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A POPULATION PERSPECTIVE ON THE BENEFICIARIES OF PUBLIC AND PRIVATE
ASSISTANCE IMMEDIATELY AND OVER THE LONG-TERM AFTER A MAJOR
DISASTER

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A Population Perspective on the Beneficiaries of Public and Private Assistance Immediately and over the Long-term After a Major Disaster

Elizabeth Frankenberg, Nicholas Ingwersen, Cecep Sumantri, and Duncan Thomas

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ABSTRACT

Natural disasters undermine economic development, destroying lives, livelihoods, the built and natural environment. Public assistance programs follow, but knowledge of their reach, impact and evolution is limited. We address this gap, analyzing population-representative longitudinal survey data collected in Indonesia before and for two decades after the 2004 Indian Ocean tsunami which was followed by a large recovery program involving multiple major actors. Those who lived, at the time of the tsunami, in communities that were badly damaged, were far more likely to receive aid and received larger amounts than residents of other areas immediately after the tsunami. Those gaps were small and insignificant four years post-tsunami. Conditional on exposure, individual attributes also shaped receipt which reached the vulnerable, particularly poor and female-headed households. Housing assistance, distributed several years post-tsunami to those who lost homes, was critical in the eyes of recipients, playing a key role as they rebuilt livelihoods.

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Natural disasters, which are increasing in frequency and intensity around the world, have devastating impacts on the built and natural environments and population well-being. They upend the lives of individuals and families, who experience death of family and friends, loss of assets, resources and livelihoods, and adverse impacts on physical and mental health.^{1,2} These effects can be long-lasting as individuals and communities struggle for months and years to recover. From a policy perspective disasters represent an escalating development challenge.

Large-scale disasters are followed by large-scale relief efforts. Governments, international agencies, and other organizations provide assistance to meet immediate needs and help individuals rebuild their lives over the longer term, often guided by principles developed as part of the Sendai Framework for Disaster Risk Reduction and the Global Facility for Disaster Reduction and Recovery. Estimates put commitments for humanitarian and disaster aid at over \$40 billion each year since 2020.³ Families provide help, which is not typically counted in official figures. Research on how these assistance programs interact and whom they benefit after a disaster are rare.⁴ Studies document the impacts of the World Bank's disaster recovery projects, including large-scale housing rehabilitation programs, but little is known about how multiple programs evolve over time and who ultimately gains from all sources of assistance in combination.⁵ These questions are important for designing and implementing comprehensive cost-effective assistance efforts that improve the circumstances of target beneficiaries.

This paper fills this knowledge gap by drawing on longitudinal survey data collected before and for two decades after a major disaster, the 2004 Indian Ocean earthquake and tsunami. The tsunami affected populations around the entire rim of the Indian Ocean, but Indonesia was hardest hit. Our longitudinal survey covers over 25,000 people who were living in vulnerable areas of Aceh and North Sumatra, Indonesia at the time of the tsunami. The disaster killed more than 160,000 people in Aceh province alone (roughly 5% of the population), displaced another half a

million, and damaged or destroyed some 200,000 homes. The disaster was followed by "Build Back Better," at that point the largest relief and reconstruction effort mounted in any low income country, supported by pledges of assistance of about \$9 billion from around the world.

The paucity of evidence on the beneficiaries of assistance reflects several challenges. First, the goal of assistance after a disaster is to help all in need; identifying the most needy is seldom prioritized. Second, information is at a premium and support for allocating scarce resources to track beneficiaries and evaluate assistance impacts is limited. Third, assembling population-representative data for both a group exposed to an event and a plausible comparison group is difficult.^{6,7} The boundaries of a disaster can be hard to delineate and individuals often move after disasters precisely because of the destruction. Studies have typically relied on administrative data produced by organizations involved in assistance efforts or survey data collected from opportunistic samples constructed after the event in ways that are likely selective.⁸⁻¹⁰

From a population perspective, neither approach provides a complete picture. Administrative data are difficult to combine into a comprehensive accounting of all assistance, rarely include information on beneficiaries' characteristics or the intensity of their disaster exposure and exclude non-recipients.¹¹ Data from non-representative samples of survivors (for example, convenience samples of those in emergency housing) are unlikely to reflect experiences of the broader population.¹² Additionally, studies based on these types of data typically focus on the period within a year or two of the disaster, but a longer-term view is critical for documenting how assistance evolves as survivors' needs change and donors' priorities and resources shift.¹³

We use data from the Study of the Tsunami Aftermath and Recovery (STAR), a longitudinal survey of a population-representative pre-disaster baseline that includes individuals living in areas differentially affected by the tsunami, to describe the characteristics linked to receipt of aid and amounts received. We document sources of aid and trace changes in patterns over 15 years post-

tsunami. We also describe individuals' overall perceptions of the assistance effort and the components that contributed most to their own recovery.

