Social policy in the face of climate change: cash transfers as safety nets

La política social, ante la amenaza del cambio climático: las transferencias de efectivo como redes de seguridad

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Abstract

This study explores the effectiveness of conventional social policy instruments as safety nets in the face of the growing threat of climate change in developing countries. We evaluate the Hunger Safety Net Program (HSNP), a cash transfer implemented by the Kenyan government between 2009 and 2012, on its effect against poverty incidence and gap, as well as on social mobility, restricting the sample to households that suffered from the 2008 drought (N=1563). With propensity score matching, we estimate the average effect of the policy (ATET) to mitigate the impacts generated by the disaster. The paper does not find evidence that the program alleviated drought impacts in the short term and points to the need to explore alternative policy designs that take into account local communities' coping strategies, economic structure, and informal support networks.

Keywords: social policy, climate change, inequality, safety nets, environmental justice.

Resumen

Este estudio explora la eficacia de los instrumentos de política social convencional como redes de seguridad ante la creciente amenaza del cambio climático. Se evalúa el HSNP, una transferencia de efectivo implementada por el gobierno de Kenia entre 2009 y 2012, en su efecto contra la incidencia y la brecha de la pobreza, así como en la movilidad social, restringiendo la muestra a los hogares que sufrieron de la sequía de 2008 (N=1176). Con pareo mediante puntuación de propensión, se estima del efecto medio de la política (ATET) para mitigar los impactos del shock medioambiental. El trabajo no encuentra pruebas de que el programa aliviara los impactos provocados por la sequía a corto plazo y apunta a la necesidad de explorar vías alternativas que tengan en cuenta las estrategias de adaptación de las comunidades locales, su estructura económica, y las redes de apoyo informal.

Palabras clave: política social, cambio climático, desigualdad, redes de seguridad, justicia ambiental.

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1. Introduction

The social dimension of climate change is increasingly recognized as one of the main challenges for the present century, and its relevance has reached social science work such as new social risks research (Adger et al., 2013). This has led to the rise in the number studies on disaster-risk management, with engagement from the academic sector, and IGOs -which contribute with handbooks of good practices for developing countries (Arnold, 2006) – among other non-academic actors. As climate change increases the probability of extreme weather phenomena (Mal et al., 2018), efforts should be made in understanding how their social impact distributes: which social strata are the most vulnerable, which measures are effective in preventing damage, how are direct and indirect costs distributed, how these impacts vary by event type… Even if Social Risk Management (SRM) goes beyond social policy and involves macroeconomic and governance measures (Holzmann & Jorgensen, 2000). this paper focuses on social policy. It has been extensively written about the new challenges of the welfare state, and among those, climate change keeps a central position. Literature on the topic is growing a fast pace, as research lines now cover how the welfare state would be in a zero-growth or circular economy, given its traditional historic linkage to economic growth (D'Alisa & Kallis, 2020); the efficacy of social policy on alleviating poverty in vulnerable areas and countries (Burchi, Scarlato & d'Agostino, 2018), and 'eco-social policies' (i.e. ex-ante policies that reduce vulnerability while working towards the goal of a sustainable economy, reducing risks and seeking a 'fair transition', see Koch, 2018).

A policy evaluation of a cash transfer policy has been done by quasi-experimental methods, with the intent of contributing to this latter debate, by testing and measuring how successful social policy is in minimizing poverty from a natural disaster. The policy selected has been the Hunger Safety Net Program (HSNP) from the Kenyan government. Its random allocation of the treatment, and its data collection design -provided by the Evaluation Survey, hosted in the World Bank DataBank-, engineered to ease ex-post evaluation, make this policy ideal for this aim (Mertens et al., 2013).

Previous research on the subject has considered the use of insurance programs (Janzen & Carter, 2013; Karlan et al., 2017) and their problems of coverage. On the other hand, cash transfers have been widely studied as their popularity as safety nets increase in

Sub-Saharan Africa (Burchi, Scarlato & d'Agostino, 2018). Positive effects on poverty, nutritional status, consumption and labour intensity in households have been found (Handa et al., 2013), but these impacts are conditional on policy design and state capacity indicators (Pelham, Clay & Braunholz, 2011). Certain studies have addressed recovery after a natural disaster happens, where the event is operationalized as the 'treatment' (Heger & Neumayer, 2019). However, none of these studies have considered in-depth the impact of CTs on reducing stricken areas.

This research departs from a different angle than the evaluation of reference . The analysis is still performed at a household level, but the sample has been narrowed down to those households that suffered from droughts in 2008, a year before the policy came into existence. With 1,563 households, distributed across 4 Northern Kenyan regions (Mandera, Marsabit, Turkana, and Wajir; known as 'Arid or Semi-Arid Lands'), three difference-in-difference analysis for 2009-2011 are performed in order to shed light on the issue, comparing households that suffered the droughts and received the quantity with those that did not even if they suffered the drought as well. Despite randomness of treatment allocation, households were paired by relevant variables for the analysis, using propensity score matching (PSM). This decision was made as random allocation of treatment followed a 2-phased design: random sub-locations were drawn by lot, and within those sub-locations, treated households were chosen by the community, to target those most in need. Therefore, PSM ensures that the comparison is done between observations similar in relevant characteristics. The way it pairs observations consists of a logistic regression, which estimates the probability of receiving the treatment as a funciton of relevant covariates. Based on this probability, comparison is performed among matched observations instead of with the general population.

The models are performed to quantify variation in households being below the national poverty line, to capture the variation in the poverty gap for those that do not rise above the threshold, and to analyse quintile mobility (in national thresholds), estimating the difference in the mean effects for treated and control units. The vulnerability of households to droughts, the existence of informal networks of support that can act in difficult times, and other household characteristics are the covariates used for matching. Following previous

literature and the theoretical argument constructed, being a beneficiary of the policy should 1) reduce incidence of poverty, 2) reduce the poverty gap and 3) improve inter-quintile mobility; significantly more than those of the control group.

Results retrieved by the statistical analysis do not support the hypothesis. Taking part of the treatment groups does not imply a lower risk of falling into poverty, nor reduces the poverty gap for those already in it. Moreover, households treated did not achieve greater upper inter-quintile mobility in comparison to those in the control group; when considering national income distribution. An exception was found for the bottom quintile, in which treated units achieved a significantly higher upper mobility than the control ones. Posterior analysis deepens into coping mechanisms households used after the droughts to infer why theoretical mechanisms pointed out by previous studies didn't work out: being a beneficiary of the policy under the context of a drought does not prevent households from selling their livestock nor reducing their nutritional intake, which are the key drivers of improvement signaled by literature on the topic.

2. Literature Review

2.1 The impact of external shocks on poverty

Natural disasters have been long documented to be a direct threat to people's lives, especially in low income countries, where their occurrence victimizes the people through mortality and asset destruction, and also forces the adoption of coping strategies that hampers long-term sustainability of the household, such as selling livestock or other productive assets (Carter, 1997; Jensen et al., 2017). At the same time, many private insurance programs remain unattainable to poor households in those countries, due to high premiums for high risk exposure (Pelham, Clay & Braunholz, 2011).

Nonetheless, a minority of studies that suggest natural disasters may produce a) an end to long-lasting conflict over social change, such as armed conflicts (Arnold, 2006) or b) episodes of 'creative destruction' that result in higher or convergent economic growth compared to non-affected areas (Benson & Clay, 1998; Strobl, 2011). However, later studies have found this to apply only to high-developed countries, with insured losses and moderate destructive outcomes (Loayza et al., 2012; Cavallo & Noy, 2011). Moreover, these accounts

would not be applicable to droughts, as phenomena that entail significant damage to households but do not produce physical destruction (Arnold, 2006).

Therefore, impacts strike more intensely in households that are more vulnerable to climate change-related extreme phenomena. In a study of social determinants of vulnerability to damage caused by drought, Benzie et al. (2011) included, among others: health status, institutional quality and access to political power, household size, income, and adaptive capacity in alternative forms of income. When these circumstances are met, shocks produce falls in household income (Jensen et al., 2017), which can make farmers in developing countries fall into deeper poverty if there is a lack of effective and long-term oriented coping strategies (Barrett and Constas, 2014; Dorward, 2009)

'Negative' strategies include the reduction of nutritional intake or de-scholarization of children (Holzmann & Jorgensen, 2000). Moreover, livestock accumulation has shown efficacy as an example of 'precautionary saving' in the event of droughts, as it maintains productive capital that allows for later recuperation (Jensen et al., 2017). As droughts imply a rise of herd mortality (Holtzmann & Kulibaba, 1995) and a consequent income deficit (Coppock & Scarnecchia, 1995), households engage in livestock sells in highly volatile and isolated markets (Barrett et al., 2003).

