0
	Observations	72	109		64	107	

Note: The t-test compares the null hypothesis that the mean value of the subsamples of returnees and stayers is the same. P-values of the t-tests are presented. In the case of the variables related to right over land, only 296 observations are available.

Table 3: Correlates of returnee status

	(1)	(2)	(3)	(4)	(5)	(6)
Male	0.029	0.869**	0.009	0.466	0.030	0.588
	(0.055)	(0.407)	(0.080)	(0.437)	(0.088)	(0.450)
Adult	0.038	0.245	0.073	0.423	0.089	0.493
	(0.074)	(0.317)	(0.074)	(0.348)	(0.073)	(0.360)
Primary education	-0.051	-0.007	-0.035	-0.009	-0.064	-0.225
	(0.086)	(0.356)	(0.096)	(0.366)	(0.097)	(0.377)
Muslim	-0.073	-2.850***	-0.424**	-3.378***	-0.380**	-3.073***
	(0.073)	(0.901)	(0.149)	(0.917)	(0.136)	(0.870)
Polygamous	-0.132**	-0.767*	-0.118**	-0.677	-0.098*	-0.581
	(0.050)	(0.422)	(0.045)	(0.445)	(0.047)	(0.456)
Divorced/widowed	-0.034	-0.332	-0.064	-0.432	-0.048	-0.348
	(0.139)	(0.489)	(0.151)	(0.550)	(0.155)	(0.557)
Household members	-0.021*	-0.118*	-0.024*	-0.138**	-0.020	-0.125**
	(0.011)	(0.060)	(0.012)	(0.057)	(0.015)	(0.062)
Nr. of babies (< 5)	0.029*	0.153*	0.035*	0.189**	0.032*	0.182**
	(0.013)	(0.080)	(0.015)	(0.078)	(0.016)	(0.083)
Inherited house	0.087	-0.547	-0.071	-0.716**	-0.120	-0.994***
	(0.065)	(0.335)	(0.110)	(0.346)	(0.095)	(0.369)
House with firm walls	0.214***	-0.018	0.039	-0.401	0.165**	0.166
	(0.054)	(0.475)	(0.056)	(0.441)	(0.049)	(0.454)
Extended family	0.180***	1.844***	0.241***	1.647***	0.113**	0.913**
	(0.043)	(0.420)	(0.042)	(0.398)	(0.038)	(0.387)
Paid agric. workers	-0.066	0.278	0.021	0.471	0.038	0.549
	(0.056)	(0.427)	(0.065)	(0.394)	(0.057)	(0.408)
Non agric. income	-0.166**	-1.424*	-0.329	-2.070**	-0.303	-2.119*
	(0.054)	(0.772)	(0.179)	(0.950)	(0.182)	(1.195)
Land Size	-0.001	-0.415***	-0.001	-0.298***	-0.002***	-0.286***
	(0.001)	(0.087)	(0.001)	(0.108)	(0.001)	(0.105)
Land ownership	-0.045	0.239				
	(0.099)	(0.449)				
Right to sell land			0.261***	1.209***		
			(0.060)	(0.364)		
Unconditional land right					0.023	0.006
					(0.060)	(0.433)
Conditional land right					0.488***	2.577***
					(0.080)	(0.551)
Model	LPM	Logit	LPM	Logit	LPM	Logit
Observations	344	344	290	290	290	290
R^2	0.118		0.173		0.215	
Pseudo R^2		0.229		0.206		0.243
% outside [0,1]	0.009		0.031		0.021	

Standard errors clustered at village level in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. The dependent variable is a dummy that takes value one if the household is returnee, zero if stayer. All specifications include village fixed effects. The variables *Single*, *Elder*, and *Number of kids* were also included in the estimation, but are not reported (were never statically significant).

