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Social Hierarchies and the Allocation of Development Aid: Evidence from the 2015 Earthquake in Nepal

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Abstract

We study the role of discrimination and in-group biases in the allocation of public funds by community-based committees. Specifically, we investigate the effect of caste hierarchies on the amount of emergency aid given to households after the 2015 earthquake in Nepal. Local committees allocated aid immediately after the earthquake, and –officially– the amount of aid was a function of the magnitude of the housing damage. To identify discrimination and in-group favoritism in this context, we utilize rich data on house characteristics and housing damage and exploit exogenous variation in earthquake intensity. We first provide evidence for caste-based discrimination by these committees: Upper caste households received more aid than lower caste households. Second, we find in-group favoritism among upper caste households: Upper caste households received more aid if individuals from their own (upper) caste were involved in the allocation of aid. In contrast, lower caste households did not benefit from the presence of their own (lower) caste representatives in aid allocation committees. The results highlight the importance of social hierarchies in the study of favoritism and contribute to a better understanding of social structure for the implementation of development policy.

Keywords: Discrimination, Favoritism, Disaster aid, Natural disasters

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1. Introduction

Community-based agents play an increasingly larger role in how public funds, and in particular development aid, are distributed and used (e.g., Mansuri and Rao, 2012). Among the expected benefits of community participation are improvements in the relevance and sustainability of projects, better beneficiary identification for support programs, and the ability to react quickly to local needs, e.g., in case of an emergency. At the same time, participatory approaches are also seen as prone to elite capture and favoritism (Bardhan and Mookherjee, 2000; Platteau, 2004). Indeed, a body of empirical work provides evidence for the validity of this concern (Olken, 2007; Alatas et al., 2019; Bandiera et al., 2020; Heß et al., 2021). One limitation of this literature is that it does not consider possible heterogeneity of elite capture and favoritism (which concern leadership roles, independent of the social position) with respect to social hierarchies. However, community-based activities are frequently embedded in a society with a strong social hierarchy, such as the caste system. The central goal and the main contribution of this paper therefore is to study how elite status and a social hierarchy interact. The context is a participatory setting in which local communities are involved in the identification of beneficiaries of a support program.

The hypothesis of heterogeneous effects in elite capture and favoritism is motivated by research that demonstrates the important role that social hierarchies play for economic life in many ways (for the caste system, see, e.g., Munshi, 2019). Further, research in the field of social psychology has found a larger in-group bias for groups identified – in an experimental setting – as "superior" (Turner and Brown, 1978), while other research in psychology in fact found out-group favoritism among members of disadvantaged groups, i.e., a tendency of disadvantaged individuals to favor individuals outside of their own group (e.g., Jost and Burgess, 2000; Jost et al., 2004; Umphress et al., 2007). On the other hand, in economics we are aware of only few papers that explicitly consider heterogeneity in favoritism (Hanna and Linden, 2012; Bandiera et al., 2020; Vera-Cassio, 2020). Only one of these studies considers explicitly the role of a social hierarchy, namely Hanna and Linden (2012), albeit not in the context of community-based action, but in a study of discrimination in grading student papers.

We address the dearth of work that investigates heterogeneity in favoritism with respect to social hierarchies in the context of emergency aid that was distributed right after the 2015 earthquake in Nepal. This earthquake led to 9,000 deaths, nearly 500,000 destroyed houses, and more than 250,000 partially damaged houses (NPC, 2015).[2] In response, the government tasked local disaster committees with distributing emergency aid to those households that had experienced significant damage to their house. Community-based political agents, namely local representatives of the major parties, played the most important role in these local disaster committees in identifying beneficiaries and distributing emergency aid. For the present paper,

[2] In our sample districts, surveyor engineers considered 39% of houses to be "totally" damaged and a further 25% "heavily" damaged.

we exploit the exogenous variation in earthquake intensity – and consequently in earthquake-induced damage – across different parts of the country and the subsequent community-based approach to distributing emergency aid, in combination with the availability of very detailed data, covering more than 670,000 households. This provides us with a quasi-experimental setting that allows for the identification of discrimination and favoritism, and an analysis of heterogeneity with respect to caste hierarchies.

More specifically, we proceed in two steps. We first investigate whether households lower in the social hierarchy are discriminated against during the distribution of emergency cash assistance immediately after the earthquake. Households with fully damaged houses were supposed to receive 15,000 Nepali rupees (Rs.), roughly the equivalent of a monthly wage, to cover immediate needs, in particular "to build temporary shelters" (Pokharel et al., 2016a, p.3), households with partially damaged houses were supposed to receive Rs. 3,000. Indeed, we find that "lower" caste households receive less aid through this mechanism than "upper" caste households.[3] Several empirical strategies suggest that this does not merely reflect actual differences in need (i.e., differences in levels of destruction) or differences in house values between castes, but that caste is indeed causally related to differences in aid received, i.e., that there is caste-based discrimination. The "upper caste premium" is of economically significant magnitude, with upper caste households receiving up to 9% more aid.

In a second step, we investigate the role of in-group favoritism. To do so, we combine data on the amount of aid that a household received with information we collected about caste identities of the political actors behind the aid distribution. We find that upper caste households receive more aid if individuals from their own (upper) caste are part of the community-based committees that are responsible for the allocation of aid. Because, as we show, committees that include upper caste members do not generally provide more benefits, the findings suggest in-group favoritism by upper caste members of these committees. In contrast, lower caste households do not benefit from the presence of their own (lower) caste representatives in aid allocation committees.

The data do not allow us to identify the underlying reason for caste-based favoritism among upper castes and the absence of favoritism among lower castes. Possible reasons include taste-based discrimination or political patronage that is correlated with caste. The psychological literature suggests that out-group favoritism arises through a "psychological process by which existing social arrangements are legitimized, even at the expense of personal and group interest" (Jost and Banaji, 1994, p.2). Yet, independent of the underlying reasons, our results show that in Nepal preexisting social inequalities are reinforced through favoritism, as they translate into inequalities in aid allocation. More generally, our findings highlight heterogeneity in favoritism as a possible channel through which existing social inequalities are increased. For development policy, the results provide new arguments to consider social structure as an important

[3]When referring to "lower" and "upper" caste households we refer to the hierarchy implied by local traditions (for details see below). We disavow the idea that individuals belonging to "lower" caste should be viewed as lesser in any way.

factor in the implementation of development interventions. Special care is required to avoid discriminating behavior in situations where strong social hierarchies exist and where aid is distributed and beneficiaries identified through local partners or community participation.

The paper makes the following contributions. First, we provide new evidence for elite capture and favoritism. One problem in this literature is usually that showing a bias in public resource flows towards certain elites, i.e., towards groups with decision-making power (or, in the case of favoritism, towards individuals – or households or firms – that are connected to those with decision-making power) requires a benchmark for the level of resources that should flow in the absence of a bias. In this paper, we exploit unusually rich data on housing characteristics and housing destruction, including an independent assessment of damage by a surveyor engineer, which provides such a benchmark. Differences in the amount of emergency aid between different groups (castes) that cannot be explained by these detailed data on housing characteristics and the engineers' assessments suggest biased flows of resources.

Second, going beyond the existing literature, which already provides significant evidence of capture of local development programs by elites (Mansuri and Rao, 2012), our main contribution is to demonstrate that an individual's position in the social hierarchy can interact with elite capture and favoritism. It should be noted that elites – i.e. individuals in powerful positions – are not always members of groups that are high in an overall social hierarchy. For example, certain communities may only consist of individuals that are lower in the social hierarchy, such that those agents chosen from within the community that will end up in a more powerful position will come from a socially lower group.[4] In other circumstances, affirmative action may lead to this outcome. For example, leadership roles may be reserved for individuals that are lower in a social hierarchy (e.g., Pande, 2003), e.g., through a system of quotas.

Third, our study has a near-nationwide coverage. The earthquake affected large parts of Nepal and led to widespread destruction, thus the study identifies what happens in a crisis "at scale" and our findings are less likely to be subject to possible scaling-up concerns of studies that investigate discrimination and favoritism in smaller-scale experiments (see, e.g., Acemoglu, 2010; Bold et al., 2018). Further, because aid is provided in terms of monetary grants, the setting also offers straightforward ways to quantify the estimated effects of discrimination and favoritism.

Finally, the paper contributes to a better understanding of different approaches to responding to a disaster. Due to climate change, extreme weather events such as droughts, floods, and strong storms will likely occur more frequently in the future (Field, 2014). The number of non-climate change related disasters, which includes earthquakes, and the number of people affected by these, has also gone up over the last decades (Guha-Sapir et al., 2017).[5] Further, widespread infectious disease outbreaks, such as the

[4] In our sample of the 11 districts that were most affected by the 2015 earthquake, 45% of local committee members belong to lower castes, and about a quarter of committees consist of lower caste members only.

[5] While climate-related events are the most prevalent, earthquakes (including subsequent tsunamis) are responsible for more

COVID-19 pandemic, cause major suffering. With globally increasing numbers of emergencies, in particular in less developed countries, the demand for public funds to support households affected by disasters in the immediate aftermath will grow. Therefore, situations like the one after the earthquake in Nepal, where the involvement of community-based agents was partly due to time and personnel constraints, are likely to arise more frequently. In these circumstances, the need for immediate action may result in a lack of mechanisms for monitoring and accountability, and consequently may provide these local leaders with increased opportunities to engage in illegal activities, such as corruption or favoritism. On the other hand, the shared disaster experience may also affect social capital and pro-social behavior (Rodriguez et al., 2006; Ntontis et al., 2020), counteracting the above-mentioned lack of monitoring. Data from relief activities in the context of the COVID-19 pandemic illustrate the danger that social structure matters for the response to emergencies. For example, according to one source, up to 48% of lower caste respondents in Nepal reported having experienced discrimination in the distribution of relief based on caste (Samata Foundation, 2021).[6]

In Nepal, like in much of South Asia, castes imply a strong and well-defined social hierarchy. The caste system is an important aspect of life, and an individual's caste is a strong predictor of her well-being. Members of upper castes have significantly higher education, higher incomes, and better access to public goods. They are also more likely to hold positions of power than members of lower castes (for Nepal, see, for example, Gurung, H., 2003; Bennet et al., 2008; Mainali et al., 2013). Caste-based discrimination in social and economic life is not only ethically deplorable but also creates economic distortions and hinders overall development (e.g., Pradhan and Shrestha, 2005; Fehr et al., 2008; Anderson, 2011; Munshi, 2019). The Nepalese earthquake is one such situation where caste-based discrimination and in-group favoritism could have affected development if they led to aid not being allocated to the most deserving households. Although countries like India and Nepal have banned caste-based discrimination, progress towards reducing existing caste-based inequalities is slow. One concern is that political agents themselves continue to act in discriminating ways by favoring upper caste members in general (i.e., discriminate based on caste) or specifically favoring members of their own group (i.e., show in-group favoritism). For example, they might provide preferential treatment during a job search or in the allocation of social benefits. One major hurdle for providing evidence for this is the measurement and identification of discrimination and in-group favoritism.

The key empirical difficulty to establish causality is that differences in aid allocation between upper and lower castes may exist for two reasons. One reason is caste-based discrimination and in-group favoritism. Alternatively, differences in aid allocation may simply reflect true differences, in our case, in levels of housing

deaths than all other types of disaster put together (about 750,000 between 1994 and 2013; Guha-Sapir et al., 2017).

[6]Disparities along social structure are not restricted to less developed countries. For example, Grogan et al. (2021) and Kakani et al. (2020) find that COVID-19 relief funds are reinforcing disparities among hospitals in the US, and disadvantages hospitals that predominantly serve low-income people of color, although these groups are particularly hard hit (Alsan et al., 2021).

destruction between upper and lower castes. True differences may exist if houses belonging to upper and lower castes use different building materials or are built on terrain with different levels of earthquake vulnerability.[7] The data we use provide a large number of observable characteristics that likely determine housing damage, which reduces the danger of unobserved variables driving the results. Yet, these controls may still not be enough to pick up differences in earthquake vulnerability.

Crucially, to provide us with one strategy for dealing with this empirical concern, our data contain two different measures of housing damage. The first is the damage category that local disaster committees assigned to households, which in turn directly determined the amount of emergency aid that the household would be eligible for.[8] Our goal is to study whether caste considerations influence this categorization. The second is a measure of damage from a survey performed by surveyor engineers with the goal of providing the government and donors with a comprehensive inventory of the damage. This survey provides an independent assessment of housing damage from an (external) engineer's perspective. As we will argue in more detail below, based on institutional details and econometric results, the engineer's damage assessment is much less likely to be affected by political and caste considerations. Indeed, once we control for observable building and geographic characteristics that likely influence damage levels, we cannot reject the hypothesis that the surveyor engineer's damage assessment is unrelated to caste. This suggests (a) that the higher amounts of aid (i.e., the higher first damage measure) received by upper caste households are not merely due to omitted variables but likely reflect a causal relationship, and (b) that the second (engineers') damage measure can be seen as an unbiased proxy that can be used to control for actual damage. In addition to the two building-level measures of housing damage, we have a third measure to proxy true housing damage, namely earthquake intensity provided by the US Geological Survey, the so-called Modified Mercalli Intensity (MMI), which we match to households at the ward level.

Finally, we employ a heterogeneity analysis that exploits variation in earthquake intensity to alleviate remaining concerns about unobserved variables driving our results. In this analysis, we test whether the difference between upper and lower caste households in the amount of aid that they receive increases as we move from high to low damage areas. This strategy builds on the observation that it is easier to favor specific households or groups when levels of destruction are low. In the aid allocation mechanism that we study, there is an upper limit to how much aid can be allocated to any household. Thus, it is difficult to provide favors to households that deserve the maximum amount of aid anyway. On the other hand,

[7] Upper caste households may be able to avoid earthquake-prone areas or their buildings may be better prepared for earthquakes. Yet, this would imply that unobservables lead to lower aid payments to upper caste households, which is the opposite of what we find. Further, it should be noted that earthquakes of this magnitude are not frequent in Nepal. The last earthquake with comparable magnitude hit Nepal in 1934. This reduces the probability that differences in deliberate earthquake preparedness between castes are behind the observed differences in damages.

[8] As mentioned above, the amount of aid was supposed to be tied to levels of destruction, which would determine the need "to build temporary shelters" (Pokharel et al., 2016a, p.3), but not to the value of the house.

if an individual household's damage is low, there is more room to provide unjustified benefits.[9] Under the assumption that the location of the earthquake's epicenter and the resulting variation in earthquake intensity across locations can be considered exogenous and not related to unobserved characteristics that determine differences in housing damage between upper and lower castes, our finding of a larger difference in aid received between upper and lower castes in low earthquake intensity areas than in high intensity areas therefore constitutes additional support for the existence of discrimination and favoritism.

This paper is related to several areas of research. Primarily, we contribute to the literature on favoritism and elite capture, especially in the context of community-based development projects (e.g., Bardhan and Mookherjee, 2000; Olken, 2007; Alatas et al., 2019). The analysis of heterogeneity in favoritism is related to a small set of papers in economics that finds similar heterogeneity in favoritism. Hanna and Linden (2012) report that upper caste teachers grade exams more favorably when the exam is attributed to an upper caste student than when the same exam is attributed to a lower caste student, while lower caste teachers actually give slightly worse grades to exams attributed to lower caste students. Closer to our study of a participatory program is a recent paper by Bandiera et al. (2020). In their study of community-based agricultural extension agents in Uganda, they find favoritism between local agents and their social ties only if other potential agents belong to a different social group. Our study complements the latter paper in that we analyze a situation in which there is a clear hierarchy among social groups. Our approach to the identification of discrimination and favoritism is similar in spirit to Reinikka and Svensson (2004) and Olken (2007) in that we have two different measurements of the same outcome, in our case, levels of destruction of houses. The study also connects to the literature that experimentally tests for the existence of discrimination (e.g., Altonji and Blank, 1999; Fershtman and Gneezy, 2001; Bertrand and Mullainathan, 2004; Banerjee et al., 2009; Siddique, 2011; Hanna and Linden, 2012) and to papers that analyze mechanisms that reinforce social inequalities (Hoff and Pandey, 2006). More broadly, the paper considers a specific way to identify beneficiaries of a public support program, namely through community-based targeting (e.g., Galasso and Ravallion, 2005; Alatas et al., 2012) as an alternative to strategies that involve proxy means tests (Grosh and Baker, 1995) or self-selection mechanisms (Besley and Coate, 1992; Alatas et al., 2016). Finally, the paper also contributes to the literature on the relationship between disasters, economic development, and emergency aid (e.g., Kuziemko and Werker, 2006; Cole et al., 2012; Dreher and Fuchs, 2015; Tarquinio, 2020) and papers that study economic effects of earthquakes more generally (e.g., Gignoux and Menéndez, 2016; Kirchberger, 2017).

The next section provides background on the earthquake and the subsequent approach to giving emergency aid to households who suffered damage to their dwellings. The third section introduces and discusses

[9] An analogous argument applies to local averages of destruction. If these are low, then there is overall less justified (by actual housing damage) demand for emergency aid, which relaxes possible budget constraints and makes it easier for political agents to favor certain groups' members.

the data. Section four lays out the empirical strategy and presents the results. The last section concludes.

2. Background

2.1. Caste in Nepal

While the caste system originates in Hinduism, non-Hindu groups in Nepal have also historically occupied a fairly clearly defined position in the social structure. In particular, in 1854, a National Code (the Muluki Ain) classified all Nepalese into five broad caste groups and provided a hierarchical ordering for these groups (Höfer, 1979; Gurung, P., 2000; Gurung, H., 2003; Bennet et al., 2008). At the top of this hierarchy are the Hindu Brahmin and Chhetri groups and at the bottom of this hierarchy are so-called "impure" Hindu castes.[10] According to Census (2011) data, there are about 130 sub-castes, which are broadly classified into Brahmin (14% of the households), Chhetri (18%), Newar (5%), Janajatis (31%), and "impure" (32%) castes. The upper caste, which includes Brahmin, Chhetri, and (the majority of) Newar households, thus constitutes 37% of the total population share.[11] In our data, about 15% of households belong to Brahmin, 17% to Chhetri, and 20% to Newar, while Janajatis constitute about 36% of households in sample districts and 11% of households belong to "impure" castes. Further details are provided in Online Appendix A1.1. A few statistics illustrate the socio-economic differences between upper and lower castes based on the data we use in this paper. On average, upper caste household heads have about twice as many years of education as lower caste (4.2 vs. 2.07 years), while household income, measured as the mid-point of the ranges used in our data (and 60,000 for the highest), is 22% higher for upper castes (Rs. 12,400 vs. Rs. 10,100).

Because there is a categorization for all non-Hindu ethnic and religious groups into the caste system, we will abstract from the distinction between caste and ethnicity in the following and refer to "caste" only. Although Nepal's constitution of 1990 explicitly banned discrimination based on caste, tribe, or religion, amendments to the National Code in 1992, for example the provision that traditional religious practices should not be considered discriminatory, continued to provide a basis for discrimination (Gurung, H., 2003).

2.2. The 2015 earthquake in Nepal and post-disaster aid: an overview

The earthquake that occurred in Nepal in April 2015 and an aftershock in May did not only lead to a significant loss of human life but also substantial economic damage. More than 750,000 houses were destroyed or partially damaged, and the total damage was eventually estimated to be more than seven billion USD (NPC, 2015).

[10] We use the term "impure" following general local practice, and we do not in any way condone the implication behind it.

[11] Newars, the indigenous inhabitants of Kathmandu, are a special case. Some Newar groups were assigned a high position in the hierarchy by the National Code, while others were considered impure and therefore assigned a low position. Online Appendix A4.2.3 explains how we assign Newar sub-groups to upper and lower caste.

In July 2015, the Government of Nepal tasked District Disaster Relief Committees with the coordination of an assessment of the housing damage in affected areas. The goal was to identify households that would be eligible for emergency cash grants. These committees further delegated the damage assessment to the level of the Village Development Committees (VDCs).[12] Thus, in each VDC, a Grant Distribution Committee was formed within weeks of the earthquake, and its tasks ranged from registering incoming aid, identifying the aid recipients, to facilitating the distribution of aid (Pokharel et al., 2015b, p. 24-25). In particular, these committees were responsible for carrying out the damage assessment for emergency cash grants. Three levels of destruction were distinguished. Households with complete damage to their house were given grants of 15,000 Nepali Rupees (Rs.), which is approximately US$ 135, and roughly equivalent to an average monthly salary, while households with partial damage were given Rs. 3,000. Households that –according to this assessment– had incurred no significant damage to their house did not receive an emergency grant (Pokharel et al., 2016a). Thus, housing destruction was measured in terms of the degree of damage to a house, but not in terms of the value of the house that was damaged or destroyed. Specifically, the emergency cash grant was not supposed to be proportional to the losses incurred, or be so high that they could cover actual costs that were anticipated for reconstruction or repairs or proportional to those numbers. Instead, the level of damage was taken as a very rough proxy for how much was required to cover immediate housing needs. For households whose house was "fully damaged", this meant that they received Rs. 15,000 "to build temporary shelters" (Pokharel et al., 2016a, p.3).[13]

After the distribution of emergency cash grants, a much more systematic and detailed data collection effort was initiated. The goal was to provide a database to support long-term reconstruction efforts. Starting in January 2016, this survey collected very detailed data on housing damage, pre-earthquake housing conditions, and household characteristics. Surveyor engineers were specifically hired and trained for this purpose. Details are provided in Section 3.1.

2.3. The role of local political actors in the first damage assessment

In most VDCs, the Grant Distribution Committee was composed of the VDC secretary, who are non-elected bureaucrats, and the members of the so-called All-Party Mechanism (APM) (Pokharel et al., 2015a, 2016b; Barber, 2016). In some cases, other groups, such as ward leaders, teachers, and social mobilizers, were also involved (Pokharel et al., 2016a). Yet, among all these groups, the members of the APM took center

[12] The "committee" in the VDC refers to the village council in the Local Self Governance Act (1999), but the term is interchangeably used to refer to the geographical area.

[13] The available information is silent on the issue of whether VDCs had a fixed budget that could be distributed for emergency cash grants. However, we find the strongest evidence for favoritism in VDCs with low levels of destruction. These are the localities in which budget constraints are likely the least binding. Thus, even if budget constraints exist and are binding in some (high-destruction) localities, this could not explain why favoritism is strongest in localities in which the constraint is least likely to be binding.

stage, primarily conducted the damage assessment for emergency cash grants, and determined the eligible households (Pokharel et al., 2016b). Protocols released by District Disaster Relief Committees highlight the special role of APMs (see, for example, the protocol reproduced in Online Appendix A1.3.3). Our field visits and discussions with several stakeholders also confirm the APMs' prominent role. We discuss further evidence for the important role of APMs in Online Appendix A1.3.

APMs were initially established in 2006 to involve all major political parties in local decision-making and consist of one local representative of each of the main political parties. APMs were dissolved in 2012 (TAF, 2012), yet, the local network of APMs remained and continued to influence local governance (Carter Center, 2014). Thus, when the emergency relief efforts required immediate action at local levels, APMs were informally created again in every VDC. Political parties represented in APMs were chosen based on the party's local performance in the 2013 Constituent Assembly elections.[14] In practice, in 80% of VDCs in our data, the APM consisted of members of the three main national political parties. In another 20% of VDCs, a fourth political party was represented.

The absence of strong and independent monitoring mechanisms during the distribution of emergency cash grants and the low level of accountability of APMs yielded opportunities to engage in corruption and favoritism (Pokharel et al., 2015a). According to Pokharel et al. (2016a), the emergency cash grants assessment was quite ad-hoc, controversial, with reported cases of APMs interference and corruption during the damage assessment that led to protests. Newspaper articles provide additional anecdotal evidence.[15] Further, some reports suggest that caste-based discrimination played a role in emergency cash payments (IASC, 2015; Neelakantan, 2015; Barber, 2016; Pokharel et al., 2015a).[16]

3. Data

3.1. Household Registration for Housing Reconstruction Survey

Organizations such as the World Bank and the Department for International Development (DFID) demanded a comprehensive database of housing damage and socio-economic characteristics of earthquake-affected households. Thus, in January 2016, the Household Registration for the Housing Reconstruction

[14] See `http://kathmandupost.ekantipur.com/news/2015-05-25/govt-set-to-revive-all-party-mechanism.html` (accessed February 4, 2021).