2.2 Ex-post policy instruments of Disaster Risk Management

Social Risk Management consists of a set of ex-ante and ex-post measures, that aim at reducing vulnerability (in terms of exposure to risks) and at reducing the impacts of an external shock, respectively (Pelham, Clay, & Braunholz, 2011). As the latter is the main focus of this study, a review of the main policy instruments is provided in this section.

The most frequent forms of providing ex-post measures are insurance programs and cash transfers. Insurance has been studied in South Asia and Sub-Saharan countries, and has been associated with higher investments in agriculture, higher production, lesser reduction of nutritional intake, and a reduction of livestock sells, at the same time that is said to reach the below-the-poverty-line population (Janzen & Carter, 2018; Karlan et al., 2012). Problems have been identified with coverage, as somes losses not considered in the contract may be large enough to push households further into indebtedness (Hochrainer-Stigler, Sharma &

Mechler, 2012), so that it is considered necessary their complementation with subsidies and pùblic technical assistance (Linnerooth-Bayer et al., 2011).

The other form, which will be analyzed in this study, are cash transfers (CT). CTs are increasingly used by developing countries as a form of social protection (Burchi, Scarlato & d'Agostino, 2018) as well as a way of tackling poverty and vulnerability to environmental catastrophes (Conway & Norton., 2000). These policies, whose outcomes are said to appear in the medium-to-long run (FAO, 2015), would imply a regular inflow of income to households, which would prevent negative coping strategies and diminish the need for emergency in-kind aid (Garcia & Moore, 2012). The design of cash transfer programs may also vary. Whereas relief programs have been usually put into place in order to alleviate immediate consequences of disasters, the emerging approach of safety nets has a longer-term goal, being focused on further recovery and reconstruction (Pelham, Clay & Braunholz, 2011). Therefore, these programs should be 'actively pro-poor' as the poorest and those at the above limit of the poverty threshold are the most hit by natural disasters (Peppiatt, Mitchell and Holzmann, 2001).

In addition to this, existing literature has identified certain requirements for safety nets to be effective: functioning monitoring and evaluation systems, together with state capacity to mobilize resources and activate policies in short notice are necessary for their success (Pelham, Clay & Braunholz, 2011); as it is correctly identifying the poorest population by avoiding the 'inclusion' and 'exclusion' errors (covering non-poor with high dependency ratio and poor with low dependency; McPherson et al., 2011) if the dependency criterion (requiring a minimum of members of the household who are disabled or non-working age) is considered -as it was in the policy of interest, the HSNP-. Other factors include payments, as well as correctly calculating the poverty threshold to avoid de-incentivization of work and conflicts due to allocation of payments, but also to allow an escape from poverty (Handa et al, 2012), and ensuring long-lasting and inter-party political support for the measures (Devereux & White, 2010). This, mediated by contextual factors such as infrastructure available, the type of natural disaster, or the demographics of the area, should determine the design of the safety net (see Pelham, Clay & Braunholz, 2011 for an extensive review of contextual factors). Considering this, CT have shown ability to tackle

short term deprivations, reduce negative coping tactics, and minimize the impact on nutritional intake or consumption that disasters entail (Burchi, Scarlato & d'Agostino, 2018), while creating long-term improvements in generational transmission of poverty as the cash inflow is used for keeping children in education and taking care of their health (Devereux, 2016; see also Fiszbein & Schady, 2009 for a review of 25 CT programs, coherent with these results).

Particularly in Sub Saharian Countries, the use of CTs to counter food insecurity has been commonplace. In Ghana, the Livelihood Empowerment Against Poverty Programme (LEAP) has been reported to cause better quality meals, lesser illness incidence in children, and increased consumption and labor intensity in the household (Handa et al., 2013; Agbaam & Dinbabo, 2014; Tiwari et al., 2016). In Zambia, the Child Grant Programme achieved similar outcomes, while managed to increase participants' investment in agriculture, therefore increasing production, and had a significant effect in reducing the poverty gap (American Institutes for Research, 2013; Bonilla et al., 2017). Another remarkable example is Ethiopia, which put in place the Productive Safety Net Program. The PSNP supposed a case of good practices regarding CTs working more effectively in delivery and regularity than food aid (Pelham, Clay & Braunholz, 2011, see also Berhane et al., 2013 for an in-depth evaluation of the program), whereas in Somalia CTs given during civil conflict were diverted to a lesser extent than in-kind aid (Devereux & De Jere, 2008). The growing list of cash programmes lastly includes Malawi, Tanzania, Mozambique, and Kenya. In each of these countries evaluations have shown positive effects on either poverty or household expenditure (Veras Soare & Teixeira, 2010; Evans et al., 2014; Abdoulayi et al., 2016). In a systematic review of this literature, Burchi, Scarlato & d'Agostino (2018) do not find any negative effect of the programs in indicators related to their objectives.

What may create intricacies in safety nets, however, is the urgency in mobilizing resources. This can complexify the correct allocation of funds, creating opportunities for patronage or bureaucratic considerations instead of targeting the most vulnerable –apart from not considering the priorities of the victims in the design of reconstruction programs (Arnold, 2006). To this, it adds up the usual complexity of policy designs in reflecting social behavior, in order to identify suitable mechanisms for intervention on human behavior (Goldspink,

2000). In the end, even if mobilization of resources seems to be functional according to previous studies, state capacity and quality of institutions that concern tax collection lacks the scale necessary for providing extensive programs of this type, which limits them to short-term and targeted at extreme vulnerability, and hampers political support (Garcia & Moore, 2002), dimensions all of which have been considered key to success of these policies.

Therefore, it has been seen that cash transfers as safety nets for environmental disasters are helpful in fighting the impacts of the shock. Depending on their design, they may be able to reduce poverty and hunger (the latter, as long as they come together with nutritional information to households) when hard conditionalities are not in place and there are supply side interventions to absorb the growth in purchasing power (Burchi, Scarlato & d'Agostino, 2018, see Pelham, Clay & Braunholz, 2011 for the impacts of cash transfers compared to that of vouchers or in-kind aid in local markets).

2.3 The Hunger Safety Net Program

The Hunger Safety Net is a program that targets poverty, malnutrition and food insecurity in Kenya through the means of unconditional cash transfers delivered to households every two months. The policy was implemented in the territories of Marsabit, Mandera, Turkana, and Wajir; which are known as Arid and Semi-Arid Lands (ASALs) in the North of the country. The policy was designed in a way that facilitated its posterior evaluation, following the rationale of a natural experiment. Households, before their inclusion as treatments or controls, were selected from 48 sub-locations, randomly chosen. Following the randomization of the sublocations, the households were selected by Community-Based Targeting (communities in each sublocation chose the households which they thought to be most in need of the transfer). The transfer was also compatible with other social pensions (such as retirement) and households had to exceed a dependency ratio threshold (percentage of members under 18, over 55, disabled or chronically ill) in order to be eligible. From there, households were divided in a 2x2 matrix as they were control or treatment households in control or treatment areas (Mertens et al., 2013).

In subsequent evaluations, the program seemed to achieve certain improvements in its key areas. When considering health status, treatment recipients saw reduced possibilities of their children falling under the MUAC (Mid-Upper Arm Circumference) threshold for

malnutrition (Jensen et al., 2017). The first transfers received by households were used mainly in food and debt payment, but in later years Mertens et al. (2013) have found that households increased expenditures in clothing, education, and savings; which is attributed to the regularity of payments.

HSNP evaluations regarding poverty have found a greater impact in the lower bottom of the income distribution, which yielded the bigger share of the reduction in poverty caused by the program, helping receivers exit extreme poverty situations and alleviating the impact from external shocks such as droughts. Cash provided by the program, thus, would offer alternatives when coping with natural disasters, as would allow households to adopt strategies other than selling livestock due to the decrease in income, as well as diminishing their need for taking up credits and therefore going deeper into debt (Mertens et al., 2013). There is still ongoing debate on whether HSNP increases options for mobility, as lacking the opportunity to move is related across the region with higher poverty. In this matter, there is contradictory evidence, with Hurrell & Sabates-Wheeler (2013) finding no significant difference in treatment and control groups, and Jensen et al. (2017) arguing for positive results in their study of the Marsabit territory.