Table 4: Correlates of returnee status by village control during the war

	(1)	(2)	(3)	(4)
Male	-0.014	-0.110	0.119	0.217**
	(0.074)	(0.103)	(0.083)	(0.034)
Adult	-0.020	0.111	0.049	0.090
	(0.116)	(0.104)	(0.048)	(0.039)
Primary education	0.065	0.008	-0.112	-0.147
	(0.128)	(0.180)	(0.125)	(0.125)
Muslim	-0.272*	-0.441***	-0.126	-0.828***
	(0.101)	(0.079)	(0.090)	(0.069)
Polygamous	-0.104	-0.126	-0.157***	-0.089
	(0.095)	(0.186)	(0.013)	(0.037)
Divorced/widowed	-0.188	-0.327*	0.295	0.287*
	(0.175)	(0.133)	(0.299)	(0.091)
Household members	-0.012	-0.005	-0.025**	-0.032**
	(0.021)	(0.020)	(0.005)	(0.007)
Nr. of babies (< 5)	-0.005	-0.027	0.039***	0.050***
	(0.040)	(0.035)	(0.001)	(0.003)
Inherited house	-0.149	-0.317**	0.226	-0.022
	(0.127)	(0.099)	(0.101)	(0.145)
House with firm walls	0.188*	0.175	0.098	0.172
	(0.079)	(0.098)	(0.046)	(0.097)
Extended family	0.246**	0.096	0.151**	0.141**
	(0.078)	(0.095)	(0.034)	(0.021)
Paid agric. workers	-0.014	0.009	-0.016	0.128
	(0.111)	(0.100)	(0.014)	(0.077)
Non agric. income	-0.348*	-0.606*	-0.155*	0.005
	(0.148)	(0.223)	(0.040)	(0.082)
Land Size	-0.040**	-0.036***	-0.000	-0.002**
	(0.009)	(0.005)	(0.000)	(0.000)
Land ownership	0.006		0.107	
	(0.139)		(0.275)	
Unconditional right to sell land		0.044		-0.079
		(0.139)		(0.052)
Conditional land right		0.455**		0.643***
		(0.111)		(0.031)
Model	LPM	LPM	LPM	LPM
Observations	174	139	170	151
R-squared	0.252	0.336	0.189	0.375
% outside [0,1]	0.086	0.079	0.047	0.113
Number of village	5	5	3	3
Sample	SPLM	SPLM	NCP	NCP

Standard errors clustered at village level in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
The dependent variable is a dummy that takes value one if the household is returnee, zero if stayer. All specifications include village fixed effects. The variables *Single*, *Elder*, and *Number of kids* were also included in the estimation, but are not reported (were never statically significant).

Table 5: Agricultural production

	Number of varieties			Cash crop			Staple crop		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Returnee	0.233*			-0.215***			0.375***		
	(0.108)			(0.028)			(0.031)		
SPLM * returnee		0.139			-0.246***			0.368***	
		(0.084)			(0.029)			(0.036)	
NCP * returnee		0.335**			-0.181***			0.382***	
		(0.112)			(0.024)			(0.033)	
Male * returnee			0.641*			0.168**			0.148
			(0.273)			(0.056)			(0.084)
Female * returnee			-0.082			-0.511***			0.549***
			(0.097)			(0.036)			(0.023)
Observations	344	344	344	344	344	344	344	344	344
Mean value		2.348			0.593			0.317	
R-squared	0.473	0.475	0.489	0.496	0.497	0.581	0.407	0.407	0.441
% outside [0,1]				0.177	0.172	0.221	0.145	0.148	0.151

Standard errors clustered at village level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
OLS estimation of Equation 2 for outcomes related to agricultural production. In all different regressions, village fixed effects and the household-level variables described in Section 3 are included.