[15] For example, local leaders [the APMs] in the Baseri VDC of Dhading allegedly sided with "fake" earthquake victims and applied pressure to the survey engineers (who carried out the second damage assessment) to list them as high-earthquake-damage households. (`http://kathmandupost.ekantipur.com/printedition/news/2016-02-18/fake-earthquake-victims-disrupt-data-collection.html` (accessed February 4, 2021)). In Nuwakot and Rasuwa, APM members registered more individuals as victims than existed in the current census (`http://kathmandupost.ekantipur.com/news/2015-06-06/data-mismatch-on-victims-hits-id-cash-relief-distribution.html` (accessed February 4, 2021)).

[16] For example, Dalit communities from Phinam VDC of Gorkha and Godamchaur municipality of Lalitpur did not receive relief materials as the local leaders did not inform them while non-Dalits received relief materials frequently (`https://kathmandupost.com/opinion/2015/12/30/double-trouble-20151230083734` (accessed February 4, 2021)).

Survey (HRHRS) was started under the supervision of the Central Bureau of Statistics. Overall, data were collected in 31 out of the 75 districts. Yet, in 20 districts, data were only collected on houses that were considered damaged. In 11 highly affected districts, data were collected on all houses. The focus on these 11 districts was based on an earlier declaration of a state of emergency in these districts.[17] We use only data from those 11 districts to avoid selection issues.[18]

We use data from this survey that was collected between January and June 2016 in the eleven most affected districts. A complete census of buildings and the household(s) living in those buildings was collected for these districts. If a house was not inhabited, information was collected on the household that lived there before the earthquake. We further restrict the analysis to rural VDCs only (this sample restriction drops 14 municipalities). There are 612 VDCs and about 670,000 household observations in these data.

This data set records, among other things, the level of housing damage, assessed by surveyor engineers in five categories.[19] To carry out the survey, 2,632 surveyor engineers were hired (HRHRS report, 2016). The engineers were typically not from the region in which they were placed. Their assessment did not have immediate implications, e.g., it was not used to determine emergency aid. Thus, although the possibility that the surveyor engineer's damage assessment is influenced by political or caste considerations cannot be ruled out, it is much less likely. Below we also test formally whether there are indications that caste played a role in the engineer's damage assessment, and we cannot reject the null hypothesis of no effect of caste on the engineer's damage assessment. Figure 1, Panels (a) and (b) illustrate the spatial distribution of the damage, according to the surveyor engineers' assessments.

Importantly, the data also record, for the same house, the damage category that the house was assigned to in the first damage assessment, based on which the emergency aid was distributed. Specifically, after the first damage assessment, households whose dwellings were deemed significantly damaged by the local political committees, received so-called "victim identification certificates", which indicated the damage category that a household was assigned to. Those who had received a "red" certificate were eligible to receive Rs. 15,000 and households that had received a "yellow" victim identification certificate were eligible to receive Rs. 3,000.[20]

[17] The government had declared an emergency for 14 districts, namely for these 11 districts plus the three urban districts (Kathmandu, Lalitpur, and Bhaktapur).

[18] Houses that the APM did consider "not damaged" would not appear in the survey data outside of the 11 districts that we consider.

[19] Damage categories are: "negligible", "moderate", "substantial", "heavy", or "total". See Online Appendix A1.4 for details.

[20] The survey required surveyor engineers to take a picture of this victim identification certificate and attach it to the survey (HRHRS questionnaire, 2016). Thus, the respondents' information on the category of emergency damage assessment is confirmed within the survey. Note that this raises the possibility that the first damage assessment by the local committees influences the second assessment by the engineers. However, the surveyor engineer is asked to make her own assessment before taking this picture and learning about the first assessment. Our analysis using the engineers' assessments as a dependent variable also does not support this view (Table 1, columns 3 and 4). Further, if the second assessment was indeed influenced

In those parts of the analysis where we compare both damage assessments, one possible concern arises due to the time lag between the two different damage assessments. Emergency cash grants were distributed starting in July 2015, while the damage assessment by the survey engineers was started in January 2016. In the meantime, some households had started repairs which could influence the difference in assessments. In particular, if upper caste households were quicker to repair their houses, this might explain why we find that the difference between the first damage assessment (by local committees) and the second damage assessment (by engineers) is larger for upper caste households. Fortunately, we can test this hypothesis directly and reject it, using a question in the survey that asks whether households had started repairs already.[21]

The HRHRS also collected information about disaggregated castes of household heads. As discussed above, and following Gurung, H. (2003), Bennet et al. (2008), Mainali et al. (2013), and Gellner (2007), we define as upper caste households those from Brahmin, Chhetri, and upper-Newar castes, while we define as lower caste households those from Janajati and "Impure" castes (including lower-Newar and Dalit castes). More details are provided in Online Appendices A1.1 and A1.2 and a robustness check using an alternative categorization of Newar households is shown in Online Appendix Table A4.2.3.

In addition to the above-mentioned central variables, the data contain a wealth of information that we use to capture housing conditions before the earthquake (height, ground area, and age of the building, types of building foundation, roof, floor materials, construction materials, and condition of the land surface around the house, as well as different types of legal ownership). Further, socio-demographic variables describing household characteristics include gender, education, and age of the household head, household size, whether the household owns a bank account, and a categorical measure of income. Summary statistics for damage assessments and all other variables used in the regressions, split by upper/lower caste, are provided in Online Appendix A2.1.

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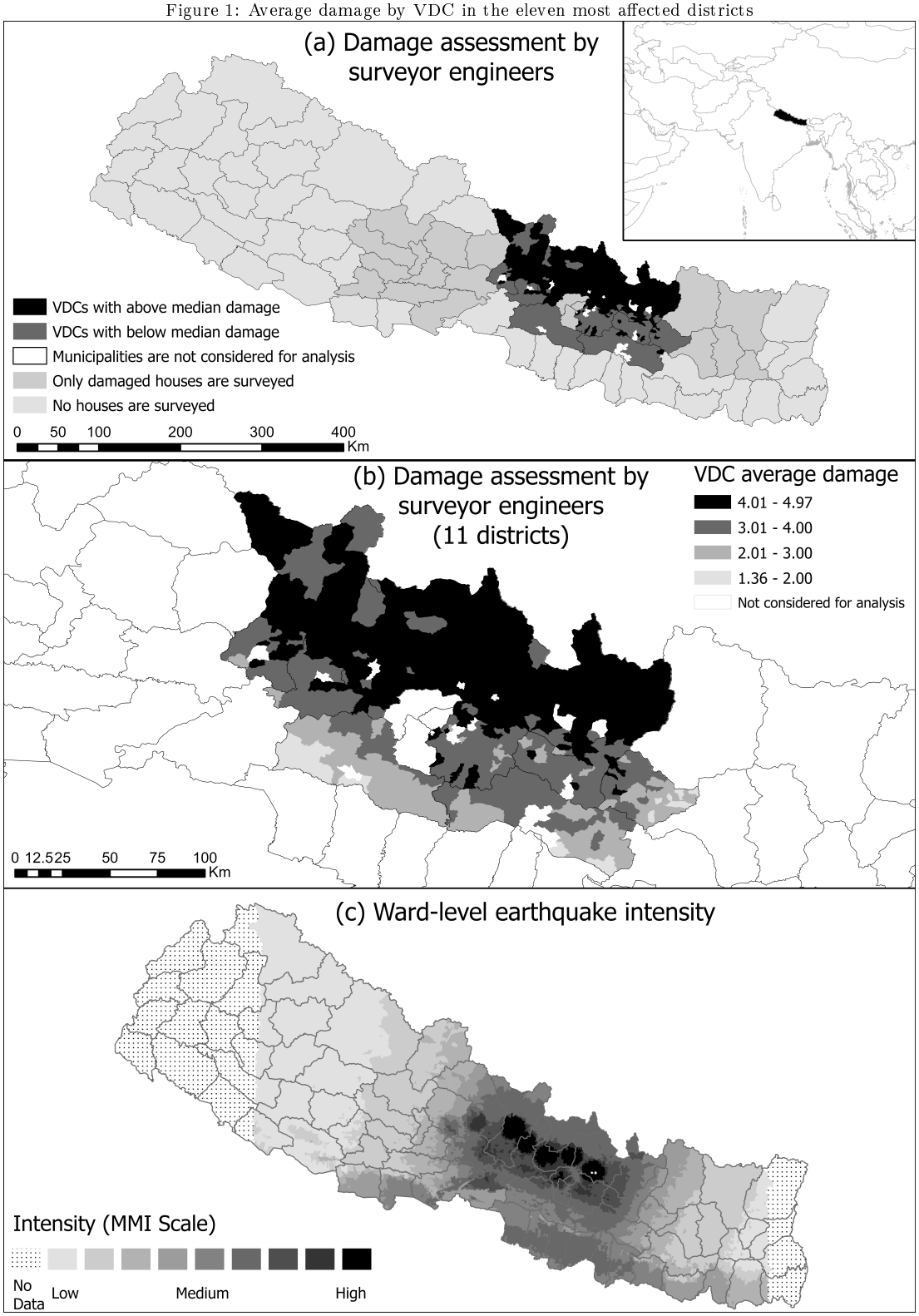
by the first assessment, this would bias the magnitude of favoritism that in regressions that use the engineers' estimates (i.e., those in Table 1, columns 6 and 7) downward.

[21] Specifically, the survey question we use is, "Have you started rebuilding/repair due to damage caused by the April 25 earthquake and its aftershocks?" The data show that upper caste households are less likely to have started repairs than lower caste households (34% of those who had started repairs are upper caste, while out of those who had not started repairs, 41% are upper caste). Overall, about 22% of households say that they had started repairs. We do not know the extent of these repairs, yet – given the relatively short time and resources available after the earthquake – it is likely that any repairs will not have been finished, but rather ones that enable households to restore the essential functioning of their dwelling, such that most damage would still be easily identified by the surveyor engineer in January 2016. The above-mentioned question would further help the engineers to take repairs into account in their assessment of the earthquake-induced damage. Finally, we note that the goal of the damage assessment that started in January 2016 was to estimate the damage that was due to the earthquake, not the damage that remained after possible repairs.

Figure 1: Average damage by VDC in the eleven most affected districts



Source: Panels (a) and (b): Own calculations based on surveyor engineer's estimates in HRHRS data (2016); 1="negligible", 5="total" damage. Panel (c) US Geological Survey (USGS 2015) Note: Panel (a) shows in two dark colors the 11 highly affected districts, i.e., for which an emergency was declared, and in which data were collected on all households and which form the basis of our empirical analysis. "Above" and "below" median refers to the median of those 11 districts.

3.2. All-Party Mechanism (APM) data

For our analysis of favoritism, we collected data on members of APMs. Unfortunately, there is no unique umbrella institution to which the APMs report. Consequently, there is no unified database or publication with information on APMs. Therefore, we collected the list of names of the APM members through a telephone survey with key informants. We mainly used listings of contact information for VDC secretaries and so-called social mobilizers from the time of the earthquake. Additionally, we contacted current ward chairs who were elected in the local election 2017. Finally, in some cases, the names of APM members were provided through other knowledgeable households in the VDC. We were able to obtain APM data for all but one VDC (Jantarkhani, which is omitted from all analyses involving APM data). Thus, in the analysis of favoritism, we work with data from 611 VDCs.[22] We infer caste from family names of APM members by using correspondences between family names and caste of the household heads that are implied by the HRHRS data (2016); Online Appendix A1.2 provides details.[23]

We provide evidence for the quality of the APM caste data in Online Appendix A2.2.[24] Yet, our procedure to obtain information about APM members' castes is prone to errors and may affect results in our analysis of favoritism (but does not affect our analysis of discrimination as this does not use the APM data). If the error is simply noise, it will lead to attenuation bias in the analysis of the role of a shared caste between household and APM, thus making it less likely that we find any effect. It is more problematic if there is a systematic error in this procedure. In response to this, we note the following: First, we work with the caste of APM members in our analysis, while our data collection only asks for the name without referring to caste. The caste of APM members is later inferred by us, based on the family names. This reduces the likelihood that the (possibly biased) responses, which are reported family names, bias our results, which are based on caste. Second, our preferred independent variable is whether "at least one" member of the APM is from the same caste as the household under consideration. This variable is a function of several APM members' names. This makes it less likely that misreporting of individual names biases our results. Third, our analysis includes VDC fixed effects.[25] Therefore, to the extent that errors introduced by the respondent reflect fixed VDC characteristics, these are controlled for. Finally, we also confirm that results are robust to omitting, one at a time, data based on each of the four informant groups (VDC secretaries, social mobilizers, ward chairs, and knowledgeable persons). Results of these robustness checks are in Online Appendix A4.2.10.

[22] In 80% of these VDCs, the APMs consisted of three members, in the others, APMs consisted of four members.

[23] For this study, family names (as well as geographic location) for households in the HRHRS data were obtained separately from the National Reconstruction Authority.

[24] We show that our data on APM castes and official data on castes of ward and VDC chairs from elections in 1997 and 2017 are highly correlated.

[25] There is just one APM per VDC. Yet, the variable of interest – a dummy variable that indicates whether an individual household shares a caste with the APM – varies within VDC.

3.3. Modified Mercalli Intensity (MMI) data

Data from the US Geological Survey (USGS) provide an exogenous measure of earthquake intensity, namely the Modified Mercalli Intensity (MMI). A spatially continuous MMI map for the April 2015 earthquake is generated by the USGS, combining information from ground motion data from 27 seismic stations that are located in Nepal in India as well as subjective reports provided by citizens (the so-called "Did You Feel It?" (DYFI) system) (USGS, 2015). We calculate the MMI measure at the centroid of the ward and assign it to each household within that ward. Note that this measure is based on data that are generated through interpolation and not through individual measurements at the disaggregated local level that we consider. For further information on the MMI and the DYFI system, see Wald et al. (1999), Wald et al. (2011), and Worden et al. (2012).[26]

4. Empirical Strategy and Results

Our analysis proceeds in two steps. First, we show that upper caste households are significantly more likely than lower caste households to receive a high damage assessment during the damage assessment for the emergency aid (i.e., the first damage assessment, performed by political actors, mainly the APMs). Various econometric approaches support a causal interpretation. In a second step, we investigate whether this apparent preferential treatment of upper caste households can be explained by in-group favoritism.

For an easier interpretation of the magnitudes (and to take into account the non-equidistant nature of the three categories of the damage measure), we translate the emergency aid damage assessment categories into the corresponding values in Nepali Rupees (Rs.). Thus, the main dependent variable takes on the values Rs. 0, 3,000, or 15,000. From now on, this variable, capturing the values of this first damage assessment, will be abbreviated *DA1*. Throughout, we cluster standard errors at the VDC level.

4.1. Caste-based discrimination

Table 1, column (1), shows results from a regression of the amount of emergency aid received (DA1) on a dummy variable that indicates the position in the caste hierarchy, i.e., estimated parameters of the following estimating equation:

$$\text{DA1}_{ic} = \alpha + \beta \text{upper caste}_{ic} + \delta X_{ic} + u_{ic}$$

where i indexes households and c indexes caste. *upper caste* is a dummy variable which is one, if the household belongs to one of the upper castes. X_{ic} includes a set of building and household characteristics,

[26] MMI and the two measures of damage coming out of the HRHRS are highly correlated. Splitting the sample into quartiles by MMI (at the ward-level), we find that DA1, which ranges between 1 and 3 is 1.85 in the first quartile and 2.83 in the fourth quartile of MMI by ward. DA2, which ranges between 1 and 5 is 2.79 in the first quartile and 4.5 in the fourth. See Table A2.1.2 in the Online Appendix.

geographic controls, as well as the interactions of building characteristics with indicators for asset ownership in a number of categories (details in notes in Table 1). The coefficient of interest is β.

According to the result shown in column (1), upper caste households receive on average Rs. 1,340 more than lower caste households. Column (2) adds a large number of building and household characteristics and geographic controls that may explain differences in housing damage (e.g., height, ground area, and age of the building, dummy variables for different types of materials, and condition of the land surface around the house; for details see the table notes) and that might be correlated with caste. One particular concern is that emergency aid allocations are different because upper caste houses were more valuable before destruction. To capture differences in pre-earthquake house values (beyond those reflected in basic building characteristics), we also include interactions of building characteristics with indicators for (pre-earthquake) ownership of individual assets (such as television, laptop, refrigerator). This also addresses the concern that APMs might assign emergency cash grants based on the value of the damage. Conditional on all those controls, upper caste households do receive about Rs. 465 more than lower caste households. Online Appendix Table A4.1.1 shows robustness to the inclusion of an even larger set of control variables.

To assess the magnitude of these baseline results, note that the mean dependent variable is about Rs. 11,000 among lower caste households. Therefore, column (1) implies that the average upper caste household receives about 12% more in aid than a lower caste household. However, because there is a limit to how much a household can receive through this channel (Rs. 15,000), an alternative way of looking at this is by calculating how much the gap between actual and maximum DA1 is closed. Thus, the coefficient implies that moving from a lower to an upper caste household closes the gap between actual and maximum DA1 by about one-third (based on column 1), or one-eighth after adding controls (column 2).[27]

[27] The dependent variable used in columns (1) and (2), *DA1*, is measured in Rupees. Using the underlying categorical variable instead, and assuming equal distances between the three categories, and rescaling this variable to lie between 0 and 1 (i.e., with values of 0, 0.5, and 1, instead of values 0, 3,000, and 15,000), does not change the qualitative picture (results not shown). Results are also robust to using an ordered probit model.

Table 1: Upper caste households receive more emergency aid

	Dependent variable is								
	DA1 (in rupees)		DA2		$DA1_{[0,1]}$ -$DA2_{[0,1]}$	DA1 (in rupees)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8) IV	(9) IV
upper caste	1340.1	465.3	0.024	-0.011	0.023	446.4	130.1	419.9	140.0
	(194.1)***	(66.2)***	(0.02)	(0.009)	(0.005)***	(64.7)***	(27.7)***	(93.0)***	(28.9)***
DA2						793.1	878.5	4447.5	1724.7
						(64.1)***	(57.7)***	(187.5)***	(359.3)***
MMI (ward)		✓	✓	✓	✓	✓	✓	✓	✓
building controls		✓	✓	✓	✓	✓	✓	✓	✓
household controls		✓	✓	✓	✓	✓	✓	✓	✓
geographic controls		✓	✓	✓	✓	✓	✓	✓	✓
building controls × individual assets		✓	✓	✓	✓	✓	✓	✓	✓
building controls × MMI (ward)		✓	✓	✓	✓	✓	✓	✓	✓
VDC fixed effects				✓			✓		✓
VDCs	612	612	612	612	612	612	612	612	612
N	670733	667862	667862	667862	667862	667862	667862	667862	667862
R^2	0.011	0.44	0.42	0.53	0.088	0.46	0.54	0.11	0.091
Mean dependent variable	11519.2	11519.2	3.76	3.76	0.090	11519.2	11519.2	11519.2	11519.2
instrumented variable								DA2	DA2
F-statistic								128.9	13.2

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable in columns (1), (2), (6) - (9) is *DA1*, i.e., the value of the first damage assessment (in rupees), and takes the values 0, 3,000, and 15,000. In columns (3) and (4), the dependent variable is the surveyor engineer's damage assessment (*DA2*). The dependent variable in column (5) is the difference between $DA1_{[0,1]}$ and $DA2_{[0,1]}$, where both the categorical values of *DA1* and *DA2* are rescaled to lie between 0 and 1 before differencing. *upper caste* is a dummy equaling one when the household belongs to Brahmin, Chhetri, or upper Newar caste groups. *MMI (ward)* is the MMI measure at the centroid of the ward that is assigned to each household within the ward. *building controls* (capturing conditions before the earthquake) are height, ground area, and age of the building, dummy variables for different types of building foundation, roof, floor materials, construction materials, and condition of the land surface around the house, as well as different types of legal ownership. *household controls* include gender, education, and age of the household head, household size, whether the household owns a bank account, and a categorical measure of income. *geographic controls* include distances from the ward centroid to both the epicenter of the main earthquake and the aftershock, the minimum of both distances, and minimum and maximum altitude and slope within the ward. *building controls* × *individual assets* and *building controls* × *MMI (ward)* include the interaction of the height, ground area, and age of the building and land surface around the house with the individual pre-earthquake asset dummies and *MMI (ward)*, respectively. Instrumental variables in columns (8) and (9) are ward-level earthquake intensity (MMI), distance to the epicenter and the aftershock, and interactions of building characteristics (height, area, age, surface conditions) with MMI.

We have argued above that the surveyor engineers' damage assessment is not affected by caste considerations. We test this in columns (3) and (4), which show the results using the second damage assessment, i.e., the one performed by the surveyor engineers (from now on called *DA2*) as the dependent variable. Here we assume equal distances between the five categories of DA2. The results show that, after adding a large set of plausible determinants of damage (column 4), there is no statistically significant relationship between the *upper caste* dummy and the engineers' assessments.[28] We note that the coefficients on building characteristics interacted with MMI are – jointly, and some individually – highly significant, suggesting that characteristics that should affect earthquake damage are indeed highly predictive (results not shown).

Columns (1) and (2) show a strong correlation between being an upper caste household and aid received. Yet, to argue that caste causally leads to differences in aid, we need to deal with the concern that omitted variables may explain the observed correlation. To do so, we follow three strategies.

First, we argue based on the finding that the *upper caste* dummy is not significant in regressions using the engineers' assessment (*DA2*) as the dependent variable (column 3). This suggests that the many available controls regarding the building itself, the household, and the geographic characteristics are sufficient to explain differences in housing damage, as measured by engineers, between castes. In turn, this also suggests that the correlation between upper caste and housing damage, as assessed by political committees, that we find in column (2), after controlling for the same set of variables as in column (3), is not simply due to omitted variables.

Second, we exploit the availability of the independent damage assessment DA2 to implement a strategy akin to Olken (2007) in that we consider the difference between the politically influenced damage measure and the engineers' measure. Unfortunately, our second measure does not have a Rupee value assigned to it and is also based on a different number of categories than DA1, so we first rescale both DA1 and DA2 to lie between 0 and 1 before taking the difference between these two transformed variables $DA1_{[0,1]}$ and $DA2_{[0,1]}$ and use that new differenced variable as the dependent variable in column (5). The results confirm the earlier findings of a significantly positive *upper caste* coefficient. This implies that APMs assign higher damage categories to upper caste households than engineers.

An alternative way to use the damage assessment by engineers is to include it as an independent variable, which we do in column (6). This does not require the assumption of a comparability of categories (which we make in column (5)). The results show that DA2 is indeed a highly significant and economically large predictor of the damage assessment of the APMs. Yet, the upper caste dummy remains significant and comparing results in column (6) with those in column (2) shows that the magnitude of the coefficient does not change much, when DA2 is included as a control.[29]

[28] Again, estimating an ordered probit model instead of OLS in columns (3) and (4) shows a similar picture.

[29] A more flexible approach is to use dummies for each DA2-category as controls for true damage levels in a regression framework with DA1 as a dependent variable. Our results are robust when we do so (results not shown here). For an easier

In column (7), we add VDC fixed effects. This reduces the upper caste coefficient, which may be explained by the fact that including VDC fixed effects takes out important variation that we are interested in. In particular, VDC fixed effects capture the part of discrimination that is due to in-group favoritism.[30]

Despite our above arguments based on the institutional environment and despite the findings shown in columns (3) and (4), there may be a concern that DA2 is endogenous in columns (6) and (7), in particular, one might expect that determinants of damage that are not captured by our large set of building, household, and geographic controls that determine higher DA1 also determine higher DA2. Therefore, in columns (8) and (9) we instrument DA2. The first stage of this regression are the specifications shown in columns (3) and (4), respectively. The instruments used are based on geography, namely ward-level earthquake intensity (MMI), distance to the epicenter and the aftershock, and interactions of several building characteristics (height, area, age, surface conditions) with MMI. Column (8) is comparable to column (6), while column (9) adds VDC fixed effects and is comparable to column (7). The coefficient of the instrumented DA2 increases significantly. This suggests that any upward bias that is due to unobserved variables driving both DA1 and DA2 is small relative to the likely attenuation bias introduced by measurement error in DA2. In any case, the coefficient on *upper caste* remains stable, i.e., are largely unaffected by the IV approach.