3. Theoretical framework

Beyond repairing immediate damage, what connects social policy and natural disasters goes deeper. Social policy in its modern form, in the shape of the welfare state, acts as a patch over distortions in social well-being generated by economic activity (Gough, 2013). One of those distortions is increasingly accounted for by environmental reasons. As argued by Garnaut (2008), this becomes a problem of enormous complexity: as economic activity develops, energy consumption implies the emission of greenhouse gas, whose cumulative effects ends up overpowering that of carbon sinks, which help absorbing atmosphere CO_2. The increased concentration of these gases implies a changing climate that translates, among other effects, into disasters (Trenberth, Fasullo, & Shepherd, 2015). This elicits altered distributional outcomes which imply redistributional demands for social policy (which would be the instrument at the disposition of the modern state). Social policy, therefore, acts as a tool to manage vulnerability and social risks created by climate circumstances, preventing impacts and assisting once they are produced so basic needs are provided, as put by scholars

of Social Risk Management (Gough, 2013). These impacts, moreover, are not equally felt, as people at the bottom of income distribution are most exposed to them, and as argued in the previous section, poverty can be deepened by the occurrence of a disaster if no relief is in place (Holzmann & Jorgensen, 2000).

The way social policy mediates environmental hazards is both through ex-ante and ex-post approaches. Ex-ante measures are based on a preventive approach, thus the focus is put on households above the poverty threshold, in order not to let them fall into poverty when the shock arrives (Burchi, Scarlato, & d'Agostino, 2018). The range of measures included would be the improvement in state capacity to put shortly in place corrective safety nets, together with regulatory action tackling environmental impacts of economic activity, in order to act on the causes of natural disasters, and the diversification of the economy (as well as creating reserves for moments of crisis, Holzmann & Jorgensen, 2000). Ex-post measures, on the other hand, seek relief for impacts caused by disasters, working as a safety net through social assistance (BRR – Government of Indonesia, 2005). These measures have been integrated by the World Bank in its efforts to tackle poverty and social exclusion (Arnold, 2006).

Therefore, this paper aims at testing empirically the effectiveness by which social policy, in the form of CTs, can alleviate the impact from a climate-change-related extreme event. Literature reviewed considered either the broad effect of CTs in Sub-Saharan countries (Davis et al., 2016) or the effect on economic growth of a natural disaster (Heger, 2019); either provided policy recommendations for effective implementation of safety nets (Pelham, Clay, & Braunholz, 2011). As this also applies when considering the Hunger Safety Net Program (Mertens et al., 2013; Song & Imai, 2019), it is deemed necessary to evaluate how CTs behave in a context of a natural disaster, narrowing the analysis to affected areas. Widespread research on vulnerability to shocks has revealed how the occurrence of extreme events translates into an increase in poverty. As their frequency rises as climate change increases its magnitude (IPCC, 2014), assessing the role of safety nets is more relevant than ever.

As seen in *Figure 1*, the social impact of natural disasters would be determined by the type of the event and its geographical expansion. Different disasters entail a different
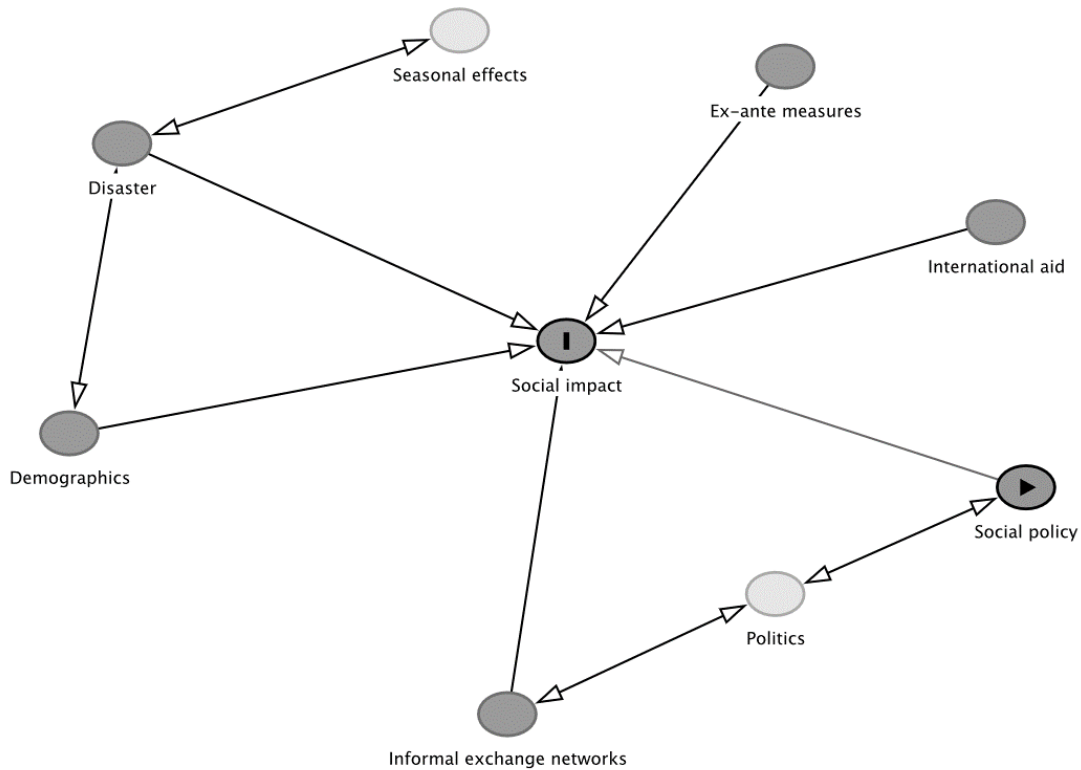
Figure 1. Factors conditioning social impact of natural disasters.

distribution of affected individuals, in terms of direct (human losses) or indirect (economic and asset destruction) damage. Seasonal effects would also play a role, as it may pose families at a more vulnerable situation according to the experiencing of short or long rains. Droughts, for example, could prove more challenging if they fall within the short rains season, as they make a per se difficult and scarce situation into an extreme event. In the social side, demographics, which has been cited as a factor for vulnerability when considering age, health status (Benzie, 2014), adding the labor market structure -considering dependency on agricultural labor. On the other hand, ex-ante social risk management measures can reduce exposure by improving infrastructure, encouraging saving, or diversifying the economy. The interaction of these factors is thought to increase poverty in the absence of a safety net policy design.