Table 6: Agricultural production by product

	Sorghum				Groundnut				Sesame				Beans			
	Kilos	yes/no			Kilos	yes/no			Kilos	yes/no			Kilos	yes/no		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
returnee	-3.646	0.132***			-2.821	0.235***			-1.120	-0.025			-3.159	-0.069		
	(3.516)	(0.033)			(5.131)	(0.033)			(2.953)	(0.021)			(2.057)	(0.044)		
SPLM*returnee			0.100**				0.187***				-0.020				-0.125**	
			(0.032)				(0.031)				(0.027)				(0.041)	
NCP*returnee			0.168***				0.290***				-0.031				-0.005	
			(0.043)				(0.034)				(0.026)				(0.027)	
male*returnee				0.275***				0.110				0.257***				0.079
				(0.077)				(0.086)				(0.033)				(0.108)
female*returnee				0.025				0.329***				-0.237***				-0.179***
				(0.023)				(0.035)				(0.049)				(0.031)
Observations	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344
Mean value	121.64		0.884		50.32		0.607		16.89		0.477		12.06		0.235	
R-squared	0.429	0.517	0.521	0.546	0.311	0.504	0.506	0.511	0.223	0.448	0.449	0.485	0.413	0.281	0.281	0.289
% outside [0,1]		0.331	0.340	0.328		0.174	0.172	0.195		0.166	0.169	0.166		0.148	0.151	0.154

Standard errors clustered at village level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
OLS estimation of Equation 2 for outcomes related to agricultural production. In all different regressions, village fixed effects and the household-level variables described in Section 3 are included.
"Kilos" refers to the amount of each specific variety produced in the year before the survey, while "yes/no" is a dummy taking value 1 if a household cultivated the product, zero otherwise.

Table 7: Livestock

	Livestock ownership			Livestock at home		
	(1)	(2)	(3)	(4)	(5)	(6)
returnee	-0.209***			-0.121*		
	(0.029)			(0.060)		
SPLM*returnee		-0.269***			0.016	
		(0.039)			(0.067)	
NCP*returnee		-0.142***			-0.273***	
		(0.019)			(0.031)	
male*returnee			-0.112			-0.284***
			(0.079)			(0.071)
female*returnee			-0.283***			0.004
			(0.031)			(0.089)
Observations	344	344	344	344	344	344
Mean value		0.439			0.637	
R-squared	0.467	0.470	0.472	0.130	0.151	0.146
Number of village	8	8	8	8	8	8
% outside [0,1]	0.174	0.169	0.172	0.014	0.023	0.017

Standard errors clustered at village level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

OLS estimation of Equation 2 for outcomes related to livestock. In all different regressions, village fixed effects and the household-level variables described in Section 3 are included.

"Livestock ownership" is a variable taking value 1 if a household declares to own livestock, zero otherwise. "Livestock at home" is a variable taking value 1 if the households has livestock at the moment of the interview, zero otherwise. The differnce between the two variables relates to lended livestock.

Table 8: Livestock by type

	Cattle				Goats				Sheep				Donkey		
	yes/no	Number			yes/no	Number			yes/no	Number			Number		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
returnee	-0.181***	-1.989***			-0.134*	-8.167***			0.121***	1.070***			-0.093***		
	(0.029)	(0.292)			(0.062)	(1.355)			(0.015)	(0.122)			(0.008)		
SPLM*returnee			-1.882***				-6.814***				1.055***			-0.115***	
			(0.291)				(1.100)				(0.200)			(0.015)	
NCP*returnee			-2.104***				-9.616***				1.086***			-0.088***	
			(0.280)				(1.496)				(0.107)			(0.009)	
male*returnee				-1.458**				-11.298***				0.293			-0.099***
				(0.474)				(2.818)				(0.270)			(0.025)
female*returnee				-2.497***				-5.171***				1.814***			-0.105***
				(0.253)				(0.867)				(0.158)			(0.021)
Observations	344	344	344	344	344	344	344	344	344	344	344	344	344	344	344
Mean value	0.31		2.889		0.34		5.78		0.11		0.663			0.07	
R-squared	0.267	0.553	0.553	0.554	0.201	0.574	0.577	0.592	0.682	0.625	0.625	0.649	0.671	0.672	0.671
% outside [0,1]	0.081				0.076										]

Standard errors clustered at village level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
OLS estimation of Equation 2 for outcomes related to livestock. In all different regressions, village fixed effects and the household-level variables described in Section 3 are included.
"Number" refers to the number of heads of each type of livestock hold by the household at the moment of the survey, while "yes/no" is a dummy taking value 1 if a household holds a type of animal, zero otherwise.