The specifications in columns (8) and (9) also present us with a way to quantify discrimination. In both specifications, the coefficient on *upper caste* is about one-tenth of the coefficient of *DA2*. If we assume that DA2 measures true damage, these coefficients suggest that the effect of belonging to an upper caste provides additional emergency cash grants of the same magnitude that a one-tenth of a DA2-degree increase in true damage would have provided. It should be noted that these are average numbers across the whole sample. As we will show below, differences between upper caste and lower caste are markedly different across areas with different earthquake intensities.

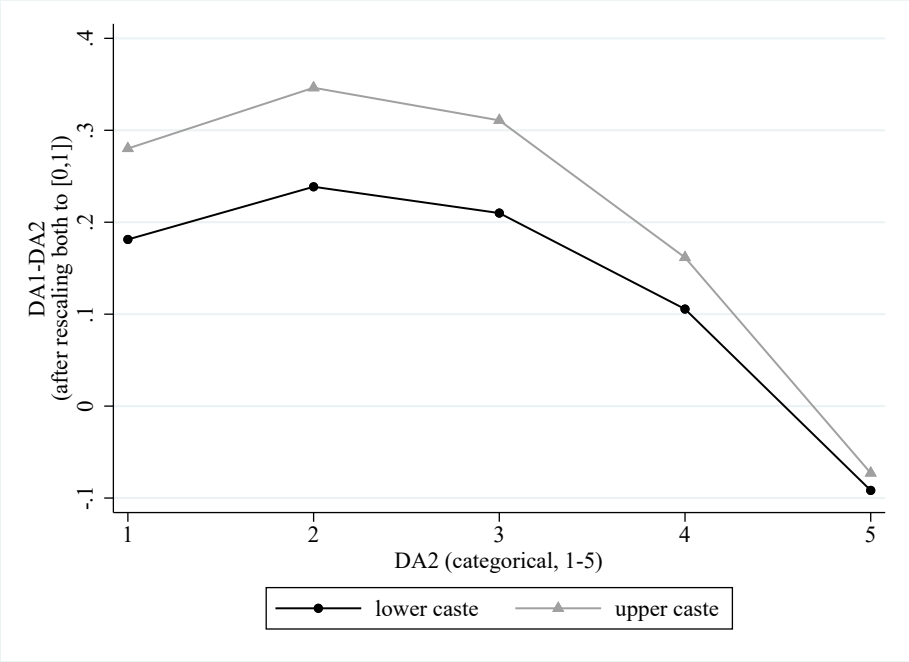
Because there are only three potential values of the outcome variable DA1 and five categories of DA2, we also investigate robustness to using an alternative specification, in which we aggregate the categories such that we have binary values, and estimate linear probability models. Details are provided in Online Appendix A4.1.3. The results are robust to this alternative approach.

In sum, Table 1 shows that upper caste households receive larger emergency cash grants. This could be due to the damage of upper castes being overstated or due to lower castes' damage being understated. To investigate this question, we tabulate, in Online Appendix A2.4, DA1 vs. DA2 separately for upper and for lower castes. Assuming that we can take the surveyor engineers' assessment (DA2) as a proxy

comparison with the IV results in columns (8) and (9) we show in Table 1 results with the categorical variable.

[30] If there is favoritism among upper castes, then emergency aid payments will be particularly large on average in VDCs that have both an upper caste representative in the APM and many upper caste households. As these are characteristics that vary at the VDC level, including VDC fixed effects will reduce the estimated magnitude of favoritism. Indeed, in the data, we see a strong correlation of upper caste APMs with the number of upper caste households in a VDC, see Online Appendix A2.3.

Figure 2: The difference in damage assessments by value of DA2.



Source: Own calculations based on HRHRS data (2016)

Notes: DA1 has 3 categories, DA2 has 5 categories. To make these measures comparable, we normalize them both to lie between 0 and 1 before taking the difference.

for true damage, these results show that for high damage (estimated by the engineers), the vast majority (>90%) of households, independent of being upper or lower caste, receive an assessment of "total damage" by the APMs, implying Rs. 15,000 in emergency cash grants. However, for households with low damage values of DA2, the APM assessment is quite different for upper and lower castes. With the lowest DA2 assessment (grade 1), 14% of lower caste households receive a "total damage" damage assessment by APMs, i.e. Rs. 15,000, while about 24% of upper caste households with the lowest DA2 assessment receive this amount. Figure 2 summarizes these results. Simply stated: when the true damage was high, both upper and lower caste households mostly received Rs. 15,000. Thus, there is less concern about understating of true damage of lower caste households when damage is high. However, for low damage, there appears more of an overstatement for upper caste than an understatement for lower caste.

The above strategies based on DA2 rely on the argument that the surveyor engineer's assessment reflects true damage levels and does not contain caste-related biases. To avoid this assumption, we employ a third strategy to support a causal interpretation that does not rely on the DA2 measure but on the variation in earthquake intensity, which we measure through the Modified Mercalli Intensity (MMI) (USGS, 2015). In particular, we implement an analysis of heterogeneity with respect to earthquake intensity, which focuses on the interaction between an upper caste dummy and earthquake intensity (i.e., a difference-in-differences

estimator). The focus on the interaction term allows us to control for any remaining unobserved difference between upper and lower caste households through upper caste fixed effects, as we exploit the within-upper-caste variation in earthquake intensity exposure. This strategy is based on the observation that it is easier to favor individual households in situations where the household's actual housing damage is low and/or the local damage is low. With low levels of damage, there is more room to provide unjustified benefits to favored households, because there is an upper limit to the individual aid level. Further, if a household has indeed a completely destroyed house, there will be little question about the correct damage assessment. Yet, with moderate levels of true damage subjective assessments are more feasible. Specifically, we use the following estimating equation:

$$\text{DA1}_{icv} = \beta \text{upper caste}_{icv} + \gamma(\text{upper caste}_{icv} \times \text{low damage}_{icv}) + \alpha_v + \delta X_{icv} + u_{icv}$$

where i indexes households, c indexes caste, v indexes VDC, and α_v is a vector of VDC-level fixed effects. X_{icv} includes a set of further controls, as before.

In this specification, the coefficient of interest is γ, which captures the increase in the difference between upper and lower caste in the amount of aid received as we move from a VDC that has "high damage" to one that has "low damage".

If we are willing to assume that the location of the earthquake's epicenter and the resulting variation in earthquake intensity across locations is exogenous, i.e., not related to unobserved characteristics that determine differences in housing damage between upper and lower castes, this approach can be used to provide additional evidence for discrimination: If there is no discrimination and earthquake intensity is unrelated to unobserved differences between upper and lower castes that determine damage, the difference between upper and lower castes should not change as earthquake intensity decreases. On the other hand, with discrimination, we expect γ to be positive.

To define "low damage", we first calculate VDC-averages of the ward-level measures of MMI. Based on these averages, we define a variable *first quartile MMI*, which is one for VDCs with a VDC-average of MMI in the first quartile.[31]

Results in Table 2 indeed show significantly positive interaction terms γ, providing evidence for caste-based discrimination. We control for MMI (ward) and for VDC fixed effects directly, so *first quartile MMI* itself is not included.

[31] Results do not depend on the use of quartiles. We get qualitatively similar results when we split the sample into above and below median earthquake intensity VDCs. Alternatively, we obtain similar results when we use the continuous MMI variable. Because it appears that the relationships are non-linear, we prefer the specification based on the quartile split over those using this continuous variable.

Table 2: Evidence for caste-based discrimination: exploiting variation in earthquake intensity

	Dependent variable is DA1 (in rupees)				
	(1)	(2)	(3)	(4)	(5)
upper caste	4.06	12.1	33.9	-258.8	-218.6
	(28.0)	(27.6)	(88.9)	(126.1)**	(144.8)
upper caste × 1^{st} quartile MMI	518.7	511.3	485.6	379.9	363.1
	(105.5)***	(105.4)***	(104.1)***	(96.7)***	(97.2)***
MMI (ward)	✓	✓	✓	✓	✓
building controls	✓	✓	✓	✓	✓
household controls	✓	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓	✓
VDC fixed effects	✓	✓	✓	✓	✓
slope and altitude × MMI (ward)		✓			✓
building controls × upper caste			✓		✓
building controls × 1^{st} quartile MMI			✓		✓
household controls × upper caste				✓	✓
household controls × 1^{st} quartile MMI				✓	✓
VDCs	612	612	612	612	612
N	667862	667862	667862	667862	667862
R^2	0.53	0.53	0.53	0.53	0.53
Mean dependent variable	11519.2	11519.2	11519.2	11519.2	11519.2

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1*, i.e. the value of the first damage assessment (in rupees), and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy variable equaling one if the household belongs to Brahmin, Chhetri, or upper Newar caste groups. *first quartile MMI* is equal to one for VDCs that belong to the first quartile of the VDC averages of MMI (ward). The regressions include *MMI (ward)*, *building controls*, *household controls*, *geographic controls*, and *building controls* × *individual assets* and are as indicated in the notes to Table 1. *slope and altitude* × *MMI (ward)* include the interaction of the mean slope and altitude at the ward and MMI (ward). *building controls* × *upper caste* and *building controls* × *first quartile MMI* include the interaction of the height, ground area, and age of the building and land surface around the house with *upper caste* and *first quartile MMI*, respectively. *household controls* × *upper caste* and *household controls* × *first quartile MMI* include the interaction of the size of the household, age and gender of the household head, whether household owns a bank account, and dummy variables for belonging to the above median education and income category with *upper caste* and *first quartile MMI*, respectively.

To illustrate the magnitude of misallocation of funds, consider the following: results in Table 2 show that this misallocation mostly happens in low-damage areas. The mean of the dependent variable in VDCs in the first quartile of damage is Rs. 5,847. So the coefficient of about 511 on the interaction term (column 2) suggests an upper caste premium of approximately 9% in low damage areas.

To further illustrate the economic significance of these numbers, we calculate the additional amount that lower caste households would obtain if the additional funds that are flowing to upper caste households (after controlling for determinants of true destruction) would be distributed to all households (akin to the calculation in Alatas et al., 2019). Again, we focus on the VDCs with the lowest level of destruction (namely, VDCs in the first quartile of VDCs, as measured by MMI). Upper caste households in those VDCs receive 511 Rupees more (column 2), and the share of upper caste households in the total population of these VDCs is 32.9%. Assume that the total amount that upper caste members receive in addition to the average payment would be taken away from upper caste households and instead be distributed to all households in these VDCs. Then each household would receive 168 Rupees. Thus, lower caste households would receive 168 Rupees more aid. Given that the average household in VDCs with the lowest level of destruction receives 5,847 Rupees as an emergency grant, the additional amount for the average lower caste household would imply 168/5,847$\approx$3% more aid in an environment in which there was no upper caste premium than with the observed preferential treatment of upper caste households.

We further investigate the robustness of the results by including further interaction terms of observable variables. One possible concern with the caste-based discrimination results reported in columns (1) and (2) is that upper caste dwellings may have characteristics that make them relatively more vulnerable in low-damage areas. To address these concerns, we add a large number of interactions of *upper caste*, and *first quartile MMI*, respectively, with characteristics of the building itself (height, base area, and age) and the land surface around the house. The qualitative results are robust, and the magnitudes remain stable across different specifications.

Of particular concern is that upper caste houses may have been more valuable before destruction and this may have played a role during the damage assessments. Therefore, we note that all regressions include controls for the interaction of pre-existing differences in household assets (as a proxy for unobserved house value) with the building controls (height, base area, and age of the building).

One potential concern regarding our measure of earthquake intensity, MMI, as a control variable that proxies the expected damage through the earthquake is that it may not fully capture possible non-linear effects of seismic activity. To address this concern, we also repeat the analysis using alternative measures of earthquake intensity, namely a severity index and an earthquake impact measure developed by the European Commission Joint Research Center and the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA). We find that the baseline results are robust to using these alternative measures (results

are shown in Online Appendix Table A4.2.14).[32] Further, MMI may interact with other geographic features, which may be particularly relevant in Nepal's rugged and mountainous terrain. To address this concern, we add additional controls for the interaction of slope and altitude with MMI (columns 2 and 5). Again the magnitudes of the results remain stable.

These results collectively strengthen the case for a causal interpretation of the difference between upper and lower castes in aid distribution.

4.2. In-group favoritism

The previous section strongly suggests that there is discrimination based on caste. In this section, we ask whether this is due to in-group favoritism, i.e., whether members of the community-based committees that perform the aid-relevant damage assessments favor members of their own caste.

As discussed above, the APM members played a central role in the first damage assessments and thus facilitated aid distribution. We therefore test for the presence of favoritism by combining information about emergency aid allocation with data on the APM composition. Specifically, we test whether households receive higher damage assessments (DA1) when there is an APM member that belongs to the same caste as the household. Thus, we define a variable $co\text{-}caste_{icv}$, which is one if at least one APM member in VDC v belongs to the same caste c as household i in VDC v. We define the co-caste variable at the level of 6 caste groups (Brahmin, Chhetri, upper Newar, Janajati, lower-Newar, and other "impure" castes). To test for heterogeneity in in-group favoritism between upper and lower castes, we interact *co-caste* with the *upper caste* dummy. Further, building on the above strategy to investigate heterogeneity with respect to earthquake intensity, we also use triple interactions, in which we interact the interaction term *upper caste* $\times$ *low damage* with *co-caste* (and add all two-way interactions). This approach addresses possible concerns regarding omitted variables at the co-caste level as well as concerns about the somewhat ad-hoc choice of APM members (and thus the possible endogeneity of being co-caste).

[32] According to UNOCHA (2015), the "Earthquake impact measure" captures the earthquake's direct impact on buildings, on humans, and on earthquake-led migration. The "severity index" additionally includes socioeconomic vulnerability (effect on Human Development Index and effect on marginalized and vulnerable groups and labor capacity) and physical vulnerability (hazard risk and humanitarian access) (UNOCHA, 2015, p.54). We obtained the UNOCHA data from `https://www.humanitarianresponse.info/en/operations/nepal/disaster-severity-estimation-index` (accessed August 19, 2019).

Table 3: Evidence for in-group favoritism

	Dependent variable is DA1 (in rupees)					
	(1)	(2)	(3)	(4)	(5)	(6)
upper caste	118.5	32.5	-18.4	-13.8	-227.7	-230.9
	(30.1)***	(39.1)	(42.0)	(42.2)	(149.3)	(149.1)
co-caste	4.40	-69.0	-0.26	-4.94	6.87	2.29
	(29.6)	(48.5)	(44.7)	(43.9)	(44.4)	(43.6)
co-caste × upper caste		159.7	35.9	42.7	37.2	43.8
		(68.8)**	(67.2)	(66.2)	(67.1)	(66.2)
upper caste × 1^{st} quartile MMI			204.7	194.4	57.0	46.9
			(111.7)*	(111.9)*	(106.1)	(106.3)
co-caste × 1^{st} quartile MMI			-341.6	-339.1	-373.6	-371.2
			(130.1)***	(129.8)***	(128.8)***	(128.4)***
co-caste × upper caste × 1^{st} quartile MMI			634.6	638.7	644.3	648.6
			(190.9)***	(190.5)***	(186.7)***	(186.3)***
MMI (ward)	✓	✓	✓	✓	✓	✓
building controls	✓	✓	✓	✓	✓	✓
household controls	✓	✓	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓	✓	✓
VDC fixed effects	✓	✓	✓	✓	✓	✓
slope and altitude × MMI (ward)				✓		✓
building controls × upper caste					✓	✓
building controls × 1^{st} quartile MMI					✓	✓
household controls × upper caste					✓	✓
household controls × 1^{st} quartile MMI					✓	✓
VDCs	611	611	611	611	611	611
N	667464	667464	667464	667464	667464	667464
R^2	0.53	0.53	0.53	0.53	0.53	0.53
Mean dependent variable	11523.8	11523.8	11523.8	11523.8	11523.8	11523.8

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1*, i.e. the value of the first damage assessment (in rupees), and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy variable equaling one if the household belongs to Brahmin, Chhetri, or upper Newar caste groups. *co-caste* is a dummy variable equaling one if the household belongs to the same caste as any one of the APM members in the VDC. *MMI (ward)* is based on the earthquake intensity measure Modified Mercalli intensity at the centroid of the ward. *first quartile MMI* is equal to one for VDCs that belong to the first quartile of the VDC averages of MMI (ward). The regressions include *building controls*, *household controls*, *geographic controls*, and *building controls* × *individual assets* and are as indicated in the notes to Table 1. Similarly, *slope and altitude* × *MMI (ward)*, *building controls* × *upper caste*, *building controls* × *first quartile MMI*, *household controls* × *upper caste*, and *household controls* × *first quartile MMI* are as indicated in the notes to Table 2.

Table 3 first shows that there is no significant co-caste effect on average. Yet, results in column (2) show strong heterogeneity in the co-caste effect between upper and lower caste households: There is a strong co-caste effect for upper caste households, while the coefficient on the main *co-caste* dummy indicates that the effect is insignificant for lower caste households. Thus, we find evidence for favoritism among upper caste households but no such effect for lower castes. Further, the coefficient on the *co-caste* × *upper caste* interaction is large relative to the main *upper caste* coefficient, implying that a large fraction of the discrimination found earlier can be explained by favoritism. Finally, the triple interaction coefficient, shown in columns (3)-(6), is significantly positive. Thus, the earlier finding that upper caste households benefit in particular in low damage VDCs is particularly strong if at least one APM member in that VDC is of the same (upper) caste. In Online Appendix Table A4.2.8 we show estimates separately for the first and the fourth quartile, thus allowing all coefficients to vary by quartile, not only the coefficients of interest. The results confirm the findings presented in Table 3.

For lower caste households, there is no benefit from the presence of their own (lower) caste representatives in aid allocation committees. Indeed, the negative and significant coefficient on *co-caste* × *first quartile MMI* suggests the opposite, namely that lower caste APMs assign less emergency aid to lower caste households, i.e., according to these estimates, lower caste APMs also favor higher caste households.

This latter result may be surprising, but it is in line with a finding by Hanna and Linden (2012), who randomly assign student characteristics (including names and caste) to exams and find that low-caste teachers in India give lower grades to exams of lower caste students. Hanna and Linden (2012) suggest as a possible explanation that "low-caste teachers may have internalized a belief that different castes have different abilities, and thus such teachers may discriminate more against low-status children" (p. 151). Transferring this argument to our setting, lower caste APMs may have internalized the belief that lower caste households deserve less help (here in terms of public funds). The finding is also consistent with research in social psychology that has found a tendency of individuals to favor individuals outside of their own group among members of disadvantaged groups (e.g., Jost and Burgess, 2000; Jost et al., 2004; Umphress et al., 2007). The psychological literature explains out-group favoritism by a so-called "system-justification", which is defined as "the psychological process by which existing social arrangements are legitimized, even at the expense of personal and group interest" (Jost and Banaji, 1994, p.2). This explanation is related to one given by Barr et al. (2018), who suggest that social norms of discrimination moderate discriminatory behavior. Our results are in line with discrimination of upper caste members being socially less acceptable. Finally, lower caste households may believe that lower caste households can provide a less valuable reciprocation than upper caste households if they are favored over other households, and therefore lower caste APM members side with the upper caste households.

As before, we also control throughout for the interaction of pre-earthquake household assets with the building controls –height, base area, and age of the building. In addition, we also again include the inter-

actions of slope and altitude with MMI. The qualitative results are robust, and magnitudes remain stable across different specifications.[33] A further analysis of heterogeneity with respect to the relative size of the upper and lower caste groups suggests that upper caste APMs act more in favor of their own upper caste members in wards in which there is a large share of upper caste members to begin with (see Online Appendix Table A4.2.5).

To further support our claim of a causal effect of caste, we use Oster's (2019) method to assess the possible importance of selection on unobservables. Based on the cut-off suggested by (Oster, 2019), the findings presented in Online Appendix Table A3 show that our central results are robust.

Together, the results in Table 3 strongly suggest the existence of in-group favoritism among upper caste households: Upper caste households receive higher damage assessments whenever there is a political representative of their own caste in the APM. There is no evidence for in-group favoritism among the lower caste members.

The main set of results is based on an analysis of co-caste that considers APM members' castes only. In Online Appendix Table A4.2.12 we show that results are robust to including the caste of the VDC secretary and the so-called Social mobilizer in the calculation of the *co-caste* variable.

4.3. Are upper caste APMs generally providing more benefits?

To argue that the finding that upper caste members receive more benefits when their caste is represented in the APM is the result of favoritism among upper caste members of the APMs, we need to rule out that APMs that include upper caste members generally provide more benefits. To investigate this alternative explanation, we add two variables that capture APM composition to the setup of Table 3. Note, however, that Table 3 includes VDC fixed effects while we cannot include VDC fixed effects here because APM composition does not vary within VDCs. For comparability, in column (1), we show results from column (3) of Table 3, but without VDC fixed effect. In columns (2) and (3), we add a dummy variable equaling one if the APM includes at least one upper caste member. As an alternative, we add in columns (4) and (5) a variable that measures the share of upper caste members in the APM. The variables indicating whether the APM includes upper caste members are statistically insignificant in columns (2) and (3). The upper caste share in the APM is borderline significant only in specification (4). Yet, we note again that the two variables related to APM composition (unlike the interaction term between upper caste and co-caste in Table 3) are identified only through variation across VDCs and may reflect unobserved variables at the VDC level (Table 3 includes VDC fixed effects). We conclude that the results provide only weak support for the hypothesis that APMs that include upper caste members are generally providing more benefits, while the estimate of

[33] In-group favoritism results are also robust to using an alternative variable to measure low earthquake intensity with MMI (results are shown in Online Appendix Table A4.2.13), an alternative measure of earthquake intensity altogether, namely the severity index and an earthquake impact measure (Online Appendix Table A4.2.14), and a finer disaggregation of castes to calculate the co-caste variable (Online Appendix Table A4.2.1a).

the interaction effect between co-caste and upper caste remains large and statistically significant, confirming the finding of favoritism among upper caste members.[34]

[34] Results are also robust to the following variations: First, we define variable that is equal to one if the household is connected to an APM member and the caste of that member is the majority caste in the APM (Online Appendix Table A4.2.6). Second, we define a variable that is equal to one if the APM is homogenous, i.e. is made up of only upper or only lower caste households (Online Appendix Table A4.2.7. In both cases, adding this new variable and interactions with the upper caste dummy does not alter the main results regarding co-caste, while the interaction terms between the new variables and upper caste are insignificant.

Table 4: Are upper caste APMs providing more benefits?

	Dependent variable is DA1 (in rupees)				
	(1)	(2)	(3)	(4)	(5)
upper caste	30.0	58.7	53.5	130.5	117.4
	(88.4)	(88.1)	(87.3)	(87.0)	(88.4)
co-caste	-583.8	-524.1	-574.1	-380.1	-449.5
	(140.2)***	(141.6)***	(204.6)***	(124.3)***	(168.4)***
co-caste × upper caste	766.7	667.7	664.6	458.4	438.7
	(180.9)***	(181.0)***	(186.0)***	(154.2)***	(173.4)**
upper caste APMs (at least one)		195.6	153.6		
		(229.6)	(258.7)		
co-caste × upper caste APMs (at least one)			62.1		
			(247.6)		
upper caste APMs (share)				444.6	381.9
				(245.3)*	(271.1)
co-caste × upper caste APMs (share)					127.7
					(301.9)
MMI (ward)	✓	✓	✓	✓	✓
building controls	✓	✓	✓	✓	✓
household controls	✓	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓	✓
VDCs	611	611	611	611	611
N	667464	667464	667464	667464	667464
R^2	0.44	0.44	0.44	0.44	0.44
Mean dependent variable	11523.8	11523.8	11523.8	11523.8	11523.8

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1*, i.e. the value of the first damage assessment (in rupees), and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy equaling one when the household belongs to Brahmin, Chhetri, and upper-Newar caste groups. *co-caste* is a dummy variable equaling one if the household belongs to the same caste as any one of the APM members in the VDC. *upper caste APMs (at least one member)* is a dummy variable equaling one if the VDC includes (at least) one upper caste member in the APM committee. *upper caste APMs (share)* is the percentage of APM members that is upper caste. The regressions include *building controls*, *household controls*, *geographic controls*, and *building controls* × *individual assets*, which are defined as indicated in the notes to Table 1.