Three innovative features of STAR contribute to a more comprehensive picture of receipt of disaster assistance than previously possible. First, we interviewed a population-representative panel of respondents, based on a pre-disaster survey, with successful tracking of all survivors and retention rates exceeding 93% of target respondents in each follow-up round. This design supports population-level inferences about the assistance received by all survivors rather than only for those remaining in the locations where they lived at the time of the disaster. This is an important strength: excluding STAR respondents who moved out of their baseline villages post-tsunami underestimates the value of aid received by 17 to 43% per year.

Second, the tsunami's impact on coastal communities was an idiosyncratic function of the precipitating earthquake's location off the coast of Sumatra in combination with local variations in the topography of the seafloor and coastline.¹⁴ The tsunami was completely unanticipated and hit shorelines within 20 minutes of the earthquake, leaving no time for behavioral responses. This means that exposure to the tsunami was plausibly exogenous, so that drawing contrasts in receipt of aid among those living in communities directly affected by the tsunami with those in nearby comparable coastal communities provides direct evidence on the links between exposure and subsequent aid. This is important because the contrasts are not contaminated by pre-existing differences between those in damaged communities and those in neighboring communities. Third, we provide evidence on aid over the long-term because STAR has followed the same respondents over almost 20 years with annual surveys in the 5 years immediately the tsunami and then two more waves roughly 11 and 17 years after the disaster--after the Build Back Better program ended.

1. Background

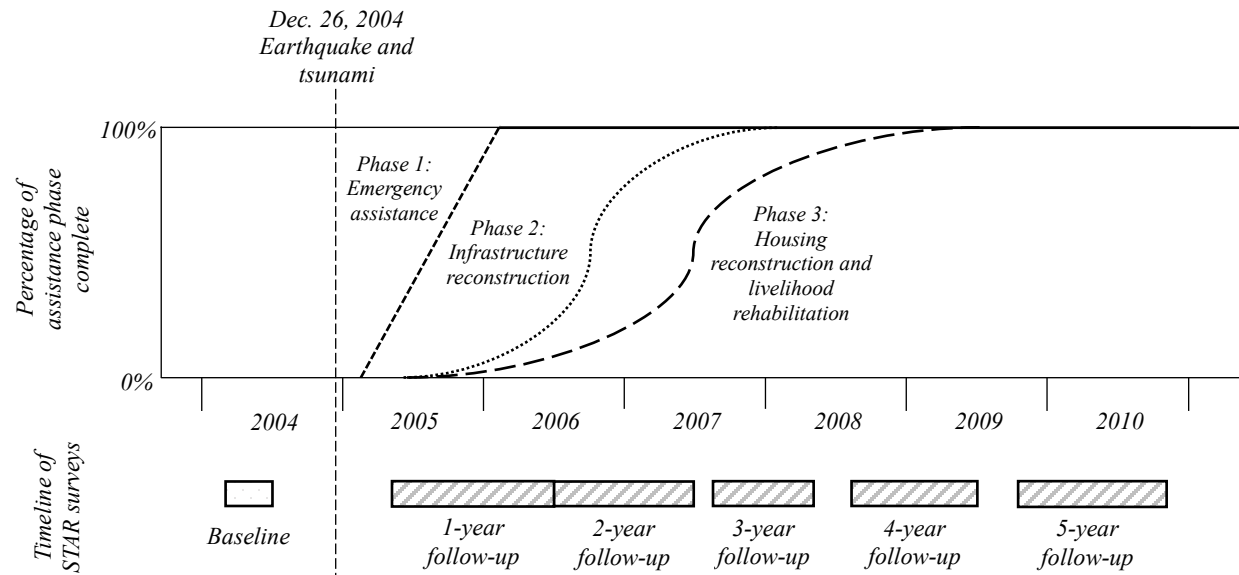
At 8 a.m. on December 26, 2004, an earthquake approximately 9.3 Mw on the Richter scale occurred below the ocean some 160 km west of the Indonesian island of Sumatra in Indonesia. The rupture displaced over 25 trillion tons of water, which radiated outward from the rift at high speed. As the displaced water arrived in shallower areas, waves reaching heights of 35 meters crashed into the coast.¹⁵