Table 9: Health indicators

	Death by disease			Malaria	Diarrhea	Dysentery	Skin	Respiratory	Malnutrition	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Returnee	-0.166***			-0.168***	-0.047	-0.164***	-0.106**	-0.116***	0.242***	0.520***
	(0.035)			(0.036)	(0.032)	(0.025)	(0.035)	(0.032)	(0.028)	(0.053)
SPLM*returnee		-0.200***								
		(0.026)								
NCP*returnee		-0.128**								
		(0.037)								
Male*returnee			-0.029							
			(0.085)							
Female*returnee			-0.291***							
			(0.044)							
Land size*returnee										-0.118***
										(0.021)
Hygiene index	-0.029***	-0.028***	-0.030***	0.009*	-0.001	-0.019***	-0.002	-0.012**	0.045***	0.041***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.006)	(0.005)	(0.009)	(0.004)	(0.008)	(0.009)
Observations	344	344	344	344	344	344	344	344	344	344
Mean value		0.247		0.904	0.355	0.279	0.224	0.148	0.166	
R-squared	0.614	0.616	0.627	0.466	0.617	0.652	0.502	0.354	0.378	0.379
% outside [0,1]	0.233	0.230	0.233	0.349	0.195	0.273	0.206	0.235	0.238	0.254

Standard errors clustered at village level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

OLS estimation of Equation 2 for outcomes related to health indicators. *Death by disease* is a variable taking value one if the household had a member who died affected by one of the diseases in the three years previous to the interview, zero otherwise. The different diseases refers to variables taking value one if a member of the household was affected by each disease in the year before the interview, zero otherwise.

All regressions include village fixed effects and the set of controls X_{hv} described in Table 2 as well as the variables *Cash crop* and *Livestock at home*.

Table 10: Attitudes

	Disease prevention			Hand washing			CBO membership		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Returnee	0.032*			0.144***			0.175***		
	(0.015)			(0.012)			(0.027)		
SPLM*Returnee		0.047**			0.159***			0.215***	
		(0.015)			(0.014)			(0.026)	
NCP*Returnee		0.014			0.127***			0.131***	
		(0.030)			(0.010)			(0.023)	
Male*Returnee			0.111***			0.127**			0.236***
			(0.021)			(0.045)			(0.039)
Female*Returnee			-0.042			0.160***			0.119**
			(0.025)			(0.031)			(0.046)
Observations	344	344	344	344	344	344	344	344	344
Mean value		0.314			0.369			0.308	
R^2	0.222	0.225	0.227	0.489	0.515	0.537	0.500	0.501	0.501
% outside [0,1]				0.320	0.358	0.352	0.203	0.203	0.201

Standard errors clustered at village level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
OLS estimation of Equation 2 using as dependent variable the indexes of sanitary attitudes (*Disease prevention* and *Hand washing*) as well as a dummy indicating if someone in the household is a member of a community based organization (*CBO membership*).
All regressions include village fixed effects and the set of controls X_{hv} described in Table 2 as well as the variables *Cash crop*, *Livestock at home*, *Death by disease*, and *Support by NGO*.
the household-level control variables described in Section 3 are included.

Table 11: First stage regression: right over land as instrument.

	(1)	(2)	(3)	(4)	(5)	(6)
Conditional land right (CR)	0.488***	0.346***	0.475***			
	(0.063)	(0.080)	(0.064)			
Right to sell land (RL)				0.204***	0.261**	0.255***
				(0.035)	(0.060)	(0.027)
Observations	290	290	290	290	290	290
Controls	NO	HH	ALL	NO	HH	ALL
R^2	0.101	0.215	0.561	0.041	0.246	0.518
% outside [0,1]	0	0.021	0.162	0	0.031	0.145
Excluded F test	46.16	43.63	51.43	11.88	15.78	22.17
Excluded R^2	0.101	0.053	0.134	0.041	0.056	0.057