4.4. Alternative Explanations

The emergency grants for housing damage may interact with other types of aid in this region and time period. For example, one hypothesis is that APMs aimed to"correct" (perceived) biases in other programs, i.e., other programs may be seen as preferring lower caste households by APMs. Related to this, we note that, immediately after the 2015 earthquake, the Government of Nepal adopted a so-called "one-door" policy with the goal of providing aid through a centralized channel (Barber, 2016). The goal was to coordinate all aid, such that, in theory, no biases of this kind would have to be considered by local actors. Further, a paper by Eichenauer et al. (2020) studies the 2015 UN Nepal Earthquake Flash Appeal, which identified 184 projects to provide life-saving assistance and protection after the earthquake. Eichenauer et al. (2020) find that the allocation of the funds from this flash appeal favor municipalities that have larger shares of higher caste households. Thus, if anything, it seems that other types of aid are also favoring higher castes. This casts further doubt on the hypothesis that APMs act to remediate perceived biases.

Further, one may be concerned about selective displacement driving our results. Unfortunately, we cannot say much about heterogeneity in displacement. We note, though, that less than 1% of household in Nepal needed to be relocated due to earthquake damage (NPC, 2015). We do not know the exact location of these displaced households and where they were relocated to, and therefore we cannot identify the share of relocated households in our sample. However, even if all the relocated households resided in the 11 sample districts, they constitute less than 4% of our sample. Further, note that instructions for surveyor engineers were such that they were supposed to collect information on all houses, including those in which (at the time of the survey) no one resided. Finally, because of cultural constraints on movements within the country, it seems that it would have been easier for upper caste households to move in response to destruction. To explain our result, households with less housing destruction would have to be more likely to move in response to destruction. However, this seems counterintuitive. Taken together, we argue that selective displacement should not be a primary concern in the analysis.

We also ask whether our results are possibly due to family networks rather than caste-based favoritism. To this end, we define a new variable that is equal to one, if the household and at least one APM not only belong to the same caste, but share the same family name. We add this variable and the interactions with the upper caste dummy to our baseline regressions. Online Appendix Table A4.2.2 shows that these variables are not statistically significant (while the co-caste variable interacted with upper caste remains significant). Thus, there is no additional effect of sharing the same family name. Although the absence of a positive finding does not rule out family networks, and may be explained by measurement issues, e.g., because many households share the same name without belonging to the same family, the results support an explanation based on caste more than one based on family.

5. Conclusion

Community-based delivery of development aid, including identification of beneficiaries of aid, is increasingly seen as a promising avenue for reaching better development outcomes because the community-based approach may, for example, lead to improved targeting and more sustainable projects (Mansuri and Rao, 2012). On the other hand, projects that are largely administered locally carry the risk of elite capture, favoritism, and, consequently, a misallocation of funds (Bardhan and Mookherjee, 2000; Platteau, 2004). Existing research indeed shows evidence for elite capture and in-group favoritism in situations where local agents play a large role in program administration (Olken, 2007; Alatas et al., 2012, 2019; Bandiera et al., 2020; Heß et al., 2021). Yet, little is known about heterogeneous effects of in-group favoritism in the context of community-based development efforts in the presence of a strong hierarchical structure of social groups, such as Nepal's caste structure. This paper addresses this gap in existing research. To deal with the inherent difficulties of measuring and identifying discrimination and favoritism, we exploit very detailed data and exogenous variation induced by the 2015 Nepalese earthquake.

We first show the existence of caste-based discrimination. We find that households higher in the caste hierarchy received significantly more emergency aid after the 2015 earthquake in Nepal than households that are lower in the hierarchy. These results are robust to controlling for levels of damage in a variety of ways, including a damage assessment by engineers, thus reducing the possibility of omitted variables driving the results. An analysis of heterogeneity with respect to earthquake intensity further supports a causal interpretation. The magnitude of the effect is economically meaningful. In VDCs with the lowest levels of destruction, where there are greater opportunities for acting on favoritism or in-group motives, the upper caste premium is about 9%.

Second, we demonstrate heterogeneous effects of in-group favoritism. Non-elected groups of local political representatives were central actors in the distribution of emergency aid. The results show that if there were members of upper castes among these community-based committees that made emergency aid decisions, they were more likely to allocate significantly more in emergency grants to households also from upper castes than compared to lower caste households. This provides strong evidence for in-group favoritism among upper caste households. The absolute values of favoritism appear moderate but should be considered relative to the modest maximum amount of aid given out and that the average household in our sample districts, which cover the most heavily affected locations, already received about 75% of the maximum. In addition, upper castes were over-represented in local decision-making committees, which magnifies the quantitative importance of the observed favoritism as a source of discrimination and misallocation of aid. On the other hand, we find no evidence for in-group favoritism among lower castes. In fact, there is evidence suggesting that committees that include lower caste members provided less aid to lower caste households. This shows that in-group favoritism cannot be seen as a generally occurring phenomenon but depends on the social hierarchy.

What are the incentives for favoritism, and why is favoritism observed only among upper caste members? Social norms, which may tolerate certain forms of discrimination - in this case involving norms favoring upper caste members - may be behind the heterogeneity result (Barr et al., 2018). Caste is also closely related to political power, as upper caste members are more likely to hold positions of power than members of lower castes (e.g., Gurung, H., 2003; Bennet et al., 2008; Mainali et al., 2013). Thus, favoritism could be a way for politicians to secure votes from influential households in coming elections. We explore this hypothesis in Online Appendix A4.2.9, yet do not find evidence for this. Our results are also not associated with one particular party (see Online Appendix Table A4.2.11). Relatedly, if upper caste members are more likely to hold positions of power at higher levels, upper caste APM members might be less concerned about being sanctioned for biased damage assessments because they believe they are covered by those individuals in higher positions. Discriminating actors might also consider the potential for some kind of "revenge" by those who are discriminated. Existing work suggests that officials disproportionally target the politically powerless (Robinson and Seim, 2018). The results may also hint at the role of entitlement considerations, which have been shown to be important in experimental studies (Paetzel and Sausgruber, 2018). Understanding the underlying reasons for caste-based favoritism is an important area for future research.

How relevant are the present findings beyond Nepal? Our specific findings are obviously valid only for Nepal. Yet, the paper provides some starting points for thinking about discrimination and favoritism more generally. At the most general level, the paper shows that caste-based discrimination continues in Nepal, despite legal provisions to the contrary. Importantly, it shows that this is not something that happens outside the official government system, but in fact, it is part of the system, as local politicians, who were officially tasked by the government with the distribution of aid, were the discriminating actors. Thus, the paper adds to evidence that shows that eliminating or at least reducing discrimination along ethnic or religious lines in other context is difficult, even if the state provides clear legal rules, and that one reason is that official actors may contribute to continued discrimination. Second, the findings of heterogeneity in favoritism are in line with a small number of papers that have shown similar heterogeneity in favoritism, as discussed in the introduction (Hanna and Linden 2012, Turner and Brown 1978). Given that these come from other contexts (education in the case of Hanna and Linden 2012, a lab experimental situation in the case of Turner and Brown 1978) there is some indication that our findings are not restricted to our specific environment. This heterogeneity in favoritism hints at so-far unstudied effects of quotas, such as those for backward castes in India, or other types of affirmative action. While papers studying quotas typically investigate how quotas change policies of leaders, i.e., focus on the official "output" (e.g., Pande 2003, Chattopadhyay and Duflo 2004, Munshi 2019), the present findings suggest that having individuals that are lower in the hierarchy in leader positions might also affect unofficial behavior of these leaders. In particular, it suggests that reserving leadership positions for individuals lower in the hierarchy might also reduce the level of favoritism.

In addition to helping us to identify discrimination and favoritism, the context of the earthquake in itself is of significant interest. Natural disasters, such as earthquakes, do not discriminate based on wealth, religion, ethnicity, or caste. Yet, economic and social factors can determine the impact of a disaster on well-being. Poor and economically marginalized groups are potentially hit harder by a disaster for many reasons. Our results highlight a mostly neglected determinant of the impact of disasters, namely the role of social structure in development policies carried out *after* the disaster has struck.

References

Acemoglu, D. (2010). Theory, general equilibrium, and political economy in development economics. *Journal of Economic Perspectives*, 24(3):17–32.

Alatas, V., Banerjee, A., Hanna, R., Olken, B. A., Purnamasari, R., and Wai-Poi, M. (2019). Does elite capture matter? Local elites and targeted welfare programs in Indonesia. *AEA Papers and Proceedings*, 109:334–39.

Alatas, V., Banerjee, A., Hanna, R., Olken, B. A., and Tobias, J. (2012). Targeting the poor: Evidence from a field experiment in Indonesia. *American Economic Review*, 102(4):1206–40.

Alatas, V., Purnamasari, R., Wai-Poi, M., Banerjee, A., Olken, B. A., and Hanna, R. (2016). Self-targeting: Evidence from a field experiment in Indonesia. *Journal of Political Economy*, 124(2):371–427.

Alsan, M., Chandra, A., and Simon, K. (2021). The great unequalizer: Initial health effects of COVID-19 in the United States. *Journal of Economic Perspectives*, 35(3):25–46.

Altonji, J. G. and Blank, R. M. (1999). Race and gender in the labor market. *Handbook of Labor Economics*, 3:3143–3259.

Anderson, S. (2011). Caste as an impediment to trade. *American Economic Journal: Applied Economics*, 3(1):239–63.

Bandiera, O., Burgess, R., Deserranno, E., Morel, R., Rasul, I., and Sulaiman, M. (2020). Development policy through the lens of social structure. Centre for Economic Policy Research Discussion Paper 14876.

Banerjee, A., Bertrand, M., Datta, S., and Mullainathan, S. (2009). Labor market discrimination in Delhi: Evidence from a field experiment. *Journal of Comparative Economics*, 37(1):14–27.

Barber, R. (2016). Did the humanitarian response to the Nepal earthquake ensure no one was left behind? A case study on the experience of marginalised groups in humanitarian action, Save the Children Australia, `https://www.savethechildren.es/sites/default/files/imce/docs/nepal_earthquake_gesi_report._march_2016.pdf` (last accessed February 4, 2021).

Bardhan, P. K. and Mookherjee, D. (2000). Capture and governance at local and national levels. *American Economic Review*, 90(2):135–139.

Barr, A., Lane, T., and Nosenzo, D. (2018). On the social inappropriateness of discrimination. *Journal of Public Economics*, 164:153–164.

Bennet, L., Dahal, D., and Govindasamy, P. (2008). Caste, ethnic and regional identity in Nepal: Further analysis of the 2006 Demographic and Health Surveys. *Calverton, Maryland, USA: Macro International Inc.*

Bertrand, M. and Mullainathan, S. (2004). Are Emily and Greg more employable than Lakisha and Jamal? A field experiment on labor market discrimination. *American Economic Review*, 94(4):991–1013.

Besley, T. and Coate, S. (1992). Workfare versus welfare: Incentive arguments for work requirements in poverty-alleviation programs. *American Economic Review*, 82(1):249–261.

Bold, T., Kimenyi, M., Mwabu, G., Ng'ang'a, A., and Sandefur, J. (2018). Experimental evidence on scaling up education reforms in Kenya. *Journal of Public Economics*, 168:1–20.

Carter Center (2014). Local governance in Nepal: Public participation and perception. `https://www.cartercenter.org/resources/pdfs/news/pr/nepal-022814-local-governance.pdf` (last accessed February 4, 2021).

Cole, S., Healy, A., and Werker, E. (2012). Do voters demand responsive governments? Evidence from Indian disaster relief. *Journal of Development Economics*, 97(2):167–181.

Dreher, A. and Fuchs, A. (2015). Rogue aid? An empirical analysis of China's aid allocation. *Canadian Journal of Economics/Revue canadienne d'économique*, 48(3):988–1023.

Eichenauer, V. Z., Fuchs, A., Kunze, S., and Strobl, E. (2020). Distortions in aid allocation of United Nations flash appeals: Evidence from the 2015 Nepal earthquake. *World Development*, 136:105023.

Fehr, E., Hoff, K., and Kshetramade, M. (2008). Spite and development. *American Economic Review*, 98(2):494–99.

Fershtman, C. and Gneezy, U. (2001). Discrimination in a segmented society: An experimental approach. *The Quarterly Journal of Economics*, 116(1):351–377.

Field, C. B. (2014). *Climate change 2014–impacts, adaptation and vulnerability: Regional aspects*. Cambridge University Press.

Galasso, E. and Ravallion, M. (2005). Decentralized targeting of an antipoverty program. *Journal of Public Economics*, 89(4):705–727.

Gellner, D. N. (2007). Caste, ethnicity and inequality in Nepal. *Economic and Political Weekly*, 42(20):1823–1828.

Gignoux, J. and Menéndez, M. (2016). Benefit in the wake of disaster: Long-run effects of earthquakes on welfare in rural Indonesia. *Journal of Development Economics*, 118:26–44.

Grogan, C. M., Gusmano, M. K., and Lin, Y.-A. (2021). Unsanitized and unfair: How COVID-19 bailout funds refuel inequity in the US health care system. *Journal of Health Politics, Policy and Law*.

Grosh, M. and Baker, J. L. (1995). Proxy means tests for targeting social programs. *Living Standards Measurement Study Working Paper*, 118:1–49.

Guha-Sapir, D., Hoyois, P., and Below, R. (2017). Annual disaster statistical review 2015: The numbers and trends. Centre for Research on the Epidemiology of Disasters (CRED). *Institute of Health and Society (IRSS) Universite catholique de Louvain–Brussels, Belgium*.

Gurung, H. (2003). *Trident and thunderbolt cultural dynamics in Nepalese politics*. Social Science Baha.

Gurung, P. (2000). Bungamati: The life world of a Newar community explored through the natural and social life of water. Unpublished thesis, Faculty of Social Science. University of Bergen, Norway.

Hanna, R. N. and Linden, L. L. (2012). Discrimination in grading. *American Economic Journal: Economic Policy*, 4(4):146–68.

Heß, S., Jaimovich, D., and Schündeln, M. (2021). Development projects and economic networks: Lessons from rural Gambia. *The Review of Economic Studies*, 88(3):1347–1384.

Hoff, K. and Pandey, P. (2006). Discrimination, social identity, and durable inequalities. *American Economic Review*, 96(2):206–211.

HRHRS data (2016). Household registration for housing reconstruction survey. *Central Bureau of Statistics (CBS), Nepal*. Dataset obtained from CBS premises on June 12, 2017.

HRHRS questionnaire (2016). Household registration for housing reconstruction survey. *Central Bureau of Statistics (CBS), Nepal*. Dataset obtained from CBS premises on June 12, 2017, `https://nada.cbs.gov.np/index.php/catalog/69` (last accessed February 4, 2021).

HRHRS report (2016). Household registration for housing reconstruction survey. *Central Bureau of Statistics (CBS), Nepal*. Dataset obtained from CBS premises on June 12, 2017.

Höfer, A. (1979). The caste hierarchy and the state in Nepal. A study of the Muluki Ain of 1854. Universitiitsverlag Wagner, Innsbruck, Reissued 2004 by Himal Books, Lalitpur, Nepal.

IASC (2015). Nepal earthquake 2015: Desk review of existing information with relevance to mental health and psychosocial support. Inter-Agency Standing Committee (IASC) Reference Group for Mental Health and Psychosocial Support in Emergency Settings, `https://interagencystandingcommittee.org/system/files/20150622_nepal_earthquakes_mhpss_desk_review_150619.pdf` (last accessed February 4, 2021).

Jost, J. T. and Banaji, M. (1994). The role of stereotyping in system-justification and the production of false consciousness. *British Journal of Social Psychology*, 33(1):1–27.

Jost, J. T., Banaji, M., and Nosek, B. (2004). A decade of system justification theory: Accumulated evidence of conscious and unconscious bolstering of the status quo. *Political Psychology*, 25(6):881–919.

Jost, J. T. and Burgess, D. (2000). Attitudinal ambivalence and the conflict between group and system justification motives in low status groups. *Personality and Social Psychology Bulletin*, 26(3):293–305.

Kakani, P., Chandra, A., Mullainathan, S., and Obermeyer, Z. (2020). Allocation of COVID-19 relief funding to disproportionately Black counties. *Jama*, 324(10):1000–1003.

Kirchberger, M. (2017). Natural disasters and labor markets. *Journal of Development Economics*, 125:40–58.

Kuziemko, I. and Werker, E. (2006). How much is a seat on the Security Council worth? Foreign aid and bribery at the United Nations. *Journal of Political Economy*, 114(5):905–930.

Mainali, R., Jafarey, S., and Montes-Rojas, G. (2013). Earnings and social background: An evaluation of caste/ethnic wage differentials in the Nepalese labor market. Working Papers 13/01, Department of Economics, City University London.

Mansuri, G. and Rao, V. (2012). *Localizing development: Does participation work?* The World Bank.

Munshi, K. (2019). Caste and the Indian economy. *Journal of Economic Literature*, 57(4):781–834.

Neelakantan, A. (2015). Nepal's political faultlines. A commentary on International Crisis Group, `https://www.crisisgroup.org/asia/south-asia/nepal/nepal-s-political-faultlines` (last accessed February 4, 2021).

NPC (2015). Post disaster needs assessment: Volume A and B. Government of Nepal, National Planning Commission(NPC).

Ntontis, E., Drury, J., Amlot, R., Rubin, G. J., and Williams, R. (2020). Endurance or decline of emergent groups following a flood disaster: Implications for community resilience. *International Journal of Disaster Risk Reduction*, 45(101493):10–1016.

Olken, B. A. (2007). Monitoring corruption: Evidence from a field experiment in Indonesia. *Journal of Political Economy*, 115(2):200–249.

Oster, E. (2019). Unobservable selection and coefficient stability: Theory and evidence. *Journal of Business & Economic Statistics*, 37(2):187–204.

Paetzel, F. and Sausgruber, R. (2018). Cognitive ability and in-group bias: An experimental study. *Journal of Public Economics*, 167:280–292.

Pande, R. (2003). Can mandated political representation increase policy influence for disadvantaged minorities? Theory and evidence from India. *American Economic Review*, 93(4):1132–1151.

Platteau, J.-P. (2004). Monitoring elite capture in community-driven development. *Development and Change*, 35(2):223–246.

Pokharel, S., Devkota, A., Michaels, L., Ramble, C., Rinck, J., and Wagner, L. (2015a). Aid and recovery in post-earthquake Nepal. Independent impacts and recovery monitoring phase 1, qualitative field monitoring: June 2015 by Democracy Resource Center Nepal (DRCN) and the Asia Foundation (TAF), https://asiafoundation.org/wp-content/uploads/2015/10/Aid-and-Recovery-in-Post-Earthquake-Nepal-Qualitative-Field-Monitoring-June-2015.pdf (last accessed February 4, 2021).

Pokharel, S., Devkota, A., Michaels, L., Ramble, C., Rinck, J., Wagner, L., Chingchit, S., and Patrick, B. (2015b). Independent impacts and recovery monitoring phase 1. Synthesis report by Democracy Resource Center Nepal (DRCN), the Asia Foundation (TAF), and the Interdisciplinary Analysts (IDA), https://asiafoundation.org/resources/pdfs/AWSynthesisreportinteractivePDF.pdf (last accessed February 4, 2021).

Pokharel, S., Gurung, A. M., Michaels, L., and Barron, P. (2016a). The Nepal government distribution of earthquake reconstruction cash grants for private houses report. IRM – Thematic study by Democracy Resource Center Nepal (DRCN) and The Asia Foundation (TAF), https://asiafoundation.org/wp-content/uploads/2016/12/Nepal-Govt-Distribution-of-Earthquake-Reconstruction-Cash-Grants-for-Private-Houses_June2017.pdf (last accessed: February 4, 2021).

Pokharel, S., Johnson, A. L., Ajeet, A., Khatiwada, A., and Parajulee, S. (2016b). Aid and recovery in post-earthquake Nepal. Independent impacts and recovery monitoring phase 2 qualitative field monitoring: February and March 2016 by Democracy Resource Center Nepal (DRCN) and the Asia Foundation (TAF), http://asiafoundation.org/wp-content/uploads/2016/09/IIRMPhase2_QualitativeReport.pdf (last accessed: February 4, 2021).

Pradhan, R. and Shrestha, A. (2005). Ethnic and caste diversity: Implications for development. Working paper 4, Asian Development Bank Nepal Resident Mission.

Reinikka, R. and Svensson, J. (2004). Local capture: evidence from a central government transfer program in Uganda. *Quarterly Journal of Economics*, 119(2):679–705.

Robinson, A. L. and Seim, B. (2018). Who is targeted in corruption? Disentangling the effects of wealth and power on exposure to bribery. *Quarterly Journal of Political Science*, 13(3):313–331.

Rodriguez, H., Trainor, J., and Quarantelli, E. L. (2006). Rising to the challenges of a catastrophe: The emergent and prosocial behavior following Hurricane Katrina. *The Annals of the American Academy of Political and Social Science*, 604(1):82–101.

Samata Foundation (2021). Summary report on the research: Impact of COVID-19 on Dalit community of Nepal. https://samatafoundation.org/wp-content/uploads/2021/05/Summary-report_impact-of-COVID-19-on-Dalits.pdf (last accessed September 21, 2021).

Siddique, Z. (2011). Evidence on caste based discrimination. *Labour Economics*, 18:S146–S159.

TAF (2012). Political economy analysis of local governance in Nepal with special reference to health and education sector. A report by the Asia Foundation, https://asiafoundation.org/resources/pdfs/analysislocalgovernancenepal.pdf (Last accessed February 4, 2021).

Tarquinio, L. (2020). The politics of drought relief: Evidence from Southern India. Institute for Economic Development Working Paper 354.

Turner, J. and Brown, R. (1978). Status, position and legitimacy in intergroup behavior: The effects of different status relationships on in-group bias and group creativity. *Differentiation Between Social Groups: Studies in the Social Psychology of Intergroup Relations. London: Academic Press Inc.*

Umphress, E., Smith-Crowe, K., Brief, A., and Dietz, J. (2007). When birds of a feather flock together and when they do not: Status composition, social dominance orientation, and organizational attractiveness. *Journal of Applied Psychology*, 92(2):396–409.

UNOCHA (2015). Nepal flash appeal revision Nepal earthquake April – September 2015. United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA), https://reliefweb.int/sites/reliefweb.int/files/resources/nepal_earthquake_2015_revised_flash_appeal_june.pdf (last accessed September 21, 2021).

USGS (2015). Advanced National Seismic System (ANSS), shakemap, global region, maps of ground shaking and intensity for event us20002926, Nepal. US Geological Survey (USGS), https://earthquake.usgs.gov/earthquakes/eventpage/us20002926/shakemap/metadata?source=us&code=us20002926 (last accessed February 4, 2021).

Vera-Cassio, D. (2020). Targeting credit through community members. Inter-American Development Bank Working Paper 10014.

Wald, D., Quitoriano, V., Worden, C., Hopper, M., and Dewey, J. (2011). USGS "Did You Feel It?" Internet-based macroseismic intensity maps. *Annals of Geophysics*, 54(4).