However, one should look not only at exogenous factors but as well as the policy itself, and meso-level social factors. The efficacy of the cash transfer program would depend on its design (including the conditionality and whether there is a dependence criterion or not), which is to some extent determined by resource availability (necessary to consider options in targeting, quantity of the transfer, and data collection for further evaluation). State capacity would alter the ability of mobilizing resources, together with political factors (ie. tensions or civil conflict not impeding the deployment of the army for a more effective and secure delivery of the transfer, as well as patronage and corruption or international support that provide additional funds). Configuration of informal exchange networks, that may provide support outside of institutional initiatives, and social stratification (see Arnold, 2006 for the unequal distribution of positive effects of cash transfers depending on household gender inequality). This process would affect the outcomes of the policy, which would manifest in a reduction in poverty compared to control areas.
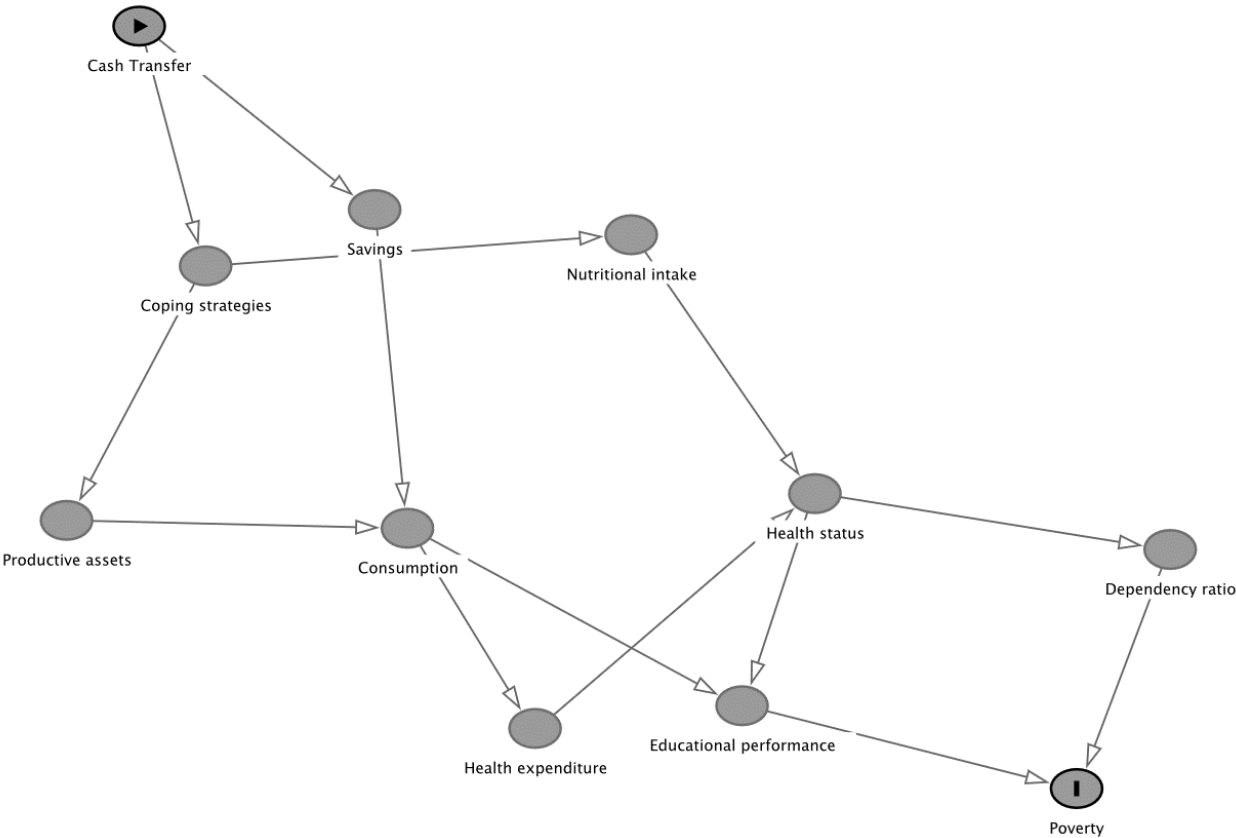

Figure 2. Causal link between CTs and poverty.

Figure 2 shows how CTs reduce poverty by providing additional resources that increase saving and provide alternatives for negative coping strategies (selling of livestock to counter the loss of income and pre-empt its death). Having more disposable income (which would be intensified by avoiding the loss of productive assets such as livestock) has been shown to increase expenditure in both education and health, which translates into higher household and child health. Child health has been for long associated with higher educational performance (Dercon & Hoddinott, 2004). This, together with better household health (which is considered to imply a higher presence of working adults in the household as well as higher productivity), would reduce the incidence of poverty in both the short and long run.

Therefore, different hypotheses are derived from the aforementioned mechanisms in order to capture the various dimension of the impact of the HSNP on poverty and social mobility, to test for differences between the treatment and control group:

H1.Recipients of HSNP will see a reduced probability of being in poverty in the follow-up survey than the control group.

H2.For the population in poverty in the follow-up survey,receiving the HSNP will mean a reduced poverty gap than th one present in the control group

H3.Households receiving the HSNP will experience higher inter-quintile mobility than the control group.

The hypotheses will be tested computing the effect of the HSNP on reducing poverty in households affected by droughts. Data from the evaluation by Mertens et al. (2013) at the household and community levels, gathered by survey, is used for the design of a quasi-experimental method, as specified in the next section.

4. Data & Method

4.1 Source

The study presents an analysis of 1,563 households in the regions of Mandera, Marsabit, Turkana, and Wajir: the known as 'Arid and Semi-Arid Lands' of Northern Kenya. Data was collected in surveys as part of the University of Oxford's evaluation of the HSNP, which began in 2009 and ended in 2016. I use cross-sectional data gathering information for

the baseline and first follow up surveys. Baseline information is included as the covariates predicting the inclusion of households in the treatment or control groups to perform matching, whereas 2011 information concerns the outcomes of interest.

The evaluation by Mertens et al., (2013) described the sampling process undertaken by the policy. The HSNP randomly sampled both the treatment and the control groups, by draw. Random sublocations were selected from each region and marked as either treated or control. In each treated sublocation, the policy introduced a mechanism of Community-Based Targeting, so that the community itself could decide who needed it the most. Households who were selected as the treatment group received the policy after the baseline interviews were conducted, whereas for the control group, the reception of the quantity was delayed for three months. The aid was unconditional once received, but for households to be eligible, they had to fulfil a dependency criterion: they had to reach a certain proportion of disabled, chronically ill, and people over age 54 or under 18, to be considered for the policy.

As this paper focuses on households affected by a natural disaster, only those who suffered from droughts will be selected for the study, which narrows the original sample of the previous HSNP evaluations. Moreover, HSNP also included a bonus for households that suffered the droughts, which doubled the quantity, so narrowing the population of study to those affected would supress bias from receiving different quantities. To consider whether a household was affected by drought or not, Mertens et al. (2013) method is replicated: those who replied 'Bad' or 'Very bad' to the survey question 'How have been this year's short rains' were included in the study.

	Treated	Control	Total
Main	999	564	1563
Poverty gap	852	401	1253

Table 1. Number of observations, by group and analysis.

4.2 Dependent variables

When considering the measures of poverty, two have been selected. On the one hand, for H1 it will be considered whether a household falls under the poverty threshold, or on the contrary, it is above it. The mean poverty threshold, used in the Mertens et al. (2013) evaluation, was a monthly expenditure of 2,317.6KSH per household. This measure intends to measure the incidence of poverty in the sample. However, CT programs have been found not only to reduce incidence but also the intensity of poverty. In order to engage with past research on this issue, H2 will be based on the poverty gap. Poverty gap is defined as the distance between a household income and the poverty threshold (World Bank, 2021). Using the national threshold, poverty gap was computed for those households that found themselves in the poverty region, which reduced observations from 1,563 to 1,253.

However, poverty has been argued to have a 'relative' side as well. For absolute conceptualizations of poverty, national thresholds of poverty may consider only extreme cases, giving rise to cases of false negatives (see Ravallion, 2020 for a detailed review of poverty measures). Moreover, relative poverty is argued to account for the social side of poverty: the so-called 'cost of inclusion' (Marí-Klose, 2019). To capture the effects of the policy in relative terms, a measure of interquintile mobility was included, as the difference between the income quintile a household occupied in 2009, and the one of 2011. In this case, quintile position is reversely coded so that the higher the quintile, the better off a household is. A graphical representation of the mobility of households affected by the drought can be seen in *Figure 3*.
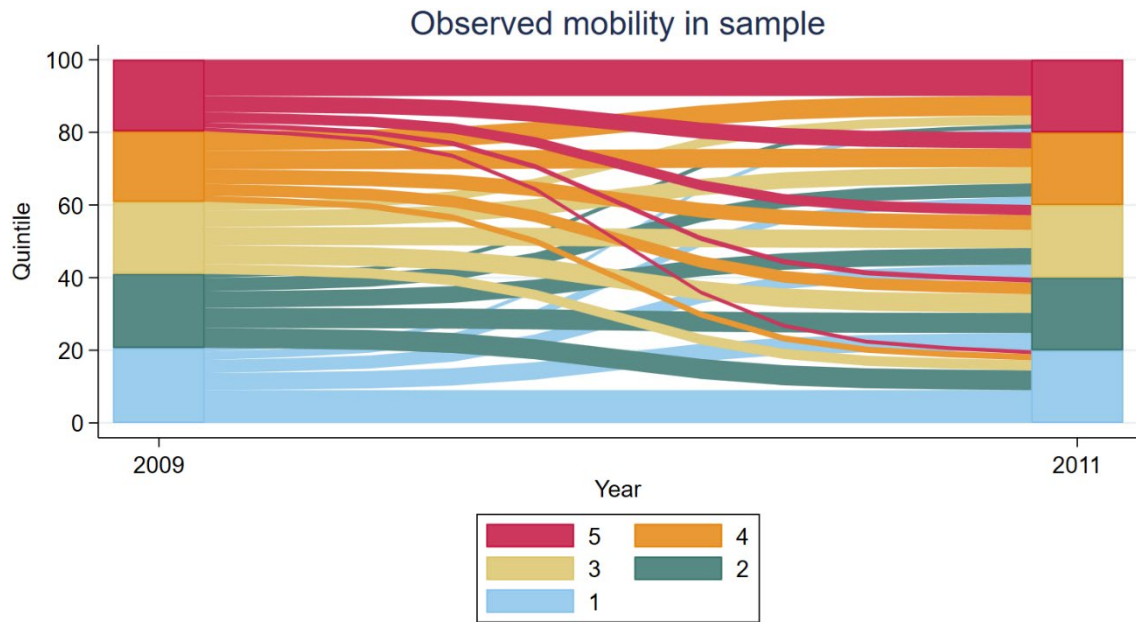
Figure 3. Observed inter-quintile mobility in sample.