The tsunami caused massive destruction in the provinces of Aceh and, to a lesser extent, North Sumatra. Costs of the disaster were estimated at \$4.5 billion—roughly equivalent to the GDP of the entire province of Aceh in the previous year. Destruction encompassed approximately 10% of homes and rice fields, over half of all fishing capital and aquaculture ponds, 3000 km of roads, and the income sources of some 265,000 people.¹⁶

The devastation in the hardest-hit communities was extraordinary. The majority of residents perished, wells filled with seawater, and the land was scraped bare of buildings and vegetation. Survivors searched for family members for days afterwards, with little choice but to relocate to places with food and water. In other areas buildings remained standing but were filled with mud and debris or sustained damage from the earthquake.

In response governments, NGOs, and private organizations and individuals pledged unprecedented levels of assistance.^{17,18} Commitments to Indonesia alone encompassed \$US 9 billion:¹⁹ \$3 billion from the Indonesian government, \$3.6 billion from foreign governments, and \$2.5 billion from private donors and NGOs.¹⁶ An explicit goal of the effort was to “build back better” for a more prosperous and resilient future.

Figure 1. Schematic timeline of assistance phases and the first five annual STAR surveys*



* (two additional STAR surveys were conducted around 2015 and 2021).

The formal relief effort consisted of three phases. In 2005 efforts focused on survivors' immediate needs for shelter, food, drinking water, medical care, and money. The second and third phases focused on critical community infrastructure such as roads, bridges, ports, and public buildings (Phase 2) and the reconstruction of housing and longer-term rehabilitation of livelihoods, including programs to restore agriculture and fishing, promote small businesses, and support cash-for-work and job training (Phase 3). Phases 2 and 3 began the second year after the disaster. Infrastructure reconstruction ramped up quickly, but housing reconstruction took longer as land ownership was verified and community members were incorporated into the planning process.²⁰

Organizing these efforts was complicated by the level of destruction, the multiple government agencies and hundreds of NGOs working in the area, high levels of local inflation that drove up costs, and the fact that prior to the tsunami, Aceh was the site of a long running civil conflict between the Free Aceh Movement and the Indonesian government.^{11,21,22} Nine months after the

tsunami, a peace agreement was brokered, partially in recognition that without peace rebuilding would fail.¹⁷ The end of fighting facilitated the disaster response but destruction and displacement from the conflict meant that many individuals from conflict-affected areas also needed assistance, which complicated the policy landscape.^{17,23} Apart from the disaster response national and provincial government policies in Indonesia mandate provision of financial and in-kind assistance to the poorest and most vulnerable households.²⁴

In STAR, we track receipt of all transfers – money, food and other goods – as well as assistance for housing, from the perspective of individuals, based on household-level reports. Sources include aid from the government, NGOs, religious organizations, and family and friends. We do not identify providers' reasons for assistance and so include aid given for reasons other than reconstruction. Starting with the first post-tsunami survey, we track aid in each annual follow-up (Figure 1) and in two more follow-ups conducted 10-12 and 15-18 years post-tsunami.

2. Data and Measures

Our data are from the Study of the Tsunami Aftermath and Recovery (STAR). STAR was designed around a population-representative baseline conducted before the tsunami—the 2004 National Socioeconomic Survey (SUSENAS), which is an annual cross-sectional socioeconomic survey conducted by Statistics Indonesia. The 2004 round took place roughly 10 months before the disaster. The SUSENAS sample is representative of the pre-tsunami population at the *kabupaten* (district) level. We constructed the STAR sample from all baseline respondents who were living in SUSENAS enumeration areas located in districts with coastlines at risk of tsunami exposure.

In collaboration with Statistics Indonesia and SurveyMeter we conducted five annual follow-up rounds between March 2005 and August 2010 (Figure 1). We ascertained the survival status of 98% of STAR baseline respondents and attempted to reinterview all who survived, including those

who left their baseline communities and children born to these respondents after the baseline.

Tracking is critical in the context of disasters because forced displacement and voluntary migration are both common responses.¹ We re-interviewed 98% of baseline survivors in at least one of the five annual STAR follow-ups. We interviewed at least 93% of survivors in each follow-up except the first, in which we interviewed 91% of the survivors.