Wald, D. J., Quitoriano, V., Heaton, T. H., and Kanamori, H. (1999). Relationships between peak ground acceleration, peak ground velocity, and modified Mercalli intensity in California. *Earthquake Spectra*, 15(3):557–564.

Worden, C., Gerstenberger, M., Rhoades, D., and Wald, D. (2012). Probabilistic relationships between ground-motion parameters and modified Mercalli intensity in California. *Bulletin of the Seismological Society of America*, 102(1):204–221.

Online Appendix for Social Hierarchies and the Allocation of Development Aid: Evidence from the 2015 Earthquake in Nepal

Journal of Public Economics

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A. Appendix

A1. Background

A1.1. Caste in Nepal

For Nepali Hindus, the classic Hindu caste system (the Vedic model) provides a framework through which class hierarchy is largely defined. In the 2001 Census, 80.6% of the population was recorded as Hindu (Pradhan and Shrestha, 2005). Although the classic system does not apply to non-Hindu groups, these groups also have well-defined positions within the caste system and, therefore, also in the social hierarchy. The 1854 National Code (the Muluki Ain) classified all Nepalese, including the indigenous people and non-Hindus, into five broad caste groups and provided a hierarchical ordering for these groups (National Code, 1854; Höfer, 1979; Gurung, H., 2003; Bennet et al., 2008).

At the top of this hierarchy are the Hindu Brahmin and Chhetri groups, who are in direct correspondence with castes in the classic model - Brahman (priests) and Kshatriya (warriors), respectively. At the bottom of the hierarchy codified by the 1854 National Code are "impure" Hindu castes, which broadly correspond to the Sudra (peasants) in the classic system. Impure castes include Dalit castes, Muslim, and foreign groups. The largest share of the indigenous population (called Janajatis) was placed by the National Code (1854) below the Chhetris, but above the "impure" castes. In our data, about 15% of households belong to Brahmin, 17% to Chhetri, and 11% to "impure" castes. Janajatis constitute about 36% of households in sample districts.

A special case is the treatment of the Newar, the indigenous inhabitants of Kathmandu (about 20% of sample households). A large share of Newars were involved in trading (Gurung, P., 2000). While Newars had an obvious correspondence in the classic Hindu system, namely the Vaisya (traders), who occupy a relatively low position in the classic Hindu caste system, a large share of Newar groups were assigned a high position in the hierarchy imposed by the National Code. Other Newar groups, however, were considered "impure" by the National Code and assigned a low position.

Nepal's constitution of 1990 explicitly bans discrimination based on caste, tribe, or religion. The Constitution of Nepal (1990, Article 11.3) states that The State shall not discriminate among citizens on the

grounds of religion, race, sex, caste, tribe, or ideological conviction or any of these." However, amendments to the National Code in 1992 continued to provide a basis for discrimination. In particular, the amended National Code states that traditional practices at religious places should not be considered discriminatory, which effectively prevents untouchable groups from entering temples (Gurung, H., 2003). The same reference to "traditional practices" also implies inequality in other spheres (Gurung, H., 2003), and caste continues to shape social and economic interactions among people in Nepal and is an important determinant of individual well-being.

In sum, while castes originate in Hinduism, the National Code also accommodates non-Hindu groups. Thus, based on their group's position, the National Code provides a framework to classify all households into upper and lower castes.[1] In addition to the upper/lower distinction, we will also explore finer disaggregations below.

A1.2. Classifying castes based on family names

The Household Registration for Housing Reconstruction Survey (HRHRS) contains information about family names and (self-identified) castes of household heads.[2] As discussed in the paper, and following Gurung, P. (2000), Gurung, H. (2003), Bennet et al. (2008), Mainali et al. (2013), and Gellner (2007), we define as upper caste households those from Brahmin, Chhetri, and upper Newar castes. In contrast, we define as lower caste households those from Janajati and "impure" castes. The latter include lower Newar, Muslim and foreign groups, and Dalit castes.

For our data on the APMs, we only have the family names of APM members. We use those family names to infer the caste of APM members using correspondences between family names and caste of the household heads that are implied by the data from the HRHRS data (2016). Since family names can indicate different castes in different parts of the country, we impute castes using correspondences at the VDC level.[3]

A1.3. Local political actors: further details

The paper highlights the central role that local political actors played, in particular, the All-Party Mechanism (APM) and Village Development Committee (VDC) secretaries. This Online Appendix provides further details.

[1] In Nepali language the upper and lower caste distinction is referred to as *mathillo* and *tallo jat*.

[2] The HRHRS available to researchers is anonymized. We obtained names separately from the National Reconstruction Authority.

[3] In about 2900 cases, households in the Housing Reconstruction Survey are classified as "other". Family names were available for those observations. To assign households to one of the six castes that we work with, we use the mentioned-above mapping from family names to castes (that is implied by the available HRHRS data (2016) data) and impute the missing data based on family names. Our main results are robust to dropping the 2909 observations with imputed castes.

A1.3.1. APM and VDC secretaries: A brief history

The APMs were established well before the earthquake. It was a result of a series of steps that the Government of Nepal took starting in July 2002 to address the lack of representation of local voices at the VDC level. This lack of representation was due to the end of the five-year term of officials that were elected in 1997. New elections did not take place in 2002 because of the Maoist insurgency.[4]

Initially, the Government handed the local political authority to VDC secretaries (Gurung, N., 2011; Pokharel et al., 2016b). VDC secretaries are civil servants whose tenure and placement is determined by the Ministry of Federal Affairs and Local Development through the district administrative offices. Often deployed outside their hometown, VDC secretaries heavily relied on the local political party representatives when unexpectedly called to run the local bodies (Barber, 2016; TAF, 2012). With the rise of the United Communist Party of Nepal (Maoist), VDC secretaries found it difficult to remain in the assigned VDCs, particularly in rural areas.[5] Several VDC secretaries relocated to their district headquarters and started carrying out local governance and budget management tasks remotely, which left large voids of local governance (Gurung, N., 2011; TAF, 2012).[6]

In light of the continuing voids in governance at the local level, the Government of Nepal established the APMs as consultative bodies (Pokharel et al., 2015a) to exploit the local networks of political parties that ran deep and persisted during and after the Maoist insurgency. In 2008, the APMs were institutionalized as political bodies consisting of one representative from all the local political parties who obtained at least ten percent of total votes received by the candidate and the party, combined at the district level in the 2008 Constituent Assembly election (LGCDP, 2008). APM decisions were supposed to be made by "political consensus" (Gurung, N., 2011). Consequently, the APMs acquired *de facto* authority at the local level, and starting in 2008, they became the most important village council player (Gurung, N., 2011; TAF, 2012).

The institutional set-up facilitated the environment of collusion and corruption at the local level. Ironically, the "political consensus" framework was intended to promote inclusive and equitable resource allocation by addressing the needs of all parties (TAF, 2012). However, the absence of any formal opposition and the lack of direct accountability (the APMs were envisioned as consultative bodies and acquired *de facto* power only eventually) encouraged the political parties to collude and divide the share of public resources between each other (TAF, 2012). A seven-fold nominal increase in the VDC budget from 1995 to 2011 only increased

[4] Gurung, N. (2011, p.12) writes: "Initially the threat of the Maoists maiming or killing of the candidates was an intuitively understood pretext of postponing elections."

[5] In rural areas, Maoists ran parallel governments -from village to central levels- and had their own judicial system called Jana Adalat (people's court) that resolved people's complaints locally. In their stronghold areas, Maoists interfered with VDC secretaries' tasks, forced them to pay a large levy, and threatened with death if they did not follow their rules, forcing several VDC secretaries to relocate (Hachhethu, 2008). However, as local residents, it was difficult for the APM members to relocate.

[6] At some point, 850 VDC secretaries were absent, or their positions were vacant (Gurung, N., 2011). Many others failed to spend the majority of the VDC budget and conduct meetings (TAF, 2012).

parties' incentives to collude in the APMs to exploit the budget (TAF, 2012). The APMs were not subject to the district and village council rules (which were defined by the Local Self-Governance Act of 1999) and were not overseen by audit committees (Adhikari and Sijapati, 2010). In contrast, civil service laws and regulations obliged the VDC secretaries to carry out an impartial and independent service to society. Regulation prohibited VDC secretaries from any future government employment if convicted of corruption (Tamang and Malena, 2011).

Ample reports suggest that the APMs misused local resources through patronage, nepotism, elite capture, and corruption (Gurung, N., 2011). According to these reports, strategies for nepotism and corruption involved teacher and health worker recruitment, scholarship allocations (TAF, 2012), VDC budgeting, public contracting, humanitarian payments, the appointment of school management and forest user committees (Tamang and Malena, 2011), contractor selection during road-building projects (TAF, 2012), and manipulation of price, quantity, and quality of construction materials (Panta, 2015). In light of this, one report notes that the APMs were "sarcastically dubbed ATMs"[7] because of the acronym APM that is "curiously close to ATMs."[8]

In response to allegations of corruption, the Commission for the Investigation of Abuse of Authority, a constitutional body for corruption control in Nepal, formally dissolved all the APMs on January 3, 2012 (TAF, 2012). Despite this, the local network and influence of the APMs remained and continued to influence the local governance decisions in an informal capacity (Carter Center, 2014). In the aftermath of the earthquake, when the emergency relief efforts required immediate action at local levels, there was an urgent need for local representatives. As a result, the Government of Nepal decided to reinstate the APMs for the relief aid distribution. The APMs were informally created in every VDC from party representatives from the political parties represented in Constituent Assembly (2013).[9] And, as described above, the APMs ended up being at the core of the VDC Grant Distribution Committees. "[A]ll that changed [for the APMs] was the reduced level of formal accountability" (TAF, 2012).

A1.3.2. Role of local political actors in the first damage assessment process

Immediately after the earthquake, the Government of Nepal adopted the so-called 'one-door policy', allowing all aid to be distributed only through District Disaster Relief Committees, which were established in the Natural Calamities Act 1982.[10] These committees further delegated tasks to VDCs. In each VDC, a Grant Distribution Committee was formed, which was responsible for carrying out the damage assessment

[7] See `https://kathmandupost.com/opinion/2015/07/27/federalism-first` (last accessed February 4, 2021).

[8] See `https://oxfamblogs.org/fp2p/political-and-some-other-priorities-in-nepal-as-of-28-april-2015/` (last accessed February 4, 2021).

[9] `http://kathmandupost.ekantipur.com/news/2015-05-25/govt-set-to-revive-all-party-mechanism.htm` (last accessed February 4, 2021)

[10] The Local Self Governance Act 1999 mandates the existing District Disaster Relief Committee to assume primary responsibility for relief after any major natural disaster (GoN, MOHA, 2013).

for emergency aid. In most VDCs, the Grant Distribution Committee was composed of the VDC secretary and the members of the so-called All-Party Mechanism (APM) (see, Pokharel et al., 2015a, 2016a, and Barber, 2016).[11] In a descriptive study carried out immediately after the earthquake, Pokharel et al. (2015a) find that each Grant Distribution Committee in their sample consisted of local leaders of the three major political parties, i.e., from NC, UML, and Maoist, and a VDC secretary.

In addition to their regular VDC administrative responsibilities, the VDC secretaries were also responsible for planning and executing emergency aid distribution. According to available sources and anecdotal evidence, the VDC secretaries were overburdened with the VDC's bureaucratic responsibilities and only documented the assessment process. And the members of the APMs primarily conducted the damage assessment for emergency aid and determined the eligible households (Pokharel et al., 2015b). Thus, the APMs played a central role in assessing damages that determined the distribution of emergency aid (Pokharel et al., 2015a).

A protocol released by the Kavrepalanchok District Disaster Relief Committee provides an example that highlights the role of the APMs in the emergency aid distribution. An (unofficial) translation of the protocol is provided below. Point two of the protocol (the first point that discusses procedures) states that an "all-party mechanism" should be formed in each rural VDC, consisting of active political parties, immediately highlighting the prominent role of the APMs. The protocol is ambiguous on who belongs to the VDC grant distribution committees and includes the VDC secretary as the coordinator along with the APMs. Point seven discusses the formal procedure and certification of emergency aid recipients. Out of all the individuals mentioned before as being "involved" in the grant distribution committee, the APMs are the only group explicitly referred to by point seven. VDC secretaries worked directly under the district administrative office. Thus, while the APMs played a central role in identifying the eligible households, The VDC secretaries received the grant cash in advance, and after distributing it, returned the recorded data and the undistributed amount to the district administrative office (point seventeen of the distribution protocol). Some aspects of the emergency aid distribution were exclusively in the hand of the APMs. For example, to be eligible for emergency aid, citizenship needed to be proven. The protocol from Kavrepalanchok shows that the APMs could issue letters certifying citizenship if no other proof of citizenship existed (point ten of the distribution protocol). Similar protocols were applied in other districts.

Our field visits and discussion with several stakeholders also confirm the prominent role of the APMs, as highlighted in the protocol. In sum, the following picture emerges from available sources: immediately after the 2015 Nepal earthquake, ward leaders, local teachers, local health care workers, members of security forces, and social mobilizers all may have been involved in the procedures to distribute emergency aid, in particular in discussing lists of eligible households (Pokharel et al., 2016a). However, the APM members

[11] Some Grant Distribution Committees also included social mobilizers, school-teachers, Ward Citizen Forum coordinators, and selected ward representatives (Pokharel et al., 2015b).

played a central role in identifying and finalizing the list of eligible emergency aid recipients in each VDC. This final list was used to distribute the victim identification cards ("red" and "yellow" cards) and, subsequently, the emergency aid by the VDC grant distribution committee, mostly from the VDC secretary offices (Pokharel et al., 2016a).

A1.3.3. District Disaster Relief Committee Protocol of Kavrepalanchok district

Our translation of an official eighteen-point protocol released by Kavrepalanchok District Disaster Relief Committee (`http://drrportal.gov.np/uploads/document/110.pdf` (last accessed February 4, 2021)) highlights Grant Distribution Committees formation and defines APMs' and VDC secretaries' responsibilities in this emergency aid distribution process:

1. Prepare a list of households with damaged houses in every ward of a municipality and a VDC. Promptly distribute Rs. 15,000 grant in their wards where the list is complete and up to date.
2. Form an All-Party Mechanism (APM, *Sarbadaliya Samyantra* in Nepali) consisting of active political parties at the VDC level if it is a VDC and at the ward level if it is a municipality.
3. Form a grant distribution committee under the VDC secretary's coordination if it is a VDC and the ward secretary's if it is a municipality.
4. Include the chief of police and army units deployed in affected areas in the grant distribution committee.
5. Distribute Rs. 15,000 to households whose damaged house cannot be repaired and who do not possess a house elsewhere.
6. Distribute cash grants together with victim identification cards.
7. Distribute cash grant only after each member of the above committee (that includes the APMs) certifies the list of households with unrepairable damaged houses.
8. Use the picture of the head of the household in the victim identification card, if possible. If the picture to put in the identification card is not available right away, distribute the identification card making provisions to put the picture later.
9. Distribute grants to an eligible household only after receiving the grant application from the household head.
10. If the copy of the Nepali Citizenship is not available with the application, keep a record of the application, and the cash grant can still be distributed after the APM certifies the application.
11. Make provisions to use victim identification cards to keep track of the previously received grants and households' temporary shelters.
12. Explicitly mention the distributed cash grant in the victim identification card.
13. Track households that provide or assist in providing false information and individuals who recommend false victims. Make them subject to punishment.

14. Cancel the identification cards of individuals who provide false information and make provisions to restrict them from receiving future grants.
15. Provide distributed aid details to the district administration office and district development committee before the first office hour of the next working day.
16. Provide notice of cash grant distribution to the district police office and Nepali army through local police and army units regularly. Also, provide notice of the cash grant distribution to the chief district officer.
17. The VDC secretary and the municipality's executive officer can get the grant cash from the district administrative office in advance. They can submit the record and return the undistributed amount to the district administrative office after distributing the cash grant.
18. In case of doubts regarding certain households, not to distribute the grant to such households but instead write to the district disaster relief committee and follow their instruction for cash-grant distribution.

A1.4. Examples to illustrate degrees of damage (HRHRS survey manual)

The following figures are taken from the HRHRS survey manual to be used as guidelines by the surveyor engineers to assess different degrees of damage during the survey.

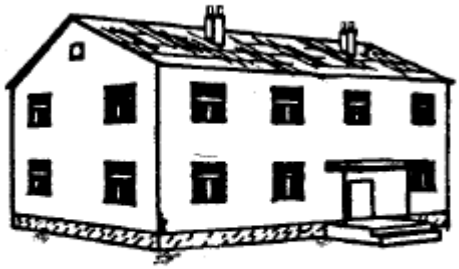
Figure A1.4.1: Masonry building vs. concrete building (grade 5)

(a) Masonry building

(b) Concrete building

Source: HRHRS manual pages 36 and 39 (2016)

Figure A1.4.2: Damage based on the surveyor engineer's assessment

Classification of damage to masonry buildings	
	**Grade 1: Negligible to Slight Damage** (no structural damage, slight non-structural damage) Hair-line cracks in very few walls. Fall of small pieces of plaster only. Fall of loose stones from upper parts of buildings in very few cases.
	**Grade 2: Moderate Damage** (slight structural damage, moderate non-structural damage) Cracks in many walls. Fall of fairly large pieces of plaster. Partial collapse of chimneys.
	**Grade 3: Substantial to Heavy Damage** (moderate structural damage, heavy non-structural damage) Large and extensive cracks in most walls. Roof tiles detach. Chimneys fracture at the roof line; failure of individual non-structural elements (partitions, gable walls).
	**Grade 4: Very Heavy Damage** (heavy structural damage, very heavy non-structural damage) Serious failure of walls; partial structural failure of roofs and floors.
	**Grade 5: Destruction** (very heavy structural damage) Total or near total collapse.

Source: HRHRS manual page 47 (2016)

A2. Data

A2.1. Summary statistics

Table A2.1.1: Summary statistics

	total sample mean	total sample std. dev	upper caste mean	lower caste mean
Damage-related variables				
rupee value of DA1	11519	6216	12336	10996
DA1	2.56	0.80	2.66	2.49
DA2	3.76	1.28	3.83	3.71
Other variables				
co caste	0.56	0.50	0.65	0.50
age of the house	20.67	17.05	21.83	19.93
plinth area of the house (sq meters)	36.94	18.65	38.29	36.07
height of the house before the earthquake (meters)	4.89	1.56	5.16	4.72
size of the household	4.96	2.50	4.77	5.09
age of the household head	46.72	15.08	47.83	46.01
male	0.69	0.46	0.71	0.68
number of floor of the house before the earthquake	2.11	0.62	2.26	2.01
household has a bank account (dummy variable)	0.17	0.38	0.27	0.11
above median education	1.41	0.49	1.52	1.35
monthly income of the household (in 10,000 Rs.)	1.60	0.84	1.74	1.51
above median income	1.43	0.49	1.51	1.37
Foundation of the house				
foundation is mud and mortar	0.86	0.35	0.88	0.84
foundation is rcc	0.06	0.24	0.07	0.05
foundation is bamboo	0.08	0.27	0.04	0.11
Roof of the house				
roof is light	0.68	0.47	0.64	0.70
roof is heavy	0.30	0.46	0.32	0.28
roof is concrete	0.03	0.17	0.04	0.02
Structure of the house				
adobe-mud	0.04	0.19	0.04	0.03
mud-mortar (stone)	0.85	0.36	0.88	0.83
stone	0.04	0.19	0.02	0.05
cement-mortar (stone)	0.01	0.12	0.02	0.01
mud-mortar (brick)	0.01	0.12	0.02	0.01
cement-mortar (brick)	0.04	0.21	0.05	0.04
timber	0.26	0.44	0.22	0.29
bamboo	0.08	0.27	0.06	0.09
concrete (non-engineered)	0.03	0.17	0.04	0.02
concrete (engineered)	0.01	0.08	0.01	0.00
other	0.01	0.11	0.01	0.01
Observations	670733		261893	408840

Table A2.1.2: Earthquake intensity and damage assessments by quartile of the ward-level distribution of MMI

	Full sample	Quartiles of the distribution of MMI			
		first quartile	second quartile	third quartile	fourth quartile
MMI (ward)	6.90	5.81	6.65	7.06	7.89
DA1 (categorical, 1-3)	2.56	1.85	2.71	2.77	2.83
DA2 (categorical, 1-5)	3.76	2.79	4.00	3.66	4.50
Observations	670,733	155,639	156,258	180,100	178,736

A2.2. Investigating the quality of APM data

Supporting the quality of APM data, this Online Appendix shows that the caste composition of APMs, VDC chair candidates from 1997 (the last local election before the earthquake), and ward chair candidates from 2017 (the next local election after the earthquake) are highly correlated. Specifically, we have official data on all the candidates at the VDC-level elections from the 1997 village council elections and from the ward-level elections in 2017. We infer the caste of these representatives in a way that is analogous to the above-described procedure, i.e., via their family names. Assuming that there is persistence over time in the caste of individuals who are represented in the local leadership, there should be a high correlation of co-caste measures based on the APMs and based on VDC chair (ward chair) candidates from the 1997 (2017) village council elections. Indeed, in 87% of VDCs where there is at least one upper caste APM member, there is at least one upper caste VDC chair candidate in the 1997 village council elections. Similarly, in 76% of the cases where there is no upper caste member in the APM, there is also no upper caste among the VDC chair candidates in the 1997 election.

By 2017, the village council was restructured, and 3,900 old VDCs and municipalities were restructured to 753 new administrative units.[12] As a result of the restructuring, most former VDCs correspond to wards in the new village council system.[13] Using the caste of up to four ward chair candidates from the 2017 village council elections, we find that in 87% of VDCs where there is at least one upper caste APM member, there is at least one upper caste ward chair candidate in the 2017 village council elections. Similarly, in 74% of the cases where there is no upper caste member in the APM, there is also no upper caste among the ward chair candidates in the 2017 election.

At the household level, the correlation coefficient between a dummy *co-caste VDC chair (1997)* and the *co-caste* variable that we use in the main analysis (which is based on co-caste with the APM members) is 89%. The correlation between a dummy *co-caste ward chair (2017)* and the *co-caste* variable is 94%. In sum, the high correlations of co-caste measures based on APM data and co-caste measures calculated from official data on candidates from local elections support the quality of the APM data.

[12] See, for example, `https://thehimalayantimes.com/nepal/new-local-level-structure-comes-effect-today/` (last accessed February 4, 2021).

[13] Some former municipalities representing urban areas were restructured, and others were not. But most former VDCs were restructured to one of the wards of a new municipality. Because we restrict our sample to rural VDCs, most of our former VDCs are now part of a ward. Given the fact that not all former VDCs were restructured into a ward, correlation results between the caste of ward chair (2017) candidates and the APMs are at the household level (results not shown).

A2.3. Correlation of upper castes in the APM committees and share of upper caste households in the VDC

A strong correlation between representation of upper castes in the APM committees and the share of upper castes in VDCs provides a reason for why including VDC fixed effects reduces the estimated magnitude of favoritism. If there is favoritism among upper castes, then emergency aid payments will be particularly large on average in VDCs that have both an upper caste representative in the APM and many upper caste households. As these are characteristics that vary at the VDC level, including VDC fixed effects will reduce the estimated magnitude of favoritism. Indeed, in the data we see a strong correlation of upper caste APMs with the number of upper caste households in a VDC. Figure A2.3 shows that as the share of upper caste households increases, so does the share of upper caste APM members in a VDC.