Source: own elaboration using Hamjediers, 2022

4.3 Matching variables

Even if treatment allocation is considered random, some covariates have been included in the models to account for potential selection bias resulting from the Community-Based Targeting phase, since communities could have been more prone to give the aid to those worse off, and these criteria could not be homogeneous across communities. Consequently, the following measures were included in the matching procedure: whether the household was above or below the poverty threshold and their quintile position in 2009, household size, other measurements of material deprivation (days without eating during short rains, whether the household has a private toilet, the material of the walls), the presence of an supporter external to the household, the number of years dwelling in that location, and the belonging to a religious minority with Muslim as the reference category (these three variables are thought to affect the support network of a household). Covariates also account for the vulnerability of households to drought-related losses, which could condition coping strategies: if households kept livestock ahead of the drought, coping strategies such as selling it, or keeping it as a productive asset would be enabled, which is not for households that lack livestock. Similarly, the money a household may had borrowed or whether they had any savings before the extreme event are considered as alternative resources to the CT that can

be used for getting through the impact of the drought. A more detailed descriptive account of the variables can be found in *Table 5,* in Annex.

4.4 Model

 In order to compute the effect of the treatment on the different measures of poverty, analysis using propensity score matching (PSM) will be performed. In PSM, covariates work as predictors of the inclusion in a treatment (see *Table 3* in Annex). If the correct covariates are included, PSM solves issues of non-random treatment allocation, since then matches the observations with the most similar PSM. In this paper, I predict treatment group with a logit model, given the binary treatment variable and the skewness of the treatment distribution towards 1 (as logit regressions work better with skewed distributions than probit ones). Matching was done with the nearest-neighbor according to computed Mahalanobis distance. As a consequence of higher presence of treated units, matches were done with replacement, so units of the control group could be macthed twice with a counterpart in the treatment. Using comparisons among these paired households, the model computes the Average Treatment Effect on the Treated (ATT). The ATT consists of the difference between the mean effects in the outcome variable of belonging to the treatment.

PSM has been selected due to the absence of data waves. Having just one baseline and one post-treatment, the 'equal trends' assumption would be untestable, so a difference-in-difference model could be wrongly applied. In order to overcome this drawback, PSM has been selected as the method with the best fit. I argue that controlling for poverty, relative income position, material deprivation, measures of social integration, economic activity, and household size in the propensity score satisfactorily fulfills the unconfoundedness assumption, which states that the bias induced by relevant variables in the coefficients can be accounted for by conditioning on the propensity score (Imbens, 2004). Lastly, I include in *Figures 4 & 5* a visual test of the overlap assumption. Even if overlap is not perfect, all observations have counterparts in the other group with a similar propensity score, and this together with replacement should tackle the issue.

5. Results and discussion

In order to test the hypotheses, the Average Treatment on Treated (ATET) is computed, matching households according to their probability of being included on the HSNP by the aforementioned covariates. Results are displayed in Table 2.

	(1) Poverty	(2) Poverty gap	(3) Quintile mobility
ATET Beneficiary Status (1 v. 0)	0.0127	19.41	-0.0312
	(0.03)	(35.69)	(0.09)
Observations	1563	1253	1563

Table 2. Average Treatment Effect on Treated, by outcome of interest

Source: own elaboration

Standard errors in parentheses
$^{*} p < 0.10$, $^{**} p < 0.05$, $^{***} p < 0.01$

For the matched pairs, when considering the ATT, the model computes that receiving the treatment is associated with an increase of 0.012 in the proportion of households that fall into poverty compared to control units. However, this difference across pairs in the mean is not statistically significant. The model also yields insignificant results for the difference in the poverty gap and quintile mobility. The policy, therefore, would not be effective within the households affected by the drought. Whereas CTs had been previously tested to assert their resutls when dealing with poverty in areas of Sub-Saharan Africa, the study casts doubts on whether these general improvements can be generalized to more extreme settings where a natural disaser strikes.

The anlaysis, though, finds a significant effect at the 10% on interquintile mobility when sample is restricted to those at the bottom of the distribution (N_0: 112 N_1: 275, see *Table 4*, in Annex). Given the specification of the variable, this would mean that the treated units increased their quintile position in 0.25 units, when compared to their matched control counterparts. This result provides interesting insights as it speaks of the inability of the policy to tackle impacts in absolute poverty, but recognizes an effect in making those at the bottom

relatively better of than higher quintiles: the effect does not replicate when looking at poverty and poverty gap at the lowest quintile (*Table 3*, in Annex), nor for better placed households in the income distribution (*not reported*). Mertens et al. (2003) already argued for a more positive effect of the HSNP on the lowest part of the income distribution, which would be maintained under conditions of extreme drought as well.

However, overall results do not go in line with previous research performed on the HSNP. Most evaluations of this specific program found positive effects in the intensity and incidence of poverty. Therefore, a look is needed at what prevents the mechanisms identified in the literature from working in this situation.

Even if alternative explanations should be given a more systematic look, one of the keys to these different effect when restricting the sample to people affected by the droughts could be the coping mechanisms. Most studies agree that receiving the Cash Transfer would suppose an alternative resource to face hardship and would prevent households from selling their productive assets. However, if placed under special stress, such as a natural disaster, even doubling an already scarce quantity could not be enough to avoid this. Indeed, in a very tentative analysis, I ran a logistic regression of different coping strategies on the beneficiary status of the households. Detailed results are reported in *Table 6*, in Annex. Being a beneficiary of the policy did not have any significant effect on the probability that households engage in selling animals, reducing the number and size of meals, and skipping days without eating. Negative effects at the 10% were found for receiving help from family, buying food on credit, or eating wild food, whereas the coefficient was highly significant for selling other productive assets than animals.

Even if there are negative effects on some coping strategies, the key mechanisms identified up to now have been the nutritional intake and the livestock maintainance. These variables are crucial in keeping the productive capcity of households. The complementary analysis shows tentative evidence that suffering from a shock makes these behaviors equally likely among control and treated units. Even if the evaluation by Mertens et al. (2013) found that recipients used payments to clear their debts and buy food, which could be equally right for the restricted sample, it would not be enough in their case to escape the setbacks occasioned by the droughts despite the doubled quantity.

Lastly, social mobility may be one of the more uncertain debates concerning the study of the HSNP. Adding to previous studies reporting competing evidence (while no significative results are provided by Hurrell & Sabates-Wheeler, 2013; positive effects are reported by Jensen et al., 2017 for the region of Marsabit), my analysis shows upper mobility happening for the lowest strata. Given that there are no systematic differences in poverty and poverty gap in 2011 for those who formed the lowest quintile in 2009, it could be argued that this could be due to higher strata in 2009 being relatively worse off than them after the shock.

Lastly, it must be considered, however, how the policy defined of the treatment and control groups: control household did receive the policy, with a 3 month lag in comparison to the treatment one. This suggests that the real effect of the policy should be bigger than the reported in this paper. However, the lack of longitudinal pre-treatment data complicates the generation of other counter-factual methods that allow for the interpretation of trends or the construction of synthetic cohorts. Lack of data, thus, implies that the measured effect is that of receiving the policy three months before, which should induce caution in interpreting the results.