We focus on assistance provided directly to survivors, distinguishing between two major types: (1) transfers of money and goods, which are fungible and provided multiple times and (2) assistance with repairing or replacing housing, which is less fungible in the short-term and typically occurs once.²

A knowledgeable member of the household provided information on transfers in each post-tsunami survey covering whether their household received or gave money, food, or other goods and the estimated values, from/to five sources: (1) government organizations, (2) non-government organizations, (3) religious organizations, (4) family members, and (5) friends and neighbors. We combine family and friends into a single group and define receipt of assistance from these informal sources based on whether household members received more assistance than they provided (that is, net transfers are positive).³

Across surveys the questions relating to the types and sources of assistance are consistent, but the time frames differ because each wave took about 12 months to complete and we wanted to

¹ Among STAR respondents, 12% left their baseline village within a few months of the disaster. Moves were more common among those from the most heavily damaged communities (52%) than for respondents from communities that experienced no damage (4%).²⁵

² Investments in public infrastructure (roads, schools, public buildings) are excluded as they cannot be assigned to specific individuals. We exclude post-tsunami services such as training, health care, education, and temporary housing, which are difficult to value.

³ Transfers to governments and NGOs are rare in all years (<3%), whereas transfers to family and friends and to religious groups are more common overall, with prevalence rising after 2006. The percentage of respondents who make transfers to family and friends is relatively constant across damage zones, but transfers to religious groups are more common among those from undamaged areas.

avoid gaps in the temporal coverage of receipt of assistance. In the follow-up 2 years post-tsunami, we fielded questions covering transfers in 2005 (the first year after the disaster) and also in 2006 (the second year after the disaster).⁴ In the 3, 4, and 5-year follow-ups, the questions covered the start of the calendar year in which the survey round began up to the date of the interview (see Figure 1). As a result, in these survey rounds, the time frame covered by the assistance questions can range from 7 to 23 months. Because of the longer periods required to complete field work for the 11 and 17-year follow-ups, questions on transfers collected in these rounds cover the 12 months prior to the date of interview.

We examine two measures of receipt of money and goods from formal (government, NGOs, religious organizations) sources: whether households received any assistance and, conditional on receipt, the annualized per capita value of that assistance. The measures constructed from the follow-up rounds cover the first five calendar years after the tsunami (2005 through 2009) and 12-month periods between 2014- 2016 and 2018- 2023 (depending on the household interview date). For simplicity we refer to these longer-term periods as 2015 and 2021 in our tables and figures.

To facilitate comparisons of the values of assistance we annualize them by dividing the reported values by the number of months covered by the questions in that survey round and multiplying by 12. Additionally, we account for household composition by estimating per capita values of assistance (which requires dividing by the number of household members) and for inflation by adjusting the values so that they reflect prices in 2005/2006 (adjustments were calculated based on prices from local markets and stalls in each STAR survey community).

Beginning in the 2-year follow-up we also collected information about the receipt of a newly constructed house or building materials and the sources and overall value of that assistance. In

⁴ We did not ask about receipt of assistance in the first round because we focused on finding respondents and on determining immediate impacts of the disaster.

most survey rounds the measures captured housing assistance received over the previous 12-18 months. In the 2-year follow-up, however, the question captures all housing assistance received between the tsunami and the date of 2-year interview. Sources include the government, NGOs, and “other” sources. We account for inflation by adjusting the housing assistance values as described above.

Our analytical sample consists of the 23,618 STAR baseline respondents for whom a household member provided data on transfers and housing assistance in the 2-year or subsequent follow-up survey rounds.⁵ STAR respondents are asked to report on all transfers regardless of whether the respondents believe the assistance was related to the tsunami. Accordingly reported transfers include assistance provided in response to the disaster and other assistance. Although transfers are measured at the household level, we conduct analyses at the individual level, which allows us to control for individual characteristics and account for changes in household composition.

We measure tsunami exposure with a categorical indicator of the level of damage sustained in each baseline enumeration area. This measure provides a robust indicator of the tsunami’s relative intensity across communities by triangulating information from three data sources to categorize each community as sustaining a low, moderate, or high level of damage in the tsunami. The data sources consist of measures of destruction to ground cover constructed from satellite imagery, direct observations of damage from STAR field supervisors, and reports of damage and water inundation from *desa* (village) leaders in STAR community surveys. Among the 23,618 baseline respondents in our study sample, 18% lived at baseline in communities that experienced high damage in the tsunami, 59% lived in moderate-damage areas, and 23% lived in areas that

⁵ We investigated the sensitivity of our findings to the effects of changing sample composition between survey rounds and found that they are similar to those estimated using our full sample of STAR respondents.

sustained low or no damage from the tsunami (Table 1). Turning to individual exposures, we identify respondents whose homes were destroyed (13%) or damaged (24%).