Figure A2.3: Share of upper caste representation in the APMs vs. share of upper caste households (in deciles) in the VDC

The figure also indicates that upper caste households are over-represented in APMs. Existing reports also highlight this over-representation of upper castes in the APM committees (Barber, 2016; Pokharel et al., 2015a). Upper castes are also over-represented at higher levels.[14]

[14]See, `https://kathmandupost.com/opinion/2015/12/30/double-trouble-20151230083734` (last accessed February 4, 2021). In the 14 most-affected districts, "[no] Dalit was included in the District Disaster Relief Committees." Even if some Dalits were included at the village level grant distribution committees, they were not invited to the meetings. One of the lower

A2.4. Tabulating DA1 vs. DA2 separately for upper and for lower castes

Table A2.4: Distribution of DA1 for each category of DA2 (in %) by castes

		DA2					
		grade 1	grade 2	grade 3	grade 4	grade 5	Total
	DA1: no damage	77.84	44.98	24.34	12.87	8.82	22.90
lower	DA1: partial damage	8.06	12.32	9.33	3.13	0.70	4.75
caste	DA1: total damage	14.09	42.70	66.33	83.99	90.49	72.36
	Observations	37981	45178	72198	93528	159955	408840
	DA1: no damage	67.68	35.14	16.18	8.19	7.15	15.39
upper	DA1: partial damage	8.61	10.47	5.47	1.29	0.27	2.97
caste	DA1: total damage	23.71	54.39	78.34	90.52	92.59	81.65
	Observations	15824	24874	47300	73249	100646	261893

Notes: The columns show the relative frequency of the three categories of DA1 for each category of DA2 (in %).

caste distribution committee members at the local level was neither informed about nor invited to the meetings.

A3. Possible selection on unobservables

Upper and lower caste households are different in a number of dimensions, which may contribute to different assessments of damage. In the main body of the paper, we use various empirical strategies to capture unobserved variables that may differ across castes and that may at the same time explain differences in damage. As a further test of the robustness of our main findings and to support our claim of a causal effect of caste, we use in this Appendix Oster's (2019) method to assess the possible importance of selection on unobservables (Oster, 2019).

Table A3 shows results investigating the robustness of some of our central results. The table shows how the point estimates in our central estimating equations change as we change assumptions about the role of unobservables. One central estimate in the context of Oster's approach is an estimate of $\delta_{\beta=0}$. A value of $\delta_{\beta=0}$ larger than 1 is considered by Oster evidence of a robust result. Columns (3) and (5) show estimates of $\delta_{\beta=0}$ for three different specifications of our analysis and for two different assumptions on the maximum possible R-squared (R_{max}), i.e., an assumption about how much of the variation could, hypothetically, be explained in a linear regression framework. For values of R_{max} we follow standard procedures (see table notes for details).

First, note that estimates of $\delta_{\beta=0}$ shown in Panel A, which investigates the baseline specification of Table 1, column (7), are only included for completeness. We know from our analysis that the specifications in Table 1 omit important variables, in particular, these specifications do not take into account the heterogeneity across localities with different damage, and the role of favoritism. Indeed, estimates of $\delta_{\beta=0}$ are small in Panel A. This confirms that the role of unobservables is quite important in this specification.

Panel B investigates robustness of the result shown in Table 2, column (1), and Panel C considers robustness of Table 3, column (5). In Panels B and C, $\delta_{\beta=0}$ is always larger than 1 (the cutoff used by (Oster, 2019)). In fact, in Panel C it is 97 and 266. Thus, the selection on unobservables in Panel B and C would need to be at least six times larger, and in one specification it would have to be 266 larger, than the selection on observables to produce a treatment effect of zero, i.e., to "explain away" the effect of belonging to an upper caste on the amount of emergency aid a household receives.

Columns 4 and 6 show the estimated bounds on the parameters of interest. These confirm the findings based on $\delta_{\beta=0}$, namely that our results of Tables 2 and 3 are quite robust.

In sum, based on the cut-off value suggested by Oster (2019), the results presented in Table A3 provide further evidence that our central results are robust.

Table A3: Investigating possible selection on unobservables of our central results

	Dependent variable is DA1 (in Rupees)					
	(1)	(2)	(3)	(4)	(5)	(6)
	point estimate from an Uncontrolled [R^2]	point estimate from a Controlled [$\tilde{R}^2$]	R_{max} =1.3 × $\tilde{R}^2$		R_{max} = 1	
				Bound estimates		Bound estimates
		$\beta_{\delta=0}$	$\delta_{\beta=0}$	$\beta_{\delta=[0,1]}$	$\delta_{\beta=0}$	$\beta_{\delta=[0,1]}$
Panel A: Analysis for Table 1:	*column (7)*					
upper caste	309.3 [0.52]	130.1 [0.54]	0.10	[-1886, 130]	0.04	[-16798, 130]
Panel B: Analysis for Table 2:	*column (1)*					
upper caste × 1^{st} quartile MMI	531.1 [0.49]	518.7 [0.53]	6.33	[462, 519]	2.31	[346, 519]
Panel C: Analysis for Table 3:	*column (3)*					
co-caste × upper caste× 1^{st}quartile MMI	632.1 [0.49]	634.6 [0.53]	266.8	[635, 645]	97.1	[635, 645]

Notes: Results apply Oster's (2019) method. R-squares are in square brackets. Column (1) presents results for the so-called "uncontrolled" or parsimonious regression. The results control for the VDC fixed effects and DA2 (Panel A), and the level effects (Panel B), and the level and all two-way interaction effects (Panel C), as they are likely not a part of the confounding set. To estimate the relative degree of selection, $\beta_{\delta=0}$, and bounds, in column (2), we add a large set of explanatory variables in addition to the "uncontrolled" effect from column (1). The controls include *building controls*, *household controls*, *geographic controls*, and *building controls* × *individual asset dummies* and are as indicated in the notes to Table 1. R_{max} is the R-squared from a hypothetical regression that includes both (observable and unobservable) controls. $\tilde{R}^2$ is the R-squared from the regression with full observed controls from the regression of interest. Columns (3) and (4) uses $R_{max} = 1.3 \times \tilde{R}^2$ and presents results for the $\beta_{\delta=0}$ and the estimated bounds. Parametrization 1.3 is based on an analysis of Oster (2019). For a given R_{max}, one of the bounds for the coefficient is calculated by assuming that the selection on observables (based on a large set of controls) equals the selection on unobservables, $\beta_{\delta=0} = 1$, and the other bound is calculated from column (2). Columns (5) and (6) repeat the degree of selection and bound estimates for $R_{max} = 1$.

A4. Robustness to alternative specifications

A4.1. Discrimination results

A4.1.1. Robustness to additional interaction terms as controls

Table A4.1.1: Upper caste households receive more emergency aid (results are robust to additional interactions)

	Dependent variable is DA1 (in rupees)							
	Without VDC fixed effects				With VDC fixed effects			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
upper caste	448.0	448.0	448.4	450.8	130.8	130.7	131.1	132.2
	(64.4)***	(64.8)***	(64.6)***	(64.5)***	(27.7)***	(27.7)***	(27.6)***	(27.7)***
DA2	971.7	793.5	1112.0	1231.0	836.5	876.8	931.1	993.1
	(112.2)***	(64.0)***	(120.3)***	(152.8)***	(86.4)***	(57.6)***	(88.3)***	(120.2)***
MMI (ward)	✓	✓	✓	✓	✓	✓	✓	✓
building controls	✓	✓	✓	✓	✓	✓	✓	✓
household controls	✓	✓	✓	✓	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓	✓	✓	✓	✓
building controls × MMI (ward)	✓	✓	✓	✓	✓	✓	✓	✓
building controls × DA2	✓			✓	✓			✓
MMI (ward) × individual assets		✓		✓		✓		✓
DA2 × individual assets			✓	✓			✓	✓
VDC fixed effects					✓	✓	✓	✓
VDCs	612	612	612	612	612	612	612	612
N	667862	667862	667862	667862	667862	667862	667862	667862
R^2	0.46	0.46	0.46	0.46	0.54	0.54	0.54	0.54
Mean dep. var.	11519.2	11519.2	11519.2	11519.2	11519.2	11519.2	11519.2	11519.2

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1*, i.e., the value of the first damage assessment (in rupees), and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy equaling one when the household belongs to Brahmin, Chhetri, or upper Newar caste groups. *MMI (ward)* is the MMI measure at the centroid of the ward that is assigned to each household within the ward. The regressions include *building controls*, *household controls*, *geographic controls*, and *building controls* × *individual assets* and *building controls* × *MMI (ward)*, which are defined as indicated in the notes to Table 1.

A4.1.2. Estimating standard errors that allow for spatial correlation in the distance dimension

In our baseline specifications we allow standard errors to be correlated at the VDC level. To investigate the issue of spatial correlation of error terms further, this Online Appendix presents estimates for the baseline regression standard errors that allow for spatial correlation in the distance dimension (Conley, 1999). We use a spatial cutoff of 50km. Using a cutoff of 100 or 200km does not change results substantially. For comparison, we also show standard errors for the baseline approach (VDC clusters) next to the Conley

standard errors. For the baseline results (analogous to Table 1, results show in columns (1) and (2) that standard errors increase when we use estimate spatial standard errors as in Conley (1999), yet not to such an extent that they render our estimates of interest (on upper caste) insignificant. For results analogous to Table 2,Conley standard errors are shown in column (4). Compared to VDC-clustered standard errors (column 3), they are slightly larger. On the other hand, for results analogous to Table 3, Conley-spatial standard errors for the key estimate, the triple interaction, are actually smaller in column (6) than those based on VDC clusters in column (5). Overall, the results show that baseline results are robust to alternative strategies to take into account spatial correlation.

Table A4.1.2: Allowing for spatial correlation in the distance dimension

	Dependent variable is DA1 (in rupees)					
	Table 1 column 6		Table 2 column 1		Table 3 column 3	
	(1)	(2)	(3)	(4)	(5)	(6)
upper caste	446.4	446.4	4.06	4.06	-18.4	-18.4
	(64.7)***	(112.4)***	(28.0)	(38.0)	(42.0)	(46.5)
upper caste × 1^{st} quartile MMI			518.7	518.7	204.7	204.7
			(105.5)***	(146.9)***	(111.8)*	(141.3)
co caste					-0.26	-0.26
					(44.7)	(36.4)
co-caste × 1^{st} quartile MMI					-341.6	-341.6
					(130.1)***	(117.6)***
co-caste × upper caste					35.9	35.9
					(67.2)	(58.6)
co-caste × upper caste × 1^{st} quartile MMI					634.6	634.6
					(191.0)***	(166.9)***
DA2	793.1	793.1				
	(64.1)***	(245.1)***				
MMI (ward)	✓	✓	✓	✓	✓	✓
building controls	✓	✓	✓	✓	✓	✓
household controls	✓	✓	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓	✓	✓
VDC fixed effects			✓	✓	✓	✓
SE cluster	VDC	Spatial	VDC	Spatial	VDC	Spatial
Distance cutoff (in km)		50		50		50
VDCs	612	612	612	612	611	611
N	667862	667862	667862	667862	667464	667464
R^2	0.46	0.46	0.53	0.53	0.53	0.53
Mean dep. var.	11519.2	11519.2	11519.2	11519.2	11523.8	11523.8

Notes: Standard errors are in parenthesis. In columns 1, 3, and 5, standard errors allow for clustering of the model error at the VDC level. In columns 2, 4, and 6 standard errors allow for correlation within a 50km radius (Conley 1999). For spatial correlation, we use the latitude and longitude information from the centroid of the ward and assume the correlation between the error term of two observations beyond 50km to be zero. The dependent variable is *DA1*, i.e., the value of the first damage assessment (in rupees), and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy equaling one when the household belongs to Brahmin, Chhetri, or upper Newar caste groups. *co-caste* is a dummy variable equaling one if the household belongs to the same caste as any one of the APM members in the VDC. *first quartile MMI* is equal to one for VDCs that belong to the first quartile of the VDC averages of MMI (ward). The regressions include *MMI (ward)*, *building controls*, *household controls*, *geographic controls*, *building controls* × *individual assets*, MMI (ward), and *building controls* × *MMI (ward)*, which are defined as indicated in the notes to Table 1.

A4.1.3. Robustness to aggregating DA1 and DA2 to binary variables

Because there are only three potential values of the outcome variable DA1 and five categories of DA2, we investigate here the robustness of our main results to using an alternative specification, in which we aggregate the categories such that we have binary values, and estimate linear probability models. "Highest aid" indicates that the variables are defined such that they are 1 if households received the highest possible damage categorization, and 0 otherwise. The label "any aid" indicates that variables are defined such that they are 1 if households received any damage categorization other than the lowest, and 0 if they received the lowest damage categorization. The results are robust to this alternative approach. Only for the "any aid" aggregation, we find a marginally significant result where before we had an insignificant coefficient on *upper caste*.

Table A4.1.3: Robustness to using binary DA1 and DA2

	Dependent variable is							
	highest aid (0/1)				any aid (0/1)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	$DA1_{[highest]}$	$DA1_{[highest]}$	$DA1_{[highest]}$	$DA2_{[highest]}$	$DA1_{[any]}$	$DA1_{[any]}$	$DA1_{[any]}$	$DA2_{[any]}$
upper caste	0.093	0.032	0.008	-0.003	0.075	0.025	0.007	0.005
	(0.01)***	(0.005)***	(0.002)***	(0.004)	(0.01)***	(0.004)***	(0.002)***	(0.003)*
MMI (ward)		✓	✓	✓		✓	✓	✓
building controls		✓	✓	✓		✓	✓	✓
household controls		✓	✓	✓		✓	✓	✓
geographic controls		✓	✓	✓		✓	✓	✓
building controls × individual assets		✓	✓	✓		✓	✓	✓
building controls × MMI (ward)		✓	✓	✓		✓	✓	✓
VDC fixed effects			✓	✓			✓	✓
VDCs	612	612	612	612	612	612	612	612
N	670733	667862	667862	667862	670733	667862	667862	667862
R^2	0.011	0.44	0.53	0.42	0.0084	0.37	0.45	0.41
Mean dep. var.	0.76	0.76	0.76	0.64	0.80	0.80	0.80	0.82

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable in columns (1) and (2) is $DA1_{[highest]}$, which is a dummy variable equaling one for households receiving Rs. 15,000, the highest amount of emergency cash assistance, and 0 for households receiving Rs. 3,000 or no assistance. In columns (3) and (4), the dependent variable is $DA2_{[highest]}$, which is a dummy variable equaling one for houses categorized as "total" or "heavy" damage by engineers, and 0 for houses categorized as "negligible", "moderate", or "substantial" damage. The dependent variable in columns (5) and (6) is $DA1_{[any]}$, which is one for a household receiving Rs. 15,000 or Rs. 3,000 emergency cash assistance, and 0 for households receiving no assistance. In columns (7) and (8), the dependent variable is $DA2_{[any]}$, which is one for houses categorized as "total", "heavy", or "substantial" damage by engineers, and 0 for houses categorized as "negligible" and "moderate" damage. *upper caste* is a dummy equaling one when the household belongs to Brahmin, Chhetri, or upper Newar caste groups. The regressions include *building controls*, *household controls*, *geographic controls*, *building controls* × *individual assets*, MMI (ward), and *building controls* × *MMI (ward)*, which are defined as indicated in the notes to Table 1.

A4.2. In-group favoritism results

A4.2.1. Robustness to using different aggregation level of castes to calculate the co-caste variable

In our main analysis, we aggregate 91 sub-castes into 6 main castes. Table A4.2.1a shows that results are robust when we define co-caste using all 91 sub-castes, rather than aggregating to 6 castes and all columns correspond to different columns of Table 3.

Table A4.2.1a: Robustness to using finer disaggregation of castes (91 sub-castes)

	Dependent variable is DA1 (in rupees)					
	(1)	(2)	(3)	(4)	(5)	(6)
upper caste	120.4	46.4	-20.7	-15.5	-226.0	-228.6
	(30.6)***	(35.4)	(38.4)	(38.5)	(148.1)	(148.0)
co-sub-caste	-3.98	-73.1	-19.3	-23.9	-9.85	-14.5
	(29.1)	(46.5)	(43.6)	(43.3)	(43.6)	(43.2)
co-sub-caste × upper caste		150.1	48.6	55.3	46.6	53.1
		(63.0)**	(61.9)	(61.5)	(62.1)	(61.8)
upper caste × 1^{st} quartile MMI			289.4	278.4	135.7	125.0
			(107.9)***	(108.1)**	(99.9)	(100.0)
co-sub-caste × 1^{st} quartile MMI			-253.5	-251.8	-296.9	-295.3
			(124.4)**	(124.2)**	(123.7)**	(123.5)**
co-sub-caste × upper caste × 1^{st} quartile MMI			496.4	501.8	523.3	528.8
			(176.4)***	(175.7)***	(174.1)***	(173.5)***
MMI (ward)	✓	✓	✓	✓	✓	✓
building controls	✓	✓	✓	✓	✓	✓
household controls	✓	✓	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓	✓	✓
VDC fixed effects	✓	✓	✓	✓	✓	✓
slope and altitude × MMI (ward)				✓		✓
building controls × upper caste					✓	✓
building controls × 1^{st} quartile MMI					✓	✓
household controls × upper caste					✓	✓
household controls × 1^{st} quartile MMI					✓	✓
VDCs	611	611	611	611	611	611
N	667464	667464	667464	667464	667464	667464
R^2	0.53	0.53	0.53	0.53	0.53	0.53
Mean dependent variable	11523.8	11523.8	11523.8	11523.8	11523.8	11523.8

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1 (in Rupees)* and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy equaling one when the household belongs to Brahmin, Chhetri, and upper Newar caste groups. *co-sub-caste* is a dummy variable equaling one if the household belongs to the same sub-caste as any one of the APM members in the VDC. Note here the *co-sub-caste* category is based on the 91 finer caste groups. MMI (ward) is based on the earthquake intensity measure Modified Mercalli intensity at the centroid of the ward. *first quartile MMI* is equal to one for VDCs that belong to the first quartile of the VDC averages of MMI (ward). All other controls are defined as indicated in the notes to Table 1 and Table 2.

Table A4.1.2b: Robustness to using upper and lower castes (2 castes)

	Dependent variable is DA1 (in rupees)					
	(1)	(2)	(3)	(4)	(5)	(6)
upper caste	107.5	103.6	42.8	51.6	-183.0	-182.5
	(32.6)***	(118.5)	(110.3)	(111.1)	(182.1)	(182.5)
co-sub-caste	40.9	39.4	69.3	65.8	73.3	69.8
	(50.1)	(74.2)	(64.0)	(63.5)	(63.3)	(62.9)
co-sub-caste × upper caste		4.87	-64.5	-64.1	-59.9	-59.5
		(148.7)	(132.5)	(132.8)	(132.2)	(132.6)
upper caste × 1^{st} quartile MMI			52.6	27.3	-63.9	-88.7
			(343.5)	(343.2)	(333.7)	(333.4)
co-sub-caste × 1^{st} quartile MMI			-294.3	-294.3	-309.7	-309.5
			(221.3)	(222.0)	(215.6)	(216.2)
co-sub-caste × upper caste × 1^{st} quartile MMI			636.9	657.5	606.9	627.2
			(443.8)	(444.3)	(426.1)	(426.3)
MMI (ward)	✓	✓	✓	✓	✓	✓
building controls	✓	✓	✓	✓	✓	✓
household controls	✓	✓	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓	✓	✓
VDC fixed effects	✓	✓	✓	✓	✓	✓
slope and altitude × MMI (ward)				✓		✓
building controls × upper caste					✓	✓
building controls × 1^{st} quartile MMI					✓	✓
household controls × upper caste					✓	✓
household controls × 1^{st} quartile MMI					✓	✓
VDCs	611	611	611	611	611	611
N	667464	667464	667464	667464	667464	667464
R^2	0.53	0.53	0.53	0.53	0.53	0.53
Mean dependent variable	11523.8	11523.8	11523.8	11523.8	11523.8	11523.8

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1 (in Rupees)* and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy equaling one when the household belongs to Brahmin, Chhetri, and upper Newar caste groups. *co caste (2)* is a dummy variable equaling one if the household belongs to the same upper and lower caste category as any one of the APM members in the VDC. MMI (ward) is based on the earthquake intensity measure Modified Mercalli intensity at the centroid of the ward. *first quartile MMI* is equal to one for VDCs that belong to the first quartile of the VDC averages of MMI (ward). All other controls are defined as indicated in the notes to Table 1 and Table 2.

A4.2.2. The role of sharing a family name

Table A4.2.2: Evidence for in-group favoritism: the role of sharing a family name

	Dependent variable is DA1 (in rupees)					
	(1)	(2)	(3)	(4)	(5)	(6)
upper caste	118.7	32.6	-17.9	-13.1	-225.9	-229.1
	(30.4)***	(39.0)	(41.8)	(42.0)	(149.3)	(149.2)
co-caste	3.51	-76.2	21.9	17.2	24.9	20.4
	(32.6)	(61.3)	(58.3)	(57.2)	(58.0)	(57.0)
co-caste × upper caste		165.1	21.7	29.1	25.3	32.5
		(81.9)**	(79.3)	(77.9)	(79.2)	(77.8)
upper caste × 1^{st} quartile MMI			202.8	192.4	55.7	45.5
			(111.5)*	(111.7)*	(106.1)	(106.3)
co-caste × 1^{st} quartile MMI			-403.3	-402.3	-403.3	-402.4
			(143.9)***	(143.9)***	(142.1)***	(142.0)***
co-caste × upper caste × 1^{st} quartile MMI			633.8	637.0	626.9	630.3
			(203.9)***	(203.9)***	(198.5)***	(198.5)***
co family name	1.99	13.9	-40.1	-40.2	-33.0	-33.0
	(29.0)	(49.1)	(48.6)	(48.5)	(48.1)	(48.1)
co family name × upper caste		-9.00	18.6	16.9	16.2	14.5
		(61.9)	(55.7)	(55.9)	(55.4)	(55.5)
co family name × 1^{st} quartile MMI			130.2	133.4	58.5	61.7
			(121.8)	(121.7)	(119.9)	(119.8)
co family name × upper caste × 1^{st} quartile MMI			39.8	43.0	71.2	74.5
			(173.9)	(174.0)	(172.6)	(172.7)
MMI (ward)	✓	✓	✓	✓	✓	✓
building controls	✓	✓	✓	✓	✓	✓
household controls	✓	✓	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓	✓	✓
VDC fixed effects	✓	✓	✓	✓	✓	✓
slope and altitude × MMI (ward)				✓		✓
building controls × upper caste					✓	✓
building controls × 1^{st} quartile MMI					✓	✓
household controls × upper caste					✓	✓
household controls × 1^{st} quartile MMI					✓	✓
VDCs	611	611	611	611	611	611
N	667464	667464	667464	667464	667464	667464
R^2	0.53	0.53	0.53	0.53	0.53	0.53
Mean dependent variable	11523.8	11523.8	11523.8	11523.8	11523.8	11523.8

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1*, i.e. the value of the first damage assessment (in rupees), and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy variable equaling one if the household belongs to Brahmin, Chhetri, or upper Newar caste groups. *co-caste* is a dummy variable equaling one if the household belongs to the same caste as any one of the APM members in the VDC. *co family name* is a dummy variable equaling one if the household shares the same family name as any one of the APM members in the VDC. *MMI (ward)* is based on the earthquake intensity measure Modified Mercalli intensity at the centroid of the ward. *first quartile MMI* is equal to one for VDCs that belong to the first quartile of the VDC averages of MMI (ward). Here, we additionally control for the interaction of *co family name* with *upper caste* and *first quartile MMI* and to our central favoritism results from Table 3. The regressions include *building controls*, *household controls*, *geographic controls*, and *building controls* × *individual assets* and are as indicated in the notes to Table 1. Similarly, *slope and altitude* × *MMI (ward)*, *building controls* × *upper caste*, *building controls* × *first quartile MMI*, *household controls* × *upper caste*, and *household controls* × *first quartile MMI* are defined as indicated in the notes to Table 2.

A4.2.3. Alternative caste classifications of Newar households

Following Gurung, P. (2000), Gurung, H. (2003), Bennet et al. (2008), Mainali et al. (2013), and Gellner (2007), we define as upper caste households those from Brahmin, Chhetri, and upper Newar castes, while we define as lower caste those households from Janajati (non-Hindu, indigenous) caste and "impure" castes (which include lower Newar, Muslim and foreign groups, and Dalit castes).