More research is needed addressing why the CT does not work in the context of a drought. On the institutional side, one could argue that the policy fails due to governance factors, such as Kenyan institutions being limited due to the outbreak of violence within the country, which, as argued, complicates possibilities for development of aid (as the ASAL territories of the country are used to conflict among communities [Rohwerder, 2015]). These forms of violence usually target cattle units, and are strongly related to competition for scarce resources such as water or pasture (Sharamo, 2014 p.3), which can be specially relevant when a drought puts households under water pressure. Moreover, strength of institutions is Kenya has been reported to recently suffer from the breach of peaceful coexistence between communities and from the loss of power of traditional political parties (Okumu, 2013 pp.1-5). This, consequently, also challenges the hypothesis that disasters may create positive spill overs such as the end of conflicts. Even if arguments were pointed at the lack of physical destruction that allows for more efficient rebuilding (Arnold, 2006), making it conditional to the type of the disaster, the accounts of conflict in Kenya provide evidence also on the side of events that intesnfiy resource competition among vulnerable communities.

Provided these results, hypotheses cannot be confirmed. The results do not provide support for them, but more studies should be performed which put the focus on CTs and social impacts specifically for disaster-hit households. This study diverges from previous research which appeared to find a fewer incidence and intenstiy of poverty for treated households. The finding that is consistent with other studies is that of bottom income percentiles having a greater impact than the general population. Additionally, policy design features must be accounted for. HSNP has been critiziced due to the high requirements put by the dependency criterion, which may exclude a relevant share of else eligible households; so evaluation of these impacts in other regional programs, such as the ones mentioned in earlier sections, may be useful to test whether comparable results are yielded by further studies. Similarly, the context of the HSNP makes it study hardly generazible, least to Western countries. Given concerns over 'ecological transition' and vulnerability in those societies as well, these studies may be performed for either disasters such as heat waves, floods, or hurricanes; as well as for cost distribution of climate change adaptation and mitigation policies.

7. Conclusions

Social Risk Managament looks at the tools societies have in order to navigagte impacts from natural disasters and other extreme events. The development of the climate change is bringing an increase in the ocurrence of extreme weather events, which may have a huge impact on societies. Provided that this trend is likely to continue, it si more necessary than ever that we not only dive into ways of mitigating and adapting to climate change, but to engage in social protection as a policy tool to protect those more exposed to these conditions from poverty and social exclusion.

With this aim, the paper reviews the Hunger Safety Net Program, and its impact on 1,563 households affected by droughts in 4 regions of Norther Kenya, known as the Arid and Semi-Arid Lands. As cash transfer programs grow in Sub-Saharan Africa, social science is increasingly engaging in policy evaluations that profit from the design of the policies, highly influenced by supranational agencies and approaching randomization of receivers and intensive data collection methods to possibilitate experimental evaluation of outcomes. Literature has found positive effects of these policies on savings, nutritional intake and health

status, and educational performance (Holzmann & Jorgensen, 2000), as well as on poverty (Handa et al., 2013). However, contextual factors mediate these impacts, so that social stratification structures as gender or patronage and corruption form informal networks of exchange and condition the deployment of state officials for distributing the aid (Pelham, Clay & Braunholz, 2011).

In order to assess the efficacy of the policy in reducing poverty after the droughts, a quasi experimental statistical analysis was performed. According to the hypotheses, the policy should 1) reduce the incidence of poverty, 2) recude the severity of poverty, and 3) foster upward mobility in the income distribution compared to those households that suffered the droughts but were part of the control group. HSNP was strcutured into a two-phase sampling strategy, where the first phase consisted of the randomization of sublocations, and the second made communities select those households that needed the most the aid (Community-Based Targeting). Since this was made at the community level, conditions of the poorest in each community might vary. Therefore, propensity score matching was introduced for the analysis so that the outcomes were compared among the most similar observations (nearest neighbor). After matching each treated observation with its control pair, the Average Treatment Effect on Treated was estimated, which failed to provide significant differences among groups. Greater income mobility was observed for those making up the lowest part of the distribution, which supported previous evaluations on better effects of the policy over that stratum (Mertens et al., 2013). The rest of results however, add up new insights into the HNSP and CT literature: cash transfers that operate correctly for the national population may not work for specific circumstances of pronounced distress, specially with climate shocks that affect communities' main ways of life.

Limitations of the study open new possibilites for further studies on the issue. Firstly, generalizability of the study may be restricted to Sub Saharan Africa. Even if the quasi experimental design may help drawing more reliable results, how poverty works and what it means in each region varies significantly (Marí-Klose, 2019). Risks brought by climate change are different as well, but they still are a global threat and similar evaluations should be done in a wide variety of contexts in order to assess how ready we are to face social impacts generated by them. Also, the analysis is costrained by data avilability. The selection

of the PSM as a method of estimating the ATET has been done due to the infeasibility of testing the equal trends assumption required for performing difference-in-difference. Having more waves of data, both pre and post treatment, would allow researchers to dig in the issue with a wider range of options to fit the data and aims of the study the best.

8. Acknowledgements

9. Bibliography

Abdoulayi, S., 2021. *Malawi Social Cash Transfer Programme: Endline impact evaluation report*. Chapel Hill: Carolina Population Center - University of North Carolina.

Agbaam, C. and M. Dinbabo. 2014. Social Grants and Poverty Reduction at the Household Level: Empirical Evidence from Ghana. *Journal of Social Sciences*, 39(3), pp.293-302.

American Institutes for Research, 2013. *Zambia's child grant program: 24-month impact report. Washington*. Washington, DC.

Arnold, M., 2016. The Globalization of Disaster. *Journal of International Affairs Editorial Board*, 59(2), pp.269-279.

Barrett, C. and M. Constas, 2014. Toward a Theory of Resilience for International Development Applications. *SSRN Electronic Journal*,.

Barrett, C., F. Chabari, D. Bailey, P. Little, and D. Coppock, 2003. Livestock Pricing in the Northern Kenyan Rangelands. *Journal of African Economies*,.

Benson, C. and E. Clay, 1998. Developing countries and the economic impacts of natural disasters. In: A. Kreimer and M. Arnold, ed., *Managing Disaster Risk in Emerging Economies*. pp.11-21.

Benzie, M., A. Harvey, K. Burningham, N. Hodgson, and A. Siddiqi. 2011. *Vulnerability to heatwaves and drought: case studies of adaptation to climate change in south-west England*. York: Joseph Rowntree Foundation.

Benzie, M., 2014. Social Justice and Adaptation in the UK. *Ecology and Society*, 19(1).

Berhane, G. et al., 2013. *Evaluation of Ethiopia's food security program: Documenting progress in the implementation of the Productive Safety Nets Programme and the Household Asset Building Programme*. ESSP II—EDRI Report. Washington, DC: International Food Policy Research Institute.

Bonilla, J., R. Zarzur, S. Handa, C. Nowlin, A. Peterman, H. Ring. and D. Seidenfeld, 2017. Cash for Women's Empowerment? A Mixed-Methods Evaluation of the Government of Zambia's Child Grant Program. *World Development*, 95, pp.55-72.

Burchi, F., M. Scarlato. and G. d'Agostino, 2018. Addressing Food Insecurity in Sub-Saharan Africa: The Role of Cash Transfers. *Poverty & Public Policy*, 10(4), pp.564-589.

Carter, M., 1997. Environment, Technology, and the Social Articulation of Risk in West African Agriculture. *Economic Development and Cultural Change*, 45(3), pp.557-590.

Cavallo, E. and I. Noy. 2011. Natural Disasters and the Economy — A Survey. *International Review of Environmental and Resource Economics*, 5(1), pp.63-102.

Conway, T. and A. Norton. 2000. *Social protection: new directions of donor agencies*. DFID-ODI Inter-Agency Seminar on Social Protection. Easthamstead Park.

Davis, B. et al., 2021. The Transfer Project, Cash Transfers, and Impact Evaluation in Sub-Saharan Africa. In: B. Davis et al., ed., *From Evidence to Action. The Story of Cash Transfers and Impact Evaluations in Sub-Saharan Africa*. Oxford: Oxford University Press, pp.1-16.

Dercon, S. and J. Hoddinott, 2004. Health, Shocks, and Poverty Persistence. In: *Insurance Against Poverty*. Helsinki: UNUWorld Institute forDevelopment Economics Research, pp.124-136.

Devereux, S. and P. De Jere. 2008. *Choice, Dignity and Empowerment: Cash and food transfers in Swaziland*. Evaluations. [online] Save the Children. Available at: <https://resourcecentre.savethechildren.net/library/choice-dignity-and-empowerment-cash-and-food-transfers-swaziland> [Accessed 7 June 2021].