We also report summary statistics for receipt of transfers in each of the five years after the tsunami and at roughly 10 and 15 years after the tsunami. In 2005, nearly 90% of individuals from heavily damaged areas report receiving transfers, versus 69-75% for those from other areas. By 2009, the direction of this differential has reversed, with receipt more common for those from relatively less damaged areas (~75%) than for those from heavily damaged areas (65%). For the five year period overall almost everyone benefitted from transfers of money, food, or other goods (rates were 95% or higher) regardless of damage zone.

The wide reach of transfers over this period is remarkable, but given the scale and intensity of destruction, the value of those transfers is also important. In Table 1, we report mean per capita annualized values for transfers received in the 2005-09 period, by damage zone. The value of transfers over this period was about three times higher (Rp. 4,615,500, or \$US475) for individuals from communities that sustained a high level of damage than for individuals from other communities (Rp 155,050-172,810, or \$US160-178). In later years, 2015 and 2021, receipt of transfers is still common across all three damage zones (and levels are similar) although the official recovery programs had ended.

Restoring housing was a critical part of the recovery program. Between 2005 and 2009, 54% of those from heavily damaged communities report receiving assistance related to housing, versus 16% and 8% of those from moderate and low damage communities, respectively. Among recipients reported values are also much higher for those from high-damage communities, averaging Rp. 52,000,000, although differences in the (conditional) mean values across damage zones are not as great as differences in prevalence levels.

Table 1 establishes that receipt of transfers was common, even outside areas of high damage, but that recipients from damaged areas received higher values of transfers. To explore patterns in these high damage communities more thoroughly, we examine receipts and values by year, type, and sources of transfers (Table 2).

By year the share of individuals receiving transfers is highest in 2005 and declines by 25 percentage points by 2009. Early on, receipts of all types of transfers are common. Over time, however, the shares of respondents receiving money or other goods shrink, and by 2009 are at less than half their 2005 levels. Among recipients, mean values increase from an average of Rp. 117,000 in 2005 to Rp 200,000 in 2006, then fall to Rp. 53,000 by 2009. Values of food are highest in 2005 then fall steadily. Values of money and other goods rise after 2005 then fall.

The second panel presents results by the source of assistance and by year. In most years, assistance from the government reaches a much higher proportion of individuals (fully 79% in 2005) than assistance from other sources, and receipt levels are relatively more constant across all five years. Turning to NGOs, the reach of their assistance is highest in 2005 (at 65%) and declines to very low levels in later years. Receipt of transfers from religious organizations is relatively low in all years between 2005 and 2009. In terms of average values of the transfers, amounts provided by government and religious organizations are relatively low, whereas NGOs provide by far the highest amounts, particularly after 2005.

On balance, receipts from family and friends are more common than from religious organizations and, after 2006, higher than for NGOs. Because transfers between friends and family often flow in both directions, we also consider whether households received more transfers from family and friends they provided (“net positive transfers”) in a given period and the annualized per capita value of those transfers among the households that received them. Relative to NGOs and religious organizations, values provided by family and friends are fairly consistent over time, and

levels are higher than transfers from the government and religious organizations but lower in most years than transfers from NGOs.

Turning to housing, higher proportions of individuals receive housing in 2005-06 (35%) or in 2007 (28%) than in other years (Panel B). Among recipients, values are consistently high through 2009. Most recipients receive a newly constructed house rather than building materials, and NGOs are a more prevalent source of housing than the government.

3. Analytic approach

To isolate the relationships between tsunami exposure and assistance, we turn to multivariable models, examining how receipt of different types of aid and values of aid received vary with exposure to the tsunami, stratifying by survey year. We control for household demographic and socio-economic characteristics that could influence receipt of transfers.

$$Aid_{ihr} = \alpha + \beta Exp_{ihe} + \gamma X_{ihe} + \delta MY_{ihr} + \varepsilon_{ir} \quad [1]$$

Our outcome, Aid_{ihr} , is a measure of receipt of transfers or housing assistance for individual i in household h in survey round r . Exp_{ihe} is a vector of tsunami exposures experienced by individual i in household h from enumeration area e . Our primary measures of tsunami exposure are indicators of whether the respondent's community of residence at baseline experienced high or moderate damage in the tsunami.