It is mostly uncontroversial and straightforward to classify Brahmin and Chhetri as upper and Janajati households, and "impure" castes as lower castes using the caste data from the survey. The Newar households are somewhat more difficult to classify. The survey only has one caste-code for all Newar groups, without further distinguishing different groups. However, there exists a strong caste-hierarchy within the broader Newar caste, with some Newar (sub) castes reasonably high in the social hierarchy and others considered "impure", with a social status at the very bottom of the caste hierarchy. Based on family names of household heads, we classify Newar households into upper Newar and lower Newar castes using Müller-Böker (1988) and Gurung, H. (2005).[15]

Online Appendix Table A4.2.3 shows that our central results are robust to making no distinction within the various Newar castes and categorize all Newar caste households as upper caste. Column (1) corresponds to column (8) from Table 1, columns (2) and (3) correspond to columns (1) and (4) from Table 2, and columns (4)-(6) correspond to columns (1), (3), and (5) from Table 3.

[15] Brāhman (similar to Brahmin), Chatharīya (similar to Chhetri), and Pāñcthariya (upper class traders and merchants) are classified as upper Newar category and farmers, artisan, and scavenger Newar households in the lower Newar category (Müller-Böker, 1988; Gurung, H., 2005).

Table A4.2.3: Robustness to classifying all Newar castes as upper caste

	Dependent variable is DA1 (in rupees)					
	(1)	(2)	(3)	(4)	(5)	(6)
upper caste	128.9	0.53	-189.6	50.3	1.77	-179.8
	(28.5)***	(29.2)	(145.3)	(39.3)	(42.3)	(148.6)
co-caste				-51.9	21.0	24.2
				(48.6)	(43.8)	(42.9)
co-caste × upper caste				123.6	-7.52	-1.10
				(67.7)*	(64.6)	(63.6)
upper caste × 1^{st} quartile MMI		523.8	367.6		194.6	36.4
		(104.6)***	(95.6)***		(111.1)*	(104.9)
co-caste × 1^{st} quartile MMI					-359.8	-390.4
					(130.9)***	(129.1)***
co-caste × upper caste × 1^{st} quartile MMI					664.4	678.4
					(189.1)***	(184.9)***
DA2	✓					
MMI (ward)	✓	✓	✓	✓	✓	✓
building controls	✓	✓	✓	✓	✓	✓
household controls	✓	✓	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓	✓	✓
VDC fixed effects	✓	✓	✓	✓	✓	✓
slope and altitude × MMI (ward)			✓			✓
building controls × upper caste			✓			✓
building controls × 1^{st} quartile MMI			✓			✓
household controls × upper caste			✓			✓
household controls × 1^{st} quartile MMI			✓			✓
VDCs	612	612	612	611	611	611
N	667862	667862	667862	667464	667464	667464
R^2	0.54	0.53	0.53	0.53	0.53	0.53
Mean dependent variable	11519.2	11519.2	11519.2	11523.8	11523.8	11523.8

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1*, i.e. the value of the first damage assessment (in Rupees), and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy equaling one when the household belongs to Brahmin, Chhetri, and Newar caste groups. Note here that both upper and lower Newar households are classified as upper castes. *co-caste* is a dummy variable equaling one if the household belongs to the same caste as any one of the APM members in the VDC. For comparability of magnitudes and the direction of the effect, we rescale the MMI (ward) such that values lie between 0 and 1, where 1 refers to low damage. *first quartile MMI* is equal to one for VDCs that belong to the first quartile of the VDC averages of MMI(ward). All other controls are defined as indicated in the notes to Table 1 and Table 2.

A4.2.4. Sharing caste with the surveyor engineers

In this Online Appendix, we show results from regressions that are analogous to our main regressions, but where we use a co-caste dummy variable for the surveyor engineers. I.e., we use a dummy variable ("co-caste (SE)"), which is equal to one if the household and the surveyor engineer share the same caste. This allows us to test if the assessment by engineers is subject to in-group bias. The estimates for co-caste with the engineer are statistically insignificant in columns (1) and (2), and the magnitudes of the coefficients are also smaller than in our analysis of co-caste with APMs. The difference between DA1 and DA2 in columns (3) and (4) is significant for upper castes, reflecting the higher damage categorization by APMs for upper castes found in the main analysis and the insignificant results seen in columns (1) and (2). There is no additional effect on this difference in assessments of being co-caste with the survey engineer for upper castes.

Table A4.2.4: Investigating the role of sharing the caste with the surveyor engineers

	Dependent variable is			
	DA2		$DA1_{[0,1]}$ -$DA2_{[0,1]}$	
	(1)	(2)	(3)	(4)
upper caste	-0.012	-0.013	0.011	0.009
	(0.009)	(0.010)	(0.002)***	(0.003)***
co-caste$_{[SE]}$	0.008	0.005	-0.003	-0.008
	(0.01)	(0.03)	(0.004)	(0.006)
co-caste$_{[SE]}$ × upper caste		0.005		0.009
		(0.03)		(0.008)
MMI (ward)	✓	✓	✓	✓
building controls	✓	✓	✓	✓
household controls	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓
VDC fixed effects	✓	✓	✓	✓
VDCs	612	612	612	612
N	666027	666027	666027	666027
R^2	0.53	0.53	0.25	0.25
Mean dependent variable	3.76	3.76	0.090	0.090

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable in columns (1) and (2) is the surveyor engineer's damage assessment ($DA2$) and columns (3) and (4) is the difference between $DA1_{[0,1]}$ and $DA2_{[0,1]}$. *upper caste* is a dummy equaling one when the household belongs to Brahmin, Chhetri, or upper Newar caste groups. *co-caste*$_{[SE]}$ is a dummy variable equaling one if the household belongs to the same caste as the engineer carrying out the survey. The regressions include *MMI (ward)*, *building controls*, *household controls*, *geographic controls*, and *building controls* × *individual assets* and are as indicated in the notes to Table 1.

A4.2.5. The role of the local share of lower castes

Table A4.2.5: Splitting sample by the local share of lower castes

	Dependent variable is DA1 (in rupees)							
	below median lower caste share				above median lower caste share			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
upper caste	76.6	26.0	11.1	-383.7	98.4	-7.26	-145.8	-427.6
	(33.5)**	(42.2)	(45.1)	(178.2)**	(45.9)**	(64.7)	(70.5)**	(267.0)
co-caste	46.7	-26.6	20.1	31.0	-5.07	-53.9	8.65	16.7
	(34.7)	(59.0)	(51.3)	(50.5)	(43.0)	(55.5)	(52.4)	(51.9)
co-caste × upper caste		114.5	5.59	0.83		195.1	129.3	131.2
		(70.7)	(66.7)	(66.8)		(107.9)*	(104.4)	(104.2)
upper caste × 1^{st} quartile MMI			22.3	-68.9			480.9	378.6
			(133.1)	(123.4)			(144.8)***	(149.5)**
co-caste × 1^{st} quartile MMI			-354.7	-369.0			-222.8	-262.4
			(206.4)*	(197.0)*			(140.1)	(140.5)*
co-caste × upper caste × 1^{st} quartile MMI			729.0	729.3			163.2	180.0
			(238.3)***	(228.5)***			(250.9)	(248.1)
MMI (ward)	✓	✓	✓	✓	✓	✓	✓	✓
building controls	✓	✓	✓	✓	✓	✓	✓	✓
household controls	✓	✓	✓	✓	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓	✓	✓	✓	✓
VDC fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
slope and altitude × MMI (ward)				✓				✓
building controls × upper caste				✓				✓
building controls × 1^{st} quartile MMI				✓				✓
household controls × upper caste				✓				✓
household controls × 1^{st} quartile MMI				✓				✓
VDCs	513	513	513	513	576	576	576	576
N	334428	334428	334428	334428	333036	333036	333036	333036
R^2	0.45	0.45	0.45	0.45	0.57	0.57	0.57	0.57
Mean dependent variable	12444.2	12444.2	12444.2	12444.2	10599.5	10599.5	10599.5	10599.5

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1*, i.e. the value of the first damage assessment (in Rupees), and takes the values 0, 3,000, and 15,000. Columns (1) –(4) show our main results for VDCs with below median share of lower caste households and columns (5) –(8) show results for VDCs with above median share of lower caste households. *upper caste* is a dummy variable equaling one if the household belongs to Brahmin, Chhetri, or upper Newar caste groups. MMI (ward) is based on the earthquake intensity measure Modified Mercalli intensity at the centroid of the ward. *co-caste* is a dummy variable equaling one if the household belongs to the same caste as any one of the APM members in the VDC. *first quartile MMI (VDC)* is equal to one for VDCs that belong to the first quartile of the VDC averages of MMI(ward). All other controls are as indicated in the notes to Table 1 and Table 2.

A4.2.6. The role of a caste having an APM majority

Table A4.2.6: In-group favoritism: The role of a caste having an APM majority

	Dependent variable is DA1 (in rupees)					
	co-caste defined based on 6 subcastes			co-caste defined based on upper/lower distinction		
	(1)	(2)	(3)	(4)	(5)	(6)
upper caste	122.4	28.7	-25.5	109.5	27.3	-39.2
	(30.2)***	(39.2)	(41.9)	(32.6)***	(123.7)	(118.1)
co-caste	30.3	-35.0	59.3	63.9	55.1	91.9
	(39.8)	(60.2)	(53.4)	(54.1)	(75.2)	(66.6)
co-caste × upper caste		165.3	13.6		61.2	-0.083
		(89.5)*	(78.0)		(150.4)	(135.1)
upper caste × 1^{st} quartile MMI			215.4			28.9
			(112.2)*			(357.7)
co-caste × 1^{st} quartile MMI			-444.4			-325.9
			(147.5)***			(220.4)
co-caste × upper caste × 1^{st} quartile MMI			739.4			635.0
			(243.0)***			(455.0)
co-caste$_{[majority]}$	-46.5	-80.0	-150.4	-44.0	-128.5	-140.5
	(46.2)	(78.3)	(71.8)**	(37.3)	(67.7)*	(64.0)**
co-caste$_{[majority]}$ × upper caste		26.4	111.6		135.2	129.3
		(108.3)	(90.0)		(86.0)	(79.1)
co-caste$_{[majority]}$ × 1^{st} quartile MMI			274.3			-12.5
			(201.2)			(187.7)
co-caste$_{[majority]}$ × upper caste × 1^{st} quartile MMI			-322.1			122.6
			(298.9)			(246.0)
building controls	✓	✓	✓	✓	✓	✓
household controls	✓	✓	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓	✓	✓
MMI (ward)	✓	✓	✓	✓	✓	✓
VDC fixed effects	✓	✓	✓	✓	✓	✓
VDCs	611	611	611	611	611	611
N	667464	667464	667464	667464	667464	667464
R^2	0.53	0.53	0.53	0.53	0.53	0.53
Mean dependent variable (Full sample)	11523.8	11523.8	11523.8	11523.8	11523.8	11523.8
Mean dependent variable (1^{st} quartile VDC)	5846.6	5846.6	5846.6	5846.6	5846.6	5846.6

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1*, i.e. the value of the first damage assessment (in rupees), and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy variable equaling one if the household belongs to Brahmin, Chhetri, or upper Newar caste groups. While *co-caste* is a dummy variable equaling one if the household belongs to the same caste as any one of the APM members in the VDC, *co-caste*$_{[majority]}$ is a dummy variable equaling one if the household belongs to the co caste APM who also has a clear majority in the APM. In columns (1)-(3), *co-caste* is defined based on 6 sub-castes. *co-caste* in columns (4)-(6) is defined based on upper and lower caste distinction. MMI (ward) is based on the earthquake intensity measure Modified Mercalli intensity at the centroid of the ward. *first quartile MMI* is equal to one for VDCs that belong to the first quartile of the VDC averages of MMI (ward). All other controls are defined as indicated in the notes to Table 1 and Table 2.

A4.2.7. The role of homogenous APMs, with all upper caste or all lower caste APMs

In Table A4.2.7, we additionally control for the VDCs with all upper caste and lower caste APMs and their interactions to the in-group favoritism regressions of Table 3. *upper APM (all)* are VDCs with all APMs belonging to the upper caste and *upper APM (all)* are VDCs with all APMs belonging to the lower caste.[16] The in-group favoritism results are stable across different specifications. In columns (1) and (2), the coefficient of upper APM (all) is positive and significant, and lower caste APM (all) is negative but insignificant. In columns (3)-(5), the coefficient of upper caste APMs (all), lower caste APM (all), and their interactions are mostly insignificant. The results do not provide evidence that VDCs with all APMs belonging to upper or lower castes drive the in-group favoritism results.

[16] The specification in columns (1) and (2) take the specification from Table 3, columns (1) and (3) and additionally control for *upper APM (all)* and *lower APM (all)*. The specification in columns (3) and (4) take the specification from Table 3, column (3) and additionally control for *upper APM (all)*, *lower APM (all)*, and their interactions with *upper caste*. The specification in columns (5) takes the specification from Table 3, column (5) and additionally controls for *upper APM (all)*, *lower APM (all)* only, and further also include their interactions with *upper caste*.

Table A4.2.7: Robustness to additionally controlling for VDCs with all upper caste and lower caste APMs

	Dependent variable is DA1 (in rupees)					
	(1)	(2)	(3)	(4)	(5)	(6)
upper caste	386.9	143.1	71.3	-16.3	-18.3	-228.1
	(59.8)***	(83.2)*	(124.2)	(50.9)	(42.0)	(148.9)
co-caste	-157.2	-357.2	-370.9	-106.1	-0.24	2.25
	(70.4)**	(111.3)***	(119.9)***	(47.6)**	(44.7)	(43.7)
co-caste × upper caste		442.9	480.9	186.0	35.8	43.9
		(147.0)***	(148.4)***	(65.5)***	(67.2)	(66.2)
upper caste × 1^{st} quartile MMI					260.4	98.0
					(157.2)*	(145.2)
co-caste × 1^{st} quartile MMI					-346.8	-376.3
					(129.4)***	(127.9)***
co-caste × upper caste × 1^{st} quartile MMI					603.1	619.6
					(182.6)***	(178.0)***
upper APM (all)	394.9	306.8	265.8			
	(167.3)**	(168.2)*	(210.9)			
lower APM (all)	-214.3	-149.6	-183.8			
	(229.6)	(234.2)	(247.5)			
upper APM (all) × upper caste			77.9	102.0		
			(157.1)	(72.9)		
lower APM (all) × upper caste			189.4	-7.03		
			(218.5)	(106.7)		
upper APM (all) × upper caste × 1^{st} quartile MMI					-25.6	-22.7
					(204.6)	(198.9)
lower APM (all) × upper caste × 1^{st} quartile MMI					-187.8	-173.8
					(284.6)	(268.3)
MMI (ward)	✓	✓	✓	✓	✓	✓
building controls	✓	✓	✓	✓	✓	✓
household controls	✓	✓	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓	✓	✓
VDC fixed effects				✓	✓	✓
slope and altitude × MMI (ward)						✓
building controls × upper caste						✓
building controls × 1^{st} quartile MMI						✓
household controls × upper caste						✓
household controls × 1^{st} quartile MMI						✓
VDCs	611	611	611	611	611	611
N	667464	667464	667464	667464	667464	667464
R^2	0.44	0.44	0.44	0.53	0.53	0.53
Mean dependent variable	11523.8	11523.8	11523.8	11523.8	11523.8	11523.8

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1*, i.e. the value of the first damage assessment (in Rupees), and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy equaling one when the household belongs to Brahmin, Chhetri, and Newar caste groups. *co-caste* is a dummy variable equaling one if the household belongs to the same caste as any one of the APM members in the VDC. e ward – MMI(ward). For comparability of magnitudes and the direction of the effect, we rescale the MMI (ward) such that values lie between 0 and 1, where 1 refers to low damage. *first quartile MMI* is equal to one for VDCs that belong to the first quartile of the VDC averages of MMI(ward). All other controls are defined as indicated in the notes to Table 1 and Table 2.

A4.2.8. Dividing the VDCs with a VDC-average of MMI in the first and fourth quartiles

In Table A4.2.8, we divide the sample of VDCs in those with a VDC-average of MMI in the first quartile of MMI and those in the fourth quartile and separately run in-group favoritism results from Table 3. The specification in columns (1)-(4) take the specification from Table 3, columns (1)-(4) for VDCs with a VDC-average of MMI in the first quartile. Similarly, the specification in columns (5)-(8) again take the specification from Table 3, columns (1)-(4) for VDCs with a VDC-average of MMI in the fourth quartile.

Table A4.2.8: Robustness to dividing VDCs with a VDC-average of MMI in the first and fourth quartiles

	Dependent variable is DA1 (in rupees)			
	VDCs in the 1^{st} quartile of MMI		VDCs in the 4^{th} quartile of MMI	
	(1)	(2)	(3)	(4)
upper caste	379.0	45.7	21.2	58.2
	(86.2)***	(96.6)	(45.2)	(63.5)
co-caste	-68.5	-328.6	42.6	75.0
	(77.2)	(110.1)***	(37.9)	(62.2)
co-caste × upper caste		630.4		-67.8
		(164.8)***		(84.3)
MMI (ward)	✓	✓	✓	✓
building controls	✓	✓	✓	✓
household controls	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓
VDC fixed effects	✓	✓	✓	✓
VDCs	152	152	153	153
N	154760	154760	178062	178062
R^2	0.54	0.54	0.12	0.12
Mean dependent variable	5861.0	5861.0	13741.4	13741.4

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1*, i.e. the value of the first damage assessment (in Rupees), and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy variable equaling one if the household belongs to Brahmin, Chhetri, or upper Newar caste groups. MMI (ward) is based on the earthquake intensity measure Modified Mercalli intensity at the centroid of the ward. *first quartile MMI* is equal to one for VDCs that belong to the first quartile of the VDC averages of MMI (ward). *fourth quartile MMI* is equal to one for VDCs that belong to the fourth quartile of the VDC averages of MMI (ward). *co-caste* is a dummy variable equaling one if the household belongs to the same caste as any one of the APM members in the VDC. The regressions include *building controls*, *household controls*, *geographic controls*, and *building controls* × *assets*, which are defined as indicated in the notes to Table 1.

A4.2.9. Heterogeneity based on the closeness of 2017 village and municipal elections

One potential hypothesis to explain differences in favoritism is political competition. In localities with strong political competition, APMs may refrain from favoritism to avoid alienating lower caste households because these could represent the median voter, while APMs have less incentives to be unbiased in strongholds.

There is some existing evidence of a reduction in (co-ethnic, co-partisan) favoritism when there is a higher political competition (Curto-Grau et al., 2018; Lévêque, 2020). Even the disappearance of favoritism in democracies in Burgess et al. (2015) could be interpreted as an effect in the same direction. Here, political competition seems to discipline the political leaders (Svaleryd and Vlachos, 2009).

Table A4.2.9 shows results from an analysis in which we use data from a the village/municipal election in 2017 (the first local level elections after the earthquake). In this analysis, we use wards as the unit of observations to match the VDCs from our many analysis for the following reason: Between 2014-2016, the government of Nepal restructured the village council and transformed 3,900 old VDCs and municipalities into 753 new rural and urban municipalities. In the rural areas, the transformed wards, which are administrative units below the new municipalities, quite closely resembled the old VDCs. Thus, we compare localities (wards) with close elections to localities (wards) where a candidate wins by a large margin, to investigate whether our results on favoritism differ between these wards.

Columns 1 and 2 split the sample. An election is defined as "close" if the margin of vote shares between the winner and the runner-up candidates is less than 5%. Comparing columns 1 and 2 shows that the upper caste coefficient is larger in localities with close elections. In column 3 we pool all localities and add an interaction term between "upper caste" and a dummy "close", which is one if an election was close. We assume that all other parameter estimates are the same in close and non-close villages. In this specification, the difference in the "upper caste" between close and non-close localities is not statistically significant.

In sum, our main findings also hold when we split up the sample in close and non-close elections, and we do not find significant differences between these two types of communities.

If anything, the results suggest that close elections are associated with larger favoritism. Which would be in line with an alternative hypothesis, namely that politicians give favors to "their" constituents when they are in need of every individual vote, i.e. in close elections. Competition may increase the importance of individual votes and politicians might try to influence it by providing direct benefits to the individuals from their own groups who might play a larger role in switching the outcome of the elections.

We would like to mention the alternative hypothesis, though, namely that politicians give favors to "their" constituents when they are in need of every individual vote, i.e. in close elections. Competition may increase the importance of individual votes and politicians might try to influence it by providing direct benefits to the individuals from their own groups who might play a larger role in switching the outcome of the elections.

We should add the following caveats: 1) The data come from an election that took place two years after the earthquake (2017), and closeness might be an outcome of favoritism right after the earthquake. We do not use the election for the last local election as it took place in 1997, almost 20 years before the elections. 2) Because of the restructuring of the village council between 2014-2016, the spatial organization of administrative units is slightly different than in the earthquake-related data.

Table A4.2.9: Splitting sample by closeness of 2017 village/municipal elections)

	Dependent variable is DA1 (in rupees)							
	close	not-close	interaction	close	not-close	interaction	close	not-close
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
upper caste	661.1	357.6	417.3	23.4	-5.23	6.38	-77.3	-16.5
	(117.4)***	(71.9)***	(76.5)***	(53.2)	(32.4)	(33.9)	(75.6)	(46.5)
close			-277.1			-129.3		
			(166.7)*			(153.4)		
upper caste × close			138.0			-8.40		
			(154.2)			(69.1)		
upper caste × 1^{st} quartile MMI				648.5	409.4	417.5	375.7	128.9
				(175.5)***	(107.3)***	(111.5)***	(184.5)**	(129.3)
low ward MMI × close						-97.4		
						(253.9)		
upper caste × 1^{st} quartile MMI × close						315.5		
						(199.1)		
co-caste							-62.8	0.64
							(85.8)	(48.4)
co-caste × upper caste							178.2	17.8
							(119.8)	(74.3)
co-caste × 1^{st} quartile MMI							-136.3	-368.0
							(205.9)	(145.6)**
co-caste × upper caste × 1^{st} quartile MMI							490.1	601.4
							(252.8)*	(215.4)***
MMI (ward)	✓	✓	✓	✓	✓	✓	✓	✓
building controls	✓	✓	✓	✓	✓	✓	✓	✓
household controls	✓	✓	✓	✓	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓	✓	✓	✓	✓
VDCs	227	495	612	227	495	612	227	494
N	191210	476652	667862	191210	476652	667862	191210	476254
R^2	0.48	0.42	0.44	0.56	0.51	0.53	0.56	0.51
Mean dep. var.	10839.1	11792.0	11519.2	10839.1	11792.0	11519.2	10839.1	11798.7

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1*, i.e. the value of the first damage assessment (in Rupees), and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy equaling one when the household belongs to Brahmin, Chhetri, and Newar caste groups. *co-caste* is a dummy variable equaling one if the household belongs to the same caste as any one of the APM members in the VDC. *first quartile MMI (VDC)* is equal to one for VDCs that belong to the first quartile of the VDC averages of MMI(ward). All other controls are as defined as indicated in the notes to Table 1.

A4.2.10. Excluding one informant group at a time

We collected APM names through various key informants, relying on recollections of VDC secretaries, social mobilizers, ward chairs, and other informed VDC residents. In Online Appendix Table A4.2.10, we show that results are qualitatively unchanged if we exclude, one at a time, data based on one of the four groups of informants. Odd columns correspond to column (3) from Table 3 that interact *co-caste* with *upper caste* and even columns correspond to column (5) from Table 3 that interact *co-caste* with *upper caste* and *first quartile MMI*. For the estimates in columns (1) and (2) we exclude VDCs where the APM names were gathered by calling VDC secretaries from the time of the earthquake. For estimates in columns (3) and (4) we exclude names provided by social mobilizers. For columns (5) and (6) we exclude VDCs where the APM names were gathered by calling ward chairs from the 2017 village council elections, finally, for columns (7) and (8) we exclude VDCs where data on APMs was provided by informed village members from within the VDC.