Devereux, S. and P. White. 2010. Social Protection in Africa: Evidence, Politics and Rights. *Poverty & Public Policy*, 2(3), pp.516-540.

Devereux, S., 2016. Social protection for enhanced food security in sub-Saharan Africa. *Food Policy*, 60, pp.52-62.

Dorward, A., 2009. Integrating Contested Aspirations, Processes and Policy: Development as Hanging In, Stepping Up and Stepping Out. *Development Policy Review*, 27(2), pp.131-146.

Evans, D. et al., 2014. *Community-based conditional cash transfers in Tanzania: Results from a randomised trial*. Washington, DC: World Bank.

FAO, 2015. *Nutrition and social protection*. Rome.

Fiszbein, A. and N. Schady. 2009. *Conditional cash transfers: Reducing present and future poverty*. World Bank Policy Research Report. Washington, DC: World Bank.

Garcia, M. and T. Moore. 2012. *The cash dividend: The rise of cash transfers programs in sub-Saharan Africa*. Washington DC: World Bank.

Garnaut, R. 2008. *The Garnaut climate change review: Final report*. Cambridge: Cambridge University Press.

Goldspink, C. 2000. Modelling social systems as complex: towards a social simulation meta-model. *Journal of Artificial Societies and Social Simulation*,.

Gough, I. 2011. *Climate change and public policy futures*. New Paradigms in Public Policy. London: The British Academy.

Government of Indonesia. 2005. *Aceh and Nias one year after the tsunami. The Recovery Effort and Way Forward*.

Hamjediers, M. (2022). *GitHub - mhamjediers/sankeyplot: Stata ado-file to create Sankey plots (alluvial plot, stream graph, graph of out-flows)*. Retrieved 22 June 2022, from https://github.com/mhamjediers/sankeyplot

Handa, S. et al, 2013. *Livelihood empowerment against poverty impact evaluation.*. Carolina Population Center - University of North Carolina.

Handa, S., C. Huang, N. Hypher, C. Teixeira, F. Soares, and B. Davis. 2012. Targeting effectiveness of social cash transfer programmes in three African countries. *Journal of Development Effectiveness*, 4(1), pp.78-108.

Hansen, J., J. Hellin, T. Rosenstock, E. Fisher, J. Cairns, C. Stirling, C. Lamanna, J. van Etten, A. Rose, and B. Campbell. 2019. Climate risk management and rural poverty reduction. *Agricultural Systems*, 172, pp.28-46.

Heger, M. and E. Neumayer. 2019. The impact of the Indian Ocean tsunami on Aceh's long-term economic growth. *Journal of Development Economics*, 141, p.102365.

Hochrainer-Stigler, S., R. Sharma, and R. Mechler. 2012. Disaster Microinsurance for Pro-Poor Risk Management: Evidence from South Asia. *Journal of Integrated Disaster Risk Management*, 2(2), pp.70-88.

Holzman, J. and N. Kulibaba, 1995. Livestock marketing in pastoral Africa: Policies to increase competitiveness, efficiency and flexibility. In: I. Scoones, ed., *Living with uncertainty: New directions in pastoral development in Africa*. London: IIED.

Holzmann, R. and S. Jorgensen. 2000. *Social Risk Management: A new conceptual framework for Social Protection and beyond*. Social Protection. World Bank.

Hurrell, A. and R. Sabates-Wheeler. 2013. *Kenya Hunger Safety Net Programme Monitoring and Evaluation Component: Quantitative Impact Evaluation Final Report: 2009 to 2012*. Oxford Policy Management.

Imbens, G. 2004. Nonparametric estimation of average treatment effects under exogeneity: a review. *Review of Economics and Statistics* 86(1): 4–29.

IPCC. 2014. *Climate Change 2014 Impacts, Adaptation, and Vulnerability Part A: Global and Sectoral Aspects.* Cambridge & New York: Cambridge University Press.

Janzen, S. and Carter, M. 2018. After the Drought: The Impact of Microinsurance on Consumption Smoothing and Asset Protection. *American Journal of Agricultural Economics*, 101(3), pp.651-671.

Jensen, N., Barrett, C. and A. Mude. 2017. Index Insurance and Cash Transfers: A Comparative Analysis from Northern Kenya. *Journal of Development Economics*, 129, pp.14-28.

Karlan, D., R. Osei, I. Osei-Akoto, C. and Udry. 2012. Agricultural Decisions after Relaxing Credit and Risk Constraints. *SSRN Electronic Journal*,.

Linnerooth-Bayer, J., R. Mechler, and S. Hochrainer-Stigler. 2011. Insurance against Losses from Natural Disasters in Developing Countries. *Journal of Integrated Disaster Risk Management*, 1(1), pp.59-81.

Loayza, N., E. Olaberría, J. Rigolini, and L. Christiaensen. 2012. Natural Disasters and Growth: Going Beyond the Averages. *World Development*, 40(7), pp.1317-1336.

Marí-Klose, P. 2019. *La infancia que queremos*. Madrid: Los Libros de la Catarata

McPherson, A. et al., 2011. *A qualitative review of targeting methodologies in the Kenya Hunger Safety Net Programme (HSNP)*. United Kingdom: Department for International Development (DFID).

Merttens, F., A. Hurrell A., M. Marzi, R. Attah, M. Farhat, A. Kardan, and I. MacAuslan. 2013. *Kenya Hunger Safety Net Programme Monitoring and Evaluation Component. Impact Evaluation Final Report: 2009 to 2012.*. Oxford: Oxford Policy Management Limited.

Pelham, L., E. Clay, and T. Braunholz. 2011. *Natural Disasters: What is the Role for Social Safety Nets?*. Social Protection & Labor. World Bank.

Peppiatt, D., J. Mitchell, and P. Holzmann. 2001. *Cash transfers in emergencies*. London, England: Overseas Development Institute.

Ravallion, M. 2020. On Measuring Global Poverty. *Annual Review of Economics*, 12(1), pp.167-188.

Scarnecchia, D. and D. Coppock. 1995. The Borana Plateau of Southern Ethiopia. Synthesis of Pastoral Research, Development and Change. *Journal of Range Management*, 48(6), p.566.

Song, S. and K. Imai. 2019. Does the Hunger Safety Net Programme reduce multidimensional poverty? Evidence from Kenya. *Development Studies Research*, 6(1), pp.47-61.

Strobl, E. 2011. The Economic Growth Impact of Hurricanes: Evidence from U.S. Coastal Counties. *Review of Economics and Statistics*, 93(2), pp.575-589.

Tiwari, S., S. Daidone, M. Ruvalcaba, E. Prifti, S. Handa, B. Davis, O. Niang, L. Pellerano, P. Quarles van Ufford, and D. Seidenfeld, D. 2016. Impact of cash transfer programs on food security and nutrition in sub-Saharan Africa: A cross-country analysis. *Global Food Security*, 11, pp.72-83.

Trenberth, K., J. Fasullo, and T. Shepherd. 2015. Attribution of climate extreme events. *Nature Climate Change*, 5(8), pp.725-730.

Veras Soares, F. and C. Teixeira. 2010. *Impact evaluation of the expansion of the Food Subsidy Programme in Mozambique*. Brasilia: IPC-UNDP.