X_{ihe} is a vector of demographic and socioeconomic characteristics from the 2006 follow-up for individual i in household h from enumeration area e .⁶ We include characteristics that reflect household composition and economic resources and human capital of the household head, as well as the respondent's demographic attributes. The vector consists of the log of the total number of

⁶ We selected the 2006 characteristics over those from the baseline survey because they are more salient to the transfers received in the post-disaster period. We tested the sensitivity of our results to this choice by estimating our primary analyses using characteristics from the pre-tsunami baseline and found substantively similar results for the community damage measures to those using the 2006 characteristics.

household members, the number of household members under 15 years of age, the number of household members aged 55 years or older, log monthly per capita household expenditure, an indicator of whether the household head is female, the household head's years of education, indicators of whether the household head is relatively young (under 35 years of age) or old (55 years or older), whether the respondent's baseline community was in an urban area, the respondent's years of age at the tsunami, and an indicator of whether the respondent is female. We control for these factors to spotlight the role of community-level damage from the tsunami, net of other potentially relevant factors. Finally, we include MY_{ihr} , a vector of indicators of the month-year of interview of household h of individual i in survey round r to account for variation in transfers/assistance resulting from the timing of the survey interviews within each survey round and the random error term, ε_{ir} . We estimate our models using OLS with standard errors clustered at the level of the survey enumeration area to account for the sampling design at baseline.

We are primarily interested in the estimates of β , which are the differences in the average receipts and values of transfers and housing assistance, Aid_{ihr} , between respondents with high or moderate intensity tsunami exposures and those with low intensity exposures. Because exposure intensity is plausibly exogenous, these estimates provide evidence regarding the role of exposure in shaping receipts.

4. Analyses

We begin our analyses by documenting how transfers and housing assistance differed across our three community damage categories (high, moderate, and low).

4.1 Money and Goods

In Figure 2, we present the estimated associations between community damage and both the prevalence of transfers of money and goods (Panel A) and value of the transfers received (Panel

B). We display both the mean outcome among respondents from communities that experienced low damage (the comparison group, represented by the grey bars) and the regression-adjusted means among respondents from moderate- and high-damage communities, which we estimate by combining the mean for respondents from low-damage communities and estimated values of β from model [1] (represented by peach and blue bars, respectively).⁷ The moderate and high damage bars also include brackets to indicate the 95% confidence interval for each estimated value of β and stars to indicate whether the estimated values of β are statistically significant at the 1 (**) or 5% (*) levels.

In the first two years after the disaster, respondents from communities that sustained high damage in the tsunami were significantly more likely—by 24 and 11 percentage points, respectively—to receive transfers than respondents from communities that sustained low damage (Panel A). The sizes of the transfers received were also three to four times larger, on average, than those received by the low-damage group (Panel B). After 2006, differences by damage zone in the percentage of respondents receiving transfers are small and insignificant, but the values of transfers remained larger on average in the high-damage group through 2007 and 2008. Among households from communities that sustained moderate damage (the peach bar), neither receipt of transfers nor the value of transfers is significantly higher than for the low-damage group, in any year between 2005 and 2009.

We next examine how the relationship between the intensity of tsunami damage and post-disaster transfers varies for different types of transfers in the three years after the disaster (Figure

⁷ We present the full regression estimates of the community damage indicators (β) and demographic and socioeconomic characteristics (γ) in Appendix Table 1. We also present the regression estimates of model [1] for the panel of respondents interviewed in each of the 2-year, 3-year, 4-year, and 5-year survey rounds in Appendix Table 2. The results are very similar to those estimated using the full sample and suggests that changes in sample composition between survey rounds has no significant impact on our findings.

3).⁸ In 2005, regardless of type of transfer, respondents in the high-damage group were significantly more likely than respondents from low-damage communities to receive assistance (for food and other goods, this is also true in 2006). Among recipients (Panel B), values tend to be higher for those from high-damage than from low-damage communities.

Among respondents from moderate-damage areas, we observe somewhat higher receipts of money and of other goods in 2005 than for those from low-damage communities, but the differences are relatively small. There are no differences in the values of transfers received for those from moderate-damage relative to low-damage areas in 2005 (though in 2006 and 2007 values of other goods are higher).