Table A4.2.10: Robustness to excluding one informant group at a time

	Dependent variable is DA1 (in Rupees)							
	Not include VDC secretary		Not include social mobilizer		Not include ward chair		Not include village member	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
upper caste	8.52	-28.1	57.8	5.01	10.2	-39.7	54.9	-6.28
	(44.2)	(48.0)	(46.1)	(50.8)	(42.9)	(46.0)	(45.6)	(47.2)
co-caste	-60.7	-16.7	-64.1	21.3	-86.1	-14.7	-64.0	8.40
	(50.8)	(48.1)	(60.6)	(58.9)	(53.4)	(47.0)	(56.0)	(49.8)
co-caste × upper caste	169.4	88.8	124.2	-38.0	208.1	71.2	134.3	21.4
	(70.1)**	(72.5)	(85.9)	(85.2)	(75.6)***	(71.3)	(79.7)*	(74.7)
co-caste × 1^{st} quartile MMI		-277.7		-352.7		-362.5		-343.8
		(153.2)*		(142.2)**		(144.8)**		(155.5)**
upper caste × 1^{st} quartile MMI		199.3		150.0		196.6		292.5
		(135.7)		(118.7)		(119.4)		(145.0)**
co-caste × upper caste × 1^{st} quartile MMI		525.4		672.6		705.0		572.8
		(207.4)**		(213.2)***		(209.4)***		(236.7)**
MMI (ward)	✓	✓	✓	✓	✓	✓	✓	✓
building controls	✓	✓	✓	✓	✓	✓	✓	✓
household controls	✓	✓	✓	✓	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓	✓	✓	✓	✓
VDC fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
VDCs	401	401	441	441	517	517	474	474
N	434479	434479	482937	482937	566128	566128	518848	518848
R^2	0.51	0.51	0.56	0.56	0.51	0.51	0.52	0.52
Mean dep. var. (Full sample)	11819.4	11819.4	10987.2	10987.2	11562.8	11562.8	11733.1	11733.1
Mean dep. var. (1^{st} quartile VDC)	5846.6	5846.6	5846.6	5846.6	5846.6	5846.6	5846.6	5846.6

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1 (in Rupees)* and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy equaling one when the household belongs to Brahmin, Chhetri, and upper Newar caste groups. *co-caste* is a dummy variable equaling one if the household belongs to the same caste as any one of the APM members in the VDC. MMI (ward) is based on the earthquake intensity measure Modified Mercalli intensity at the centroid of the ward. *first quartile MMI* is equal to one for VDCs that belong to the first quartile of the VDC averages of MMI (ward). The regressions include *building controls*, *household controls*, *geographic controls*, and *building controls* × *assets* and are as indicated in the notes to Table 1.

A4.2.11. Excluding one party at a time

The APMs consist of representatives of mostly three and sometimes four parties. In Online Appendix Table A4.2.11, we show that results are qualitatively unchanged if we exclude, one at a time, APMs belonging to one particular party. Odd columns correspond to column (3) from Table 3 that interact *co-caste* with *upper caste* and even columns correspond to column (5) from Table 3 that interact *co-caste* with *upper caste*

and *first quartile MMI*. For the estimates in columns (1) and (2) we exclude VDCs with APMs belonging to the Nepali Congress party. For estimates in columns (3) and (4) we exclude VDCs with APMs belonging to United Marxist-Leninist party. For columns (5) and (6) we exclude VDCs with APMs belonging to the Maoist party, finally, for columns (7) and (8) we exclude VDCs with APMs belonging to the National Democratic party.

Table A4.2.11: Robustness to excluding one party group at a time

	Dependent variable is DA1 (in Rupees)							
	Not include NC APM		Not include UML APM		Not include Maoist APM		Not include RPP APM	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
upper caste	48.2	-24.9	86.6	13.8	53.9	-37.9	28.7	-23.3
	(38.4)	(39.0)	(37.9)**	(39.6)	(37.3)	(38.4)	(38.7)	(41.4)
co-caste	-69.5	-20.9	-48.5	9.73	-84.1	-54.6	-72.6	-2.87
	(49.9)	(45.1)	(52.2)	(49.3)	(53.4)	(48.1)	(48.7)	(45.0)
co-caste × upper caste	153.8	59.4	80.3	-18.3	154.0	98.2	169.9	45.7
	(67.2)**	(63.0)	(70.1)	(72.9)	(66.6)**	(65.0)	(69.6)**	(67.9)
co-caste × 1^{st} quartile MMI		-249.6		-302.8		-162.2		-335.3
		(134.7)*		(135.9)**		(146.7)		(130.0)**
upper caste × 1^{st} quartile MMI		312.4		293.1		399.4		223.7
		(120.3)***		(109.4)***		(121.0)***		(111.0)**
co-caste × upper caste × 1^{st} quartile MMI		489.3		556.1		300.6		603.9
		(193.7)**		(192.4)***		(185.0)		(191.9)***
MMI (ward)	✓	✓	✓	✓	✓	✓	✓	✓
building controls	✓	✓	✓	✓	✓	✓	✓	✓
household controls	✓	✓	✓	✓	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓	✓	✓	✓	✓
VDC fixed effects	✓	✓	✓	✓	✓	✓	✓	✓
VDCs	610	610	609	609	611	611	611	611
N	666398	666398	665604	665604	667464	667464	667464	667464
R^2	0.53	0.53	0.53	0.53	0.53	0.53	0.53	0.53
Mean dep. var. (Full sample)	11519.7	11519.7	11517.3	11517.3	11523.8	11523.8	11523.8	11523.8
Mean dep. var. (1^{st} quartile VDC)	5846.6	5846.6	5846.6	5846.6	5846.6	5846.6	5846.6	5846.6

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1 (in Rupees)* and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy equaling one when the household belongs to Brahmin, Chhetri, and upper Newar caste groups. *co-caste* is a dummy variable equaling one if the household belongs to the same caste as any one of the APM members in the VDC. Note here we exclude the APMs belonging to one of the four parties at a time for the calculation of *co-caste* variable. MMI (ward) is based on the earthquake intensity measure Modified Mercalli intensity at the centroid of the ward. *first quartile MMI* is equal to one for VDCs that belong to the first quartile of the VDC averages of MMI (ward). The regressions include *building controls*, *household controls*, *geographic controls*, and *building controls* × *assets* and are as indicated in the notes to Table 1.

A4.2.12. Including other local actors' castes to calculate the co-caste variable

We argued above that APMs were central to the emergency aid distribution process and calculated *co-caste* based on whether the household belongs to the same caste as one of the APM members. Yet, the VDC secretary coordinated the grant distribution committee and may have played a role in identifying emergency aid recipients. Thus, to show robustness, we calculate *co-caste* based on whether the household belongs to the same caste as one of the APM members or a VDC secretary. Results are shown in Online Appendix Table A4.2.12, columns (1) and (2). Similarly, social mobilizers, deployed in each VDC by the Nepal government to increase representation in local governance (Gurung, N., 2011), were often included in the grant distribution committees (Pokharel et al., 2016a). Therefore, we additionally include the caste of the social mobilizer to calculate the *co-caste* variable. Results are shown in Online Appendix Table A4.2.12. Odd columns correspond to column (3) from Table 3 that interact *co-caste* with *upper caste* and even columns correspond to column (5) from Table 3 that interact *co-caste* with *upper caste* and *first quartile MMI*. Results are robust to the inclusion of these local actors.

Table A4.2.12: Robustness to including VDC secretary (VDC Sec) and social mobilizer (SM) castes

	Dependent variable is DA1 (in Rupees)			
	co-caste$_{[APMs\ +\ VDC\ Sec]}$		co-caste$_{[APMs\ +\ VDC\ Sec\ +\ SM]}$	
	(1)	(2)	(3)	(4)
upper caste	-218.6	-232.1	-218.6	-238.4
	(144.8)	(148.7)	(144.8)	(148.6)
co-caste		2.52		17.6
		(43.8)		(43.5)
co-caste × upper caste		44.4		46.7
		(67.8)		(67.2)
co-caste × 1^{st} quartile MMI		-349.7		-317.5
		(120.8)***		(120.4)***
upper caste × 1^{st} quartile MMI	363.1	59.6	363.1	-9.76
	(97.2)***	(114.6)	(97.2)***	(137.9)
co-caste × upper caste × 1^{st} quartile MMI		562.8		591.8
		(174.9)***		(184.0)***
MMI (ward)	✓	✓	✓	✓
building controls	✓	✓	✓	✓
household controls	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓
VDC fixed effects	✓	✓	✓	✓
slope and altitude × MMI (ward)	✓	✓	✓	✓
building controls × upper caste	✓	✓	✓	✓
building controls × 1^{st} quartile MMI	✓	✓	✓	✓
household controls × upper caste	✓	✓	✓	✓
household controls × 1^{st} quartile MMI	✓	✓	✓	✓
VDCs	612	611	612	611
N	667862	667464	667862	667464
R^2	0.53	0.53	0.53	0.53
Mean dep. var. (Full sample)	11519.2	11523.8	11519.2	11523.8
Mean dep. var. (1^{st} quartile VDC)	5846.6	5846.6	5846.6	5846.6

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1 (in Rupees)* and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy equaling one when the household belongs to Brahmin, Chhetri, and upper Newar caste groups. In columns (1) and (2), *co-caste* is a dummy variable equaling one if the household belongs to the same caste as any one of the APM members or VDC secretary. In columns (3) and (4), *co-caste* is a dummy variable equaling one if the household belongs to the same caste as any one of the APM members or VDC secretary (VDC Sec) or a social mobilizer (SM) in the VDC. MMI (ward) is based on the earthquake intensity measure Modified Mercalli intensity at the centroid of the ward. *first quartile MMI* is equal to one for VDCs that belong to the first quartile of the VDC averages of MMI (ward). All other controls are defined as indicated in the notes to Table 1 and Table 2.

A4.2.13. Robustness to using an alternative measure of low earthquake intensity

In our main analysis, we use the variable *first quartile MMI* to identify low earthquake intensity. Table A4.2.13 shows that results are robust when we use the continuous variable *low MMI (ward)* instead. We obtain this variable as follows: First, we use the MMI measure at the centroid of the ward and assign it to each household within the ward. We call this variable *MMI (ward)*. We linearly transform MMI (ward) to lie between 0 and 1 such that this variable has a range that is comparable to the variable *first quartile MMI* that we use in the main text. To allow for a comparable interpretation of the direction of the effect, we take the additive inverse of this transformed MMI (ward) and add 1. We call the resulting variable *low MMI (ward)*, whose values range from 0-1, where 0 indicates the highest level of damage and 1 indicates the lowest level.

Columns (1) and (2) of Table A4.2.13 correspond to columns (5) and (6) of Table 3.

Table A4.2.13: Robustness to using low MMI (ward) to represent low earthquake intensity)

	Dependent variable is DA1 (in Rupees)					
	(1)	(2)	(3)	(4)	(5)	(6)
upper caste	-212.9	-197.8	-356.9	-72.3	-66.0	-202.2
	(69.2)***	(68.3)***	(160.7)**	(88.9)	(89.1)	(171.7)
co-caste				225.3	208.8	245.2
				(93.6)**	(91.8)**	(92.8)***
co-caste × upper caste				-313.7	-294.0	-319.7
				(126.6)**	(124.9)**	(124.8)**
upper caste × low MMI (ward)	733.4	713.8	496.6	221.8	213.1	-19.1
	(164.7)***	(163.6)***	(152.1)***	(192.0)	(192.1)	(184.1)
co-caste × low MMI (ward)				-623.1	-596.9	-679.2
				(218.9)***	(217.4)***	(216.0)***
co-caste × upper caste × low MMI (ward)				1054.0	1027.4	1082.7
				(296.1)***	(295.3)***	(289.0)***
building controls	✓	✓	✓	✓	✓	✓
household controls	✓	✓	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓	✓	✓
MMI (ward)	✓	✓	✓	✓	✓	✓
VDC fixed effects	✓	✓	✓	✓	✓	✓
slope and altitude × MMI (ward)		✓			✓	
building controls × upper-caste			✓			✓
building controls × 1^{st} quartile MMI (VDC)			✓			✓
household head controls × upper-caste			✓			✓
household head × 1^{st} quartile MMI (VDC)			✓			✓
VDCs	612	612	612	611	611	611
N	667862	667862	667862	667464	667464	667464
R^2	0.53	0.53	0.53	0.53	0.53	0.53
Mean dep. var. (Full sample)	11519.2	11519.2	11519.2	11523.8	11523.8	11523.8

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1*, i.e. the value of the first damage assessment (in Rupees), and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy variable equaling one if the household belongs to Brahmin, Chhetri, or upper Newar caste groups. *low MMI (ward)* is based on the earthquake intensity measure Modified Mercalli intensity at the centroid of the ward – MMI(ward). For comparability of magnitudes and the direction of the effect, we rescale the MMI (ward) such that values lie between 0 and 1, where 1 refers to low damage. *co-caste* is a dummy variable equaling one if the household belongs to the same caste as any one of the APM members in the VDC. All other controls are defined as indicated in the notes to Table 1 and Table 2.

A4.2.14. Alternative measures of earthquake intensity

This Online Appendix investigates the central discrimination and favoritism results using two alternative measures to MMI, namely a severity index and an earthquake impact measure, which were both developed by the European Commission Joint Research Center and the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA). The earthquake intensity measure provides an alternative measure of the direct impact of the earthquake on the damage and destruction of buildings, on the human death and injury, and on the earthquake-led migration (UNOCHA, 2015, p.54). The severity index is broader. In addition to the direct earthquake impact on buildings, humans, and migration, it also includes socioeconomic vulnerability, including the effects on Human Development Index, marginalized groups, vulnerable groups, and labor capacity as well as physical vulnerability, including natural hazard risk and humanitarian access (UNOCHA, 2015, p.54).

Results are shown in table A4.2.14. For the results of the heterogeneity analysis with respect to MMI, we interact upper caste with low severity index (column 1) and low earthquake impact (column 2). Similarly, for triple difference results, we interact co-caste and upper caste with low severity index (column 3) and low earthquake impact (column 4). The results show that previous results are robust to using these alternative measures of earthquake intensity.

Table A4.2.14: Robustness to using alternative measures of earthquake intensity

	Dependent variable is DA1 (in rupees)			
	(1)	(2)	(3)	(4)
upper caste	-540.5	-425.1	-326.8	-224.7
	(180.2)***	(157.6)***	(196.6)*	(165.9)
co-caste			159.2	194.7
			(133.9)	(84.5)**
co-caste × upper caste			-359.6	-350.7
			(221.3)	(124.7)***
upper caste × low severity index	869.0		357.5	
	(201.5)***		(247.5)	
co-caste × low severity index			-449.1	
			(259.1)*	
co-caste × upper caste × low severity index			957.1	
			(407.2)**	
upper caste × low earthquake impact		907.3		188.6
		(180.2)***		(206.1)
co-caste × low earthquake impact				-687.3
				(235.0)***
co-caste × upper caste × low earthquake impact				1362.0
				(340.8)***
MMI (ward)	✓	✓	✓	✓
building controls	✓	✓	✓	✓
household controls	✓	✓	✓	✓
geographic controls	✓	✓	✓	✓
building controls × individual assets	✓	✓	✓	✓
VDC fixed effects	✓	✓	✓	✓
slope and altitude × MMI (ward)	✓	✓	✓	✓
building controls × upper caste	✓	✓	✓	✓
building controls × 1^{st} quartile MMI	✓	✓	✓	✓
household controls × upper caste	✓	✓	✓	✓
household controls × 1^{st} quartile MMI	✓	✓	✓	✓
VDCs	612	612	611	611
N	667862	667862	667464	667464
R^2	0.53	0.53	0.53	0.53
Mean dependent variable	11519.2	11519.2	11523.8	11523.8

Notes: Standard errors are in parentheses and allow for clustering of the model error at the VDC level. The dependent variable is *DA1 (in Rupees)* and takes the values 0, 3,000, and 15,000. *upper caste* is a dummy equaling one when the household belongs to Brahmin, Chhetri, or upper Newar caste groups. *co-caste* is a dummy variable equaling one if the household belongs to the same caste as any one of the APM members in the VDC. *low severity index* and *low earthquake impact* data are developed by the European Commission Joint Research Center and OCHA as alternative measures of earthquake intensity. For comparability of magnitudes and the direction of the effect, low severity index and low earthquake impact measures are defined as 1 minus the value of the severity index and earthquake impact, respectively, such that the values still range from 0-1, but now 1 refers to low-intensity areas. All other controls are defined as indicated in the notes to Table 1 and Table 2.

References

Adhikari, A. and Sijapati, B. (2010). Local political economy and post-conflict situational analysis: A study of six municipalities in Nepal. World Bank.

Barber, R. (2016). Did the humanitarian response to the Nepal earthquake ensure no one was left behind? A case study on the experience of marginalised groups in humanitarian action, Save the Children Australia, `https://www.savethechildren.es/sites/default/files/imce/docs/nepal_earthquake_gesi_report._march_2016.pdf` (last accessed February 4, 2021).

Bennet, L., Dahal, D., and Govindasamy, P. (2008). Caste, ethnic and regional identity in Nepal: Further analysis of the 2006 Demographic and Health Surveys. *Calverton, Maryland, USA: Macro International Inc.*

Burgess, R., Jedwab, R., Miguel, E., Morjaria, A., and Padró i Miquel, G. (2015). The value of democracy: Evidence from road building in Kenya. *American Economic Review*, 105(6):1817–51.

Carter Center (2014). Local governance in Nepal: Public participation and perception. `https://www.cartercenter.org/resources/pdfs/news/pr/nepal-022814-local-governance.pdf` (last accessed February 4, 2021).

Conley, T. (1999). GMM estimation with cross sectional dependence. *Journal of Econometrics*, 92(1):1–45.

Curto-Grau, M., Solé-Ollé, A., and Sorribas-Navarro, P. (2018). Does electoral competition curb party favoritism? *American Economic Journal: Applied Economics*, 10(4):378–407.

Gellner, D. N. (2007). Caste, ethnicity and inequality in Nepal. *Economic and Political Weekly*, 42(20):1823–1828.

GoN, MOHA (2013). National Disaster Relief Framework (NDRF). Government of Nepal, Ministry of Home Affairs (GON, MOHA), `http://drrportal.gov.np/uploads/document/113.pdf` (last accessed February 4, 2021).

Gurung, H. (2003). *Trident and thunderbolt cultural dynamics in Nepalese politics.* Social Science Baha.

Gurung, H. (2005). The Dalit context. *Occassional Papers in Sociology and Anthropology*, 9:1–21. `https://www.repository.cam.ac.uk/handle/1810/229114` (last accessed February 4, 2021).

Gurung, N. (2011). Local democracy in the political transition of Nepal. *Southasia Institute for Advanced Studies and Alliance for Social Dialogue.*

Gurung, P. (2000). Bungamati: The life world of a Newar community explored through the natural and social life of water. Unpublished thesis, Faculty of Social Science. University of Bergen, Norway.

Hachhethu, K. (2008). The Communist Party of Nepal (Maoist): Transformation from an insurgency group to a competitive political party. Speech by Prachanda in "Hindustan Times Leadership Summit 2006", November 18, 2006, http://himalaya.socanth.cam.ac.uk/collections/journals/ebhr/pdf/EBHR_33&34_03.pdf (last accessed February 4, 2021).

HRHRS data (2016). Household registration for housing reconstruction survey. *Central Bureau of Statistics (CBS), Nepal*. Dataset obtained from CBS premises on June 12, 2017.

Höfer, A. (1979). The caste hierarchy and the state in Nepal. A study of the Muluki Ain of 1854. Universitiitsverlag Wagner, Innsbruck, Reissued 2004 by Himal Books, Lalitpur, Nepal.

Lévêque, C. (2020). Political connections, political favoritism and political competition: Evidence from the granting of building permits by French mayors. *Public Choice*, 184(1):135–155.

LGCDP (2008). Local Governance and Community Development Programme (LGCDP) document. http://lgcdp.gov.np/content/programme-document-lgcdp-phase-i (last accessed February 4, 2021).

Mainali, R., Jafarey, S., and Montes-Rojas, G. (2013). Earnings and social background: An evaluation of caste/ethnic wage differentials in the Nepalese labor market. Working Papers 13/01, Department of Economics, City University London.

Müller-Böker, U. (1988). Spatial organization of a caste society: The example of the Newar in the Kathmandu valley, Nepal. *Mountain Research and Development*, pages 23–31.

National Code (1854). The Muluki Ain (the National Code). An unofficial translation can be found on the following link, https://nepalconflictreport.ohchr.org/files/docs/1963-04-12_legal_govt-of-nepal_eng.pdf (last accessed February 4, 2021).

Oster, E. (2019). Unobservable selection and coefficient stability: Theory and evidence. *Journal of Business & Economic Statistics*, 37(2):187–204.

Panta, K. R. (2015). Decentralization of corruption and local public dervice delivery in Nepal. https://www.nrb.org.np/contents/uploads/2019/12/4.pdf (last accessed February 4, 2021).

Pokharel, S., Devkota, A., Michaels, L., Ramble, C., Rinck, J., and Wagner, L. (2015a). Aid and recovery in post-earthquake Nepal. Independent impacts and recovery monitoring phase 1, qualitative field monitoring: June 2015 by Democracy Resource Center Nepal (DRCN) and the Asia Foundation (TAF), https://asiafoundation.org/wp-content/uploads/2015/10/Aid-and-Recovery-in-Post-Earthquake-Nepal-Qualitative-Field-Monitoring-June-2015.pdf (last accessed February 4, 2021).

Pokharel, S., Devkota, A., Michaels, L., Ramble, C., Rinck, J., Wagner, L., Chingchit, S., and Patrick, B. (2015b). Independent impacts and recovery monitoring phase 1. Synthesis report by Democracy

Resource Center Nepal (DRCN), the Asia Foundation (TAF), and the Interdisciplinary Analysts (IDA), https://asiafoundation.org/resources/pdfs/AWSynthesisreportinteractivePDF.pdf (last accessed February 4, 2021).

Pokharel, S., Gurung, A. M., Michaels, L., and Barron, P. (2016a). The Nepal government distribution of earthquake reconstruction cash grants for private houses report. IRM – Thematic study by Democracy Resource Center Nepal (DRCN) and The Asia Foundation (TAF), https://asiafoundation.org/wp-content/uploads/2016/12/Nepal-Govt-Distribution-of-Earthquake-Reconstruction-Cash-Grants-for-Private-Houses_June2017.pdf (last accessed: February 4, 2021).

Pokharel, S., Johnson, A. L., Ajeet, A., Khatiwada, A., and Parajulee, S. (2016b). Aid and recovery in post-earthquake Nepal. Independent impacts and recovery monitoring phase 2 qualitative field monitoring: February and March 2016 by Democracy Resource Center Nepal (DRCN) and the Asia Foundation (TAF), http://asiafoundation.org/wp-content/uploads/2016/09/IIRMPhase2_QualitativeReport.pdf (last accessed: February 4, 2021).

Pradhan, R. and Shrestha, A. (2005). Ethnic and caste diversity: Implications for development. Working paper 4, Asian Development Bank Nepal Resident Mission.

Svaleryd, H. and Vlachos, J. (2009). Political rents in a non-corrupt democracy. *Journal of Public Economics*, 93(3-4):355–372.

TAF (2012). Political economy analysis of local governance in Nepal with special reference to health and education sector. A report by the Asia Foundation, https://asiafoundation.org/resources/pdfs/analysislocalgovernancenepal.pdf (Last accessed February 4, 2021).

Tamang, S. and Malena, C. (2011). The political economy of social accountability in Nepal. World Bank program for accountability in Nepal, https://openknowledge.worldbank.org/bitstream/handle/10986/17661/840720WP0REPLA0Box0same0box0PUBLIC0.pdf?sequence=1&isAllowed=y (last accessed February 4, 2021).

The Constitution of Nepal (1990). The constitution of Nepal. An unofficial translation by Himalayan Research Bulletin, Vol. XI, Nos. 1-3, 1991, http://himalaya.socanth.cam.ac.uk/collections/rarebooks/downloads/Nepal_1990_Constitution_English.pdf (last accessed February 4, 2021).