Standard errors clustered at village level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
First-stage reduced forms of the effects of to be a returnee in changes of attitudes. The dependent variable is a dummy taking value one if the household is a returnee. The instruments are *Right to sell land* (RL), a variable taking value one if the respondent declare to have the right to sell their land, and *Conditional land right* (CR), a variable taking value one if the right to sell the land is conditional to the approval of a third party.
All regressions include village fixed effects. The set of controls HH includes the variables described in Table 2, and the set of controls ALL additionally includes the variables *Cash crop*, *Livestock at home*, *Death by disease*, and *Support by NGO*.

Table 12: Instrumental variable estimation of different attitudes of returnee households

	Disease prevention			Hand washing		
	OLS	IV		OLS	IV	
	(1)	(2)	(3)	(4)	(5)	(6)
Returnee	0.083*	0.452***	0.722***	0.241***	0.726***	1.146***
	(0.036)	(0.083)	(0.167)	(0.031)	(0.080)	(0.197)
Observations	290	290	290	290	290	290
Mean value		0.318			0.355	
Controls	ALL	ALL	ALL	ALL	ALL	ALL
Instrument	-	CR	RL	-	CR	RL

Standard errors clustered at village level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Instrumental variables estimates of the effects of to be a returnee in changes of attitudes. The instruments are *Right to sell land* (RL), a variable taking value one if the respondent declare to have the right to sell their land, and *Conditional land right* (CR), a variable taking value one if the right to sell the land is conditional to the approval of a third party.

All regressions include village fixed effects and the set of controls X_{hv} described in Table 2 as well as the variables *Cash crop*, *Livestock at home*, *Death by disease*, and *Support by NGO*.

Table 13: Instrumental variable estimation of attitudes: Elements of the *Disease prevention* index

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
		Keep clean			Use safe water			Health advise			Mosquito net			Personal hygiene	
VARIABLES	OLS	IV		OLS	IV		OLS	IV		OLS	IV		OLS	IV	
Returnee	0.042	0.330***	0.318	0.111**	1.072***	2.245***	-0.041	-0.046	0.358**	0.177***	1.176***	1.562***	0.124	-0.273**	-0.875***
	(0.042)	(0.121)	(0.199)	(0.046)	(0.170)	(0.451)	(0.025)	(0.059)	(0.153)	(0.050)	(0.202)	(0.365)	(0.073)	(0.122)	(0.267)
Observations	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290
Mean value		0.493			0.203			0.065		0.565	0.262				
Controls	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL
Instrument		CR	RL		CR	RL		CR	RL		CR	RL		CR	RL
% outside [0,1]	0.228			0.214			0.414			0.159			0.214		

Standard errors clustered at village level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Instrumental variables estimates of the effects of to be a returnee in changes of attitudes. The instruments are *Right to sell land* (RL), a variable taking value one if the respondent declare to have the right to sell their land, and *Conditional land right* (CR), a variable taking value one if the right to sell the land is conditional to the approval of a third party.

All regressions include village fixed effects and the set of controls X_{hv} described in Table 2 as well as the variables *Cash crop*, *Livestock at home*, *Death by disease*, and *Support by NGO*.

Table 14: Instrumental variable estimation of attitudes: Elements of the *Hand washing* index

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
		After toilet			Before cooking			After eating			Before eating			When dirty	
VARIABLES	OLS	IV		OLS	IV		OLS	IV		OLS	IV		OLS	IV	
Returnee	0.365***	1.223***	2.410***	0.345***	1.035***	2.377***	0.277***	1.199***	2.165***	0.396***	1.264***	2.000***	0.238***	0.385***	0.031
	(0.034)	(0.123)	(0.398)	(0.050)	(0.124)	(0.486)	(0.074)	(0.171)	(0.432)	(0.072)	(0.180)	(0.404)	(0.028)	(0.071)	(0.152)
Observations	290	290	290	290	290	290	290	290	290	290	290	290	290	290	290
Mean value		0.311			0.486			0.403			0.286			0.852	
Controls	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL	ALL
Instrument		CR	RL		CR	RL		CR	RL		CR	RL		CR	RL
% outside [0,1]	0.145			0.224			0.138			0.186			0.345		