Distribution of assistance by community damage and provider type

We next examine how the relationship between the transfers of money and goods and the intensity of community damage varied across different providers of transfers (Figure 4).⁹

For households from high-damage areas, assistance from the government and NGOs is more common than assistance from religious organizations or family and friends, though all four sources are relevant (Panel A). Each of these sources reaches a higher share of those from high-damage areas than from other areas in 2005, but this pattern has faded by 2006 for all but NGOs (and in fact reversed for government).

The magnitudes of the differences in receiving transfers from the government and NGOs between respondents from high- versus low-damage areas (24 and 51 percentage points, respectively) are substantially larger than those differences for religious organizations and

⁸ We present the full regression estimates of the community damage indicators (β) and demographic and socioeconomic characteristics (γ) for transfers received in the five post-disaster years and the two longer-term years in Appendix Table 3 (money), Appendix Table 4 (food), and Appendix Table 5 (other goods).

⁹ We present the full regression estimates of community damage indicators (β) and demographic and socioeconomic characteristics (γ) for transfers received in the five post-disaster years and the two longer-term years in Appendix Table 6 (governments sources), Appendix Table 7 (religious organizations), Appendix Table 8 (family and friends), and Appendix Table 9 (NGOs).

friends/family. The government and NGOs were also the only providers to give significantly higher values of transfers to high-damage respondents than other respondents (Panel B).

Over time the average value of NGO transfers rises, while the average values of government transfers are stable and much lower than for NGOs. For friends and family, net transfers were significantly smaller among respondents from high-damage than low-damage communities, both in 2005 and 2006, which may reflect tighter resource constraints faced by family and friends compared to larger providers, or a substitution effect in response to the availability of assistance from formal sources in high-damage areas.

For moderately damaged areas, we also see that religious organizations and NGOs provided post-disaster assistance: respondents from moderate-damage communities were 9.5 and 14.2 percentage points more likely to receive transfers in 2005 from religious organizations and NGOs, respectively, than respondents from low-damage communities (Panel A). The average size of those transfers was also larger than those received in the low-damage group, but the differences are not statistically significant (Panel B).

In 2006, as efforts transitioned from emergency assistance to reconstruction and rehabilitation, transfers from the government, religious organizations, and family and friends all shifted away from high-damage communities relative to low-damage communities, while transfers from NGOs remained significantly more prevalent and significantly larger among respondents from high-damage areas (and to a lesser degree among respondents from moderate-damage areas) through 2008. This suggests that during the reconstruction and rehabilitation phase NGOs were the primary source of post-disaster assistance of money and goods for survivors from tsunami-affected communities. The government was the most common provider of assistance throughout the immediate post-disaster period, but after 2005, the approach broadened to include households outside tsunami-affected areas.

4.2 Housing

We now turn to another form of assistance: housing. Housing differs from food, money, and other goods in that it is durable, lumpy, and expensive. We begin by examining variation in receipt of housing assistance by the level of community damage, based on estimates of model [1].

Distribution of transfers of housing assistance by community damage

Figure 5 presents the estimated association between indicators of community damage and outcomes related to housing assistance: receipt of any assistance (Panel A) and the value of assistance (Panel B).

Far more than for other types of assistance, housing assistance was concentrated in communities that experienced more intense damage. About 35% of respondents in high-damage areas report receipt of housing assistance in the first two years after the disaster, whereas only 2 to 5% of those from other areas report receipt (Panel A). These large differences persist through 2009, although they diminish in size, largely because receipts fall for those from high-damage communities. By the end of 2009, five times more respondents in the high-damage group and two times more respondents in the moderate-damage group reported receiving any housing assistance over the post-disaster period than did those in the low-damage group.

With respect to value of housing, average amounts received are highest for those from the most heavily damaged communities and the difference relative to communities with low damage is statistically significant until 2009 (Panel B). Although the mean value of receipts for individuals from moderately damaged areas is higher in each year than for those from low damaged communities the difference is significant only for receipt in 2005/06 and for the period overall.

Distribution housing assistance by community damage and source

In Figure 6, we present the regression estimates for receipt of new housing and of building materials from NGOs and government sources for the period as a whole (2005-2009) (Panel A).

Receipt of a new home is much more common than receipt of building materials (Panel A) and the estimated value of a new home is higher (Panel B). Receipt of building materials is also concentrated in high- and moderate-damage areas, but the magnitude of the differences for high-damage versus low-damage areas are much smaller for building materials than for new homes.