9. Annex

	(1) Beneficiary status	(2) Beneficiary status (for obs. in poverty)
Days without eating (short rains)	-0.394*** (0.12)	-0.370** (0.15)
Years dwelling in that location	0.0303*** (0.00)	0.0259*** (0.01)
Number of cattle heads	-0.000893 (0.00)	-0.00317 (0.00)
Number of sheeps	-0.00177* (0.00)	-0.000830 (0.00)
Private toilet	-0.155 (0.18)	-0.197 (0.24)
Wall material	0.0530 (0.04)	0.0569 (0.05)
External supporter	0.458*** (0.16)	0.440** (0.19)
Religion (ref. cat.: Muslim)		
Catholic	-0.384** (0.18)	-0.388* (0.21)
Other christian	-0.314 (0.26)	-0.473 (0.29)
Traditional	-0.110 (0.24)	-0.234 (0.26)
Atheist	-0.604** (0.25)	-0.772*** (0.28)
Quintile (2009)	-0.133** (0.06)	-0.0719 (0.07)

Poverty (2009)	0.311*	0.244
	(0.18)	(0.24)
Household borrowed money	-0.356**	-0.563***
	(0.16)	(0.17)
Household had savings	-0.491**	-0.683***
	(0.21)	(0.24)
Adult-equivalent household size	0.146***	0.0909**
	(0.04)	(0.04)
Constant	0.233	0.538
	(0.48)	(0.58)
Observations	1736	1253

Table 3. Treatment status predicted by covariates

Source: own elaboration

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	(1) Poverty	(2) Poverty gap	(3) Quintile mobility
ATET			
Beneficiary Status (1 v. 0)	0.0003	-3.4072	0.2544*
	(0.03)	(58.24)	(0.14)
Observations	387	369	1563

Table 4. Average Treatment Effect on Treated, by outcome of interest, sample restricted to lowest quintile

Source: own elaboration

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
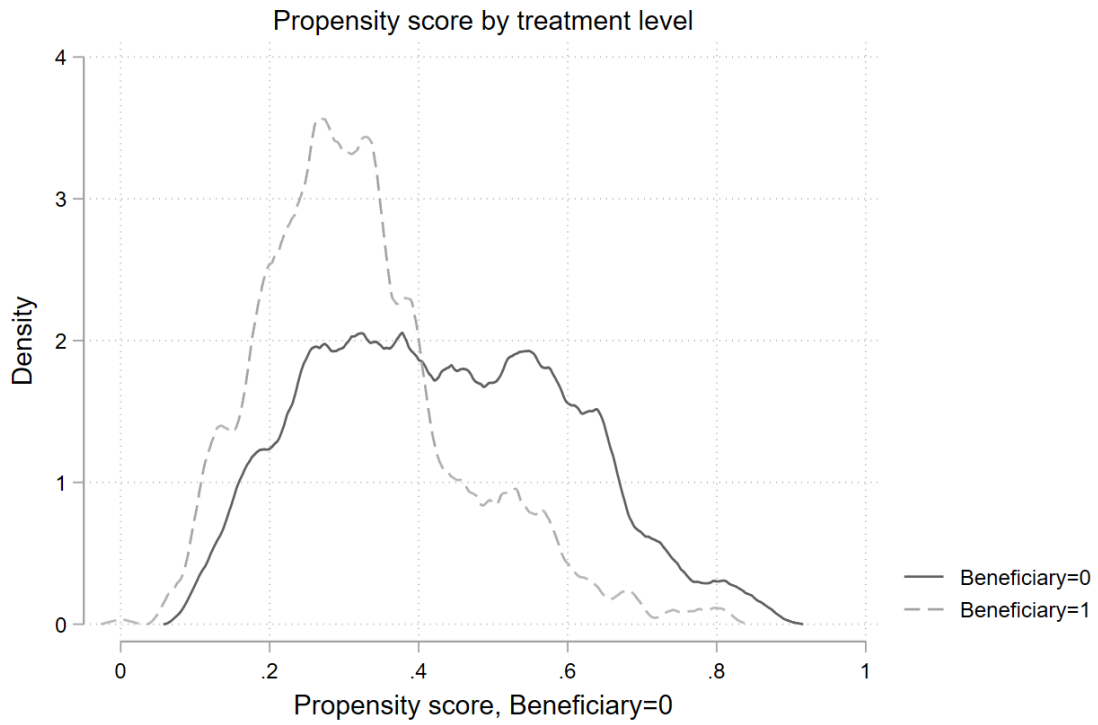
Figure 4. Propensity score by treatment level, all observations
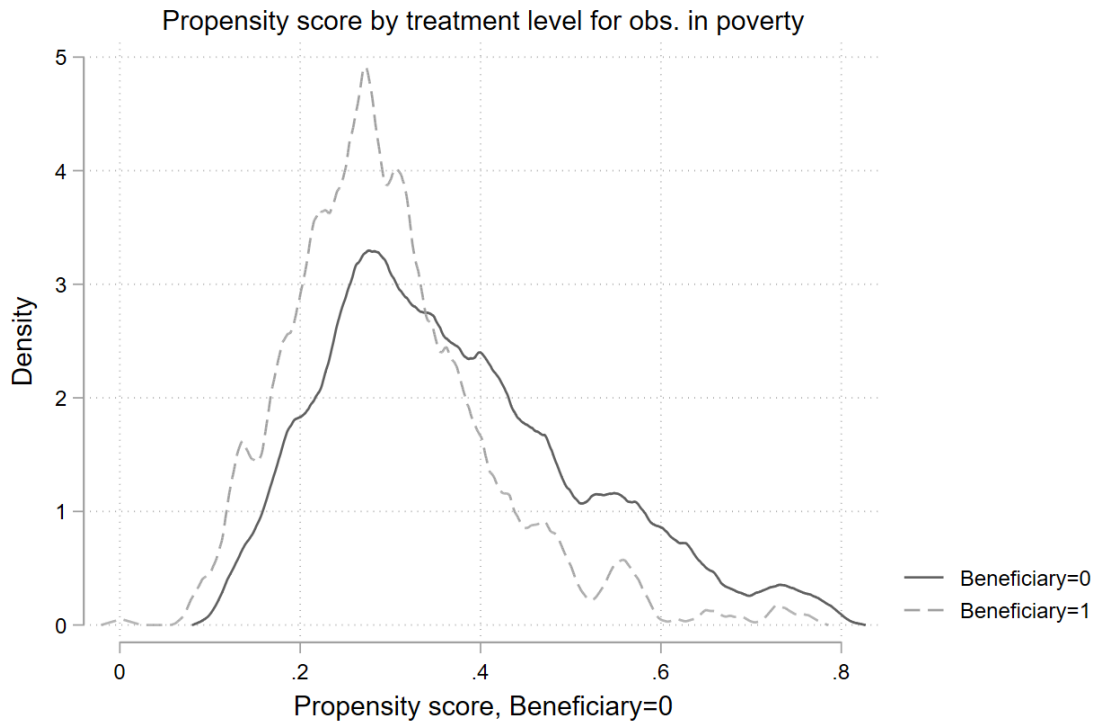
Source: own elaboration

Figure 5. Propensity score by treatment level, observations in poverty

Source: own elaboration

	N	Mean	Standard Deviation	Minimum	Median	Maximum	Type of variable
Beneficiary Status	2867	0.600	0.489	0	1	1	Binary
Poverty (2011)	2575	0.753	0.431	0	1	1	Binary
Poverty gap (2011)	1940	918.172	482.156	1.120	934.185	2122.78	Continuous
Quintile (2011)	2575	2.937	1.451	1	3	5	Discrete
Days without eating (short rains)	2865	1.329	0.470	1	1	2	Count
Years dwelling in that location	2867	12.113	12.543	0	8	80	Count
Number of cattle heads	1912	4.621	14.297	0	0	250	Count
Number of sheeps	1912	54.891	60.008	0	40	765	Count
Private toilet	2866	0.222	0.416	0	0	1	Binary
Wall material	2866	5.599	3.583	1	5	97	Discrete
External supporter	2867	0.140	0.347	0	0	1	Binary
Religion	2674	1.758	1.123	1	1	5	Categorical
Quintile (2009)	2865	2.920	1.436	1	3	5	Discrete
Poverty (2009)	2867	0.721	0.448	0	1	1	Binary
Household borrowed money	2866	0.139	0.346	0	0	1	Binary
Household had savings	2866	0.089	0.285	0	0	1	Binary
Adult-equivalent household size	2867	4.289	1.822	1	4	19.73	Count

Table 4. Descriptive statistics

Source: own elaboration

	(1) Borrow food or help family	(2) Sell animals	(3) Sell other asset	(4) Buy food on credit	(5) Eat wild food or animal
Beneficiary status	-0.143*	-0.110	-0.348***	-0.145*	-0.170*
	(0.08)	(0.08)	(0.11)	(0.08)	(0.09)
Constant	0.0628	-0.338***	-1.769***	0.491***	-1.206***
	(0.06)	(0.06)	(0.08)	(0.06)	(0.07)
Observations	2867	2867	2867	2867	2867
R^2					

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	(6) Reduce number of meals	(7) Eat smaller meals	(8) Skip days without eating
Beneficiary status	0.0281	-0.0288	0.0924
	(0.08)	(0.08)	(0.08)
Constant	0.842***	0.477***	0.249***
	(0.06)	(0.06)	(0.06)
Observations	2867	2867	2867
R^2			

Table 5. Effect of beneficiary status on coping strategies

Source: own elaboration