Standard errors clustered at village level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.
Instrumental variables estimates of the effects of to be a returnee in changes of attitudes. The instruments are *Right to sell land* (RL), a variable taking value one if the respondent declare to have the right to sell their land, and *Conditional land right* (CR), a variable taking value one if the right to sell the land is conditional to the approval of a third party.
All regressions include village fixed effects and the set of controls X_{hv} described in Table 2 as well as the variables *Cash crop*, *Livestock at home*, *Death by disease*, and *Support by NGO*.

A Appendix: Plausible exogeneity of the instruments.

The purpose of this section is to assess the robustness of the results presented in Section 5.2, where the instrumental variable (IV) estimates of the coefficient associated to the returnee status were described, considering a different sanitary measures as the dependent variable. In particular, we use the methods proposed by Conley et al. (2012) to perform inference in the IV estimates while relaxing the exclusion restriction, therefore allowing for the instrument (rights over land) to be correlated to a certain degree with the adoption of sanitary measures.

The IV estimates described in Section 5.2 is based on the following simultaneous equation model:

$$returnee_{hv} = \alpha_v + X'_{hv}\gamma + Z_{hv}\lambda + u_{hv}, \tag{1'}$$

$$y_{hv} = \alpha_v + \beta returnee_{hv} + X'_{hv}\theta + Z_{hv}\eta + e_{hv}, \tag{2'}$$

where the treatment parameter of interest is β and Z is one of the instrumental variables, either *Right to sell land* (RL) or *Conditional land right* (CR). In our estimations, we have assumed the usual exclusion restriction that $\eta \equiv 0$. In what follows we explore how violations of this assumption affect the inference about β.

We use two of the methods proposed by Conley et al. (2012) for our inference analysis, namely union of two-stages least squares (2SLS) confidence intervals and local-to-zero approximation. In the first case, assumptions about the support of η must be made. We take the conservative assumption that $\eta \in [-2\delta, +2\delta]$ (if only positive priors are assumed the confidence intervals would be narrower). In the case of the second method, the prior distribution of η is required, and we assume η prior of $N(0, \delta^2)$.

In Table A.1 we show the threshold values of δ at which the lower bound of the 95% confidence interval of β crosses zero. It can be seen that for most of the sanitary measures variables, the estimated positive value of β holds even when the exclusion restriction is violated to a certain degree. Let's take the case of the *Hand Washing* index. When CR is used as instrument, only if $\eta \in [-0.4, 0.4]$ the positive value of β is not statistically significant when the confident interval of the union of 2SLS method are considered. As a way of comparison, if CR is included in a OLS estimation of equation 2, using the same set of control variables described in Section 5.2, the obtained value of η is 0.25. The confidence intervals for *Hand Washing* using the two different methods are plotted in figure A.1.

In the case of some of the individual components of the sanitary indexes, the plausible exogeneity of the instrument is even more clear. For instance, in the case of *Mosquito net*, the lower bound of the confidence interval crosses zero only if $\delta = 0.3$, and therefore a causal interpretation of β's positive sign is still possible even if $\eta \in [-0.6, 0.6]$, as can be seen in figure A.2.

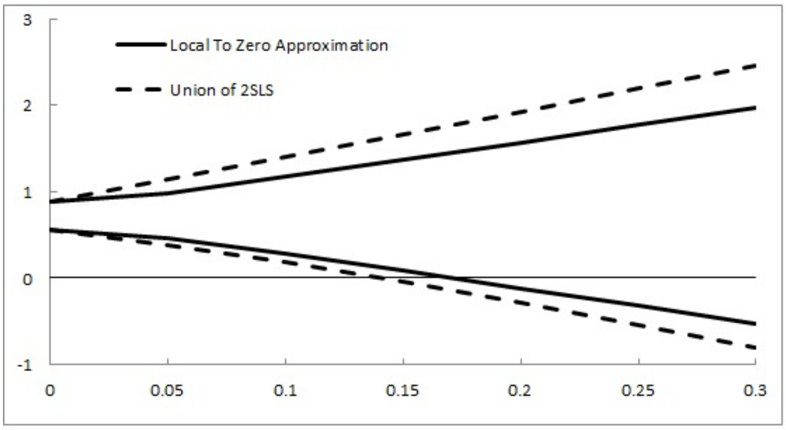
Table A.1: Thresholds values of δ at which the 95% confidence interval of β is less than zero.

Variable	Instrument: CR		Instrument: RL	
	Local to zero	Union of 2SLS	Local-to-zero	Union of 2SLS
Disease prevention index	0.15	0.1	0.1	0.15
Hand washing index	0.2	0.15	0.15	0.25
Keep clean	0.1	0.05	0	0
Use safe water	0.25	0.25	0.3	0.4
Health advise	0	0	0.05	0.05
Mosquito net	0.3	0.25	0.2	0.25
Personal hygiene	0.05	0.05	0.1	0.1
Hand washing: After toilet	0.3	0.25	0.3	0.45
Hand washing: Before cooking	0.25	0.2	0.3	0.45
Hand washing: After eating	0.3	0.25	0.3	0.4
Hand washing: Before eating	0.3	0.25	0.25	0.35
Hand washing: When dirty	0.1	0.1	0	0

The table presents values of δ at which the 95% confidence interval of β is less than zero. In the case of union of 2SLS confidence intervals δ is the support of η (equation 1), where $\eta \in [-2\delta, +2\delta]$ is assumed. For the local-to-zero approximation method, we assume η prior of $N(0, \delta^2)$.

The instruments are *Right to sell land* (RL), a variable taking value one if the respondent declare to have the right to sell their land, and *Conditional land right* (CR), a variable taking value one if the right to sell the land is conditional to the approval of a third party.

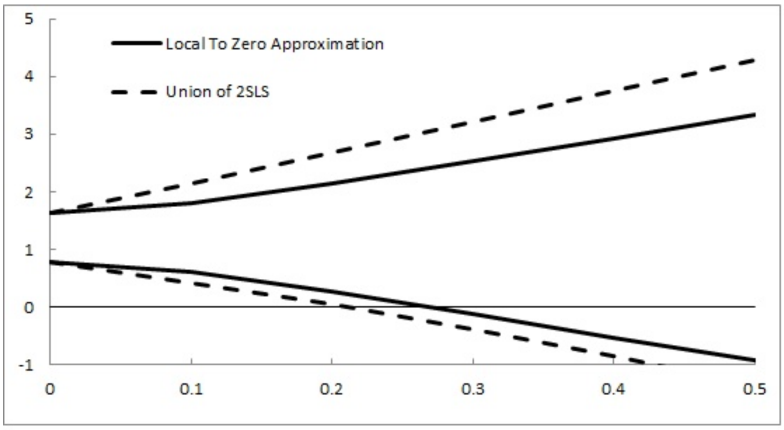
Figure A.1: Plausible exogeneity: 95% interval estimates for Hand Washing index using CR as instrument.



The horizontal axis are values of δ and the vertical axis values for β. The dotted line is for the 95% confidence interval using the union of 2SLS confidence intervals method and the solid line using local-to-zero approximation (Conley et al., 2012).

The instruments is *Conditional land right* (CR), a variable taking value one if the right to sell the land is conditional to the approval of a third party.

Figure A.2: Plausible exogeneity: 95% interval estimates for *Mosquito net* using CR as instrument.



The horizontal axis are values of δ and the vertical axis values for β. The dotted line is for the 95% confidence interval using the union of 2SLS confidence intervals method and the solid line using local-to-zero approximation (Conley et al., 2012).

The instruments is *Conditional land right* (CR), a variable taking value one if the right to sell the land is conditional to the approval of a third party.