The dominance of NGOs, relative to the government, in the provision of new homes to those from heavily damaged communities, is also clear. In the five years after the disaster individuals from high-damage communities are about four times more likely to receive housing from NGOs than from the government (Panel A). This dominance by NGOs is much less marked for individuals from moderate- and low-damage communities and for receipt of building materials. In terms of differences in values (conditional on receipts) by source and level of damage, differences are more muted both for new houses and for building materials (Panel B).

Role of Household and Individual Characteristics

To this point, we have focused on patterns over time by the level of damage to respondents' baseline communities. Households are characterized by more than their locations at the disaster, however, and questions of who receives assistance after a disaster often focus on attributes other than community-based measures of exposure. Accordingly, we turn to the estimates from our regressions, which reveal how transfers are related to demographic and socioeconomic status measured two years after the disaster. In Table 3, we present coefficients that reflect the association between the prevalence and value of transfers of money and goods and a selected set of demographic and socioeconomic characteristics measured two years after the tsunami (standard errors are in brackets).¹⁰

¹⁰ We measure characteristics at 2 years post-tsunami because the two that are time-varying, PCE and female-headed household measure status of the recipient more effectively than pre-tsunami characteristics. The full set of estimates of γ are reported in Appendix Table 10.

Although some literature documents the success of elites at capturing disaster assistance, we find that receipt of money and goods was significantly less common among households with higher levels of per capita household expenditure (PCE) and among households in which the head had more years of education.²⁶ However, among those who received transfers, the value of the transfers is consistently larger with higher PCE and more years of education (we examine patterns of targeting more explicitly in Ingwersen et al. 2026).²⁷

The estimates for the indicator of whether the household head in 2006 is female consistently indicate that receipt of transfers was more common among female-headed households (until 2015 and 2021), and that the value of receipts was higher (for all years, though statistically significant only after 2006). Households in urban areas, which are better off, on average, were less likely to receive transfers throughout the post-disaster period. Values are not significantly different between urban and rural areas in the first two years, but in subsequent years, transfers are larger on average in urban areas than in rural areas.

We also examine how household characteristics affect receipt of housing assistance (Table 4). Here we consider household-level housing damage so that we can more closely examine the distribution of housing assistance among households with varying housing needs following the disaster. We estimate model [1] with additional indicators of whether the household's housing was destroyed in the disaster or simply damaged. Table 4 presents the estimated coefficients for both our indicators of community damage and housing damage with their associated standard errors (below in brackets).

Throughout the post-disaster reconstruction period, housing assistance was most highly concentrated among respondents whose housing was destroyed by the tsunami. This pattern is largely driven by new homes, which made up the bulk of housing assistance. In contrast, for only the first three years is receipt of building materials significantly more common among those who

experienced housing destruction (2005/06 and 2007) and the magnitudes of the differences are small (ranging from -0.3 to 3.0 percentage points) compared to the differences for new houses.

Although smaller in magnitude, we also find consistent evidence that respondents whose homes were damaged but not destroyed were more likely to receive housing assistance than respondents with no damage: by the end of the reconstruction period, respondents in the “damaged” group were 14.3 percentage points more likely to receive any housing assistance. Differences in receipt between groups with damage versus no damage were fairly similar for both new housing (10.1 percentage points) and building materials (6.8 percentage points).

5. Discussion

After the 2004 Indian Ocean Tsunami survivors faced the challenges of rebuilding their families, livelihoods, homes, and communities. Governments, organizations and individuals from across the globe pledged unprecedented levels of assistance. These promises created hopes of rapid progress, but in the first years after the disaster, frustrations at the slow pace of recovery were widespread.²⁸

This paper characterizes geographical and temporal expansion of post-disaster assistance, using unusually detailed data on receipt of assistance from a population-representative sample of individuals differentially exposed to the event. In the five years after the disaster we find that almost all individuals from communities directly affected by the tsunami received help in the forms of food, money, goods, or housing. The Indonesian government was key in establishing the reach of this assistance, but aid organizations, domestic and international NGOs, religious organizations, and family and friends were also critical players.

We also examine access to assistance among individuals who at the time of the disaster lived in areas not directly affected by the tsunami. Receipt of assistance from the Indonesian government is widespread among these individuals as well, but levels lag those for individuals

from badly damaged areas in the first two years post-tsunami, eventually catching up. This diffusion of aid beyond high damage areas likely reflects multiple factors, including government efforts to include conflict-affected individuals and areas in recovery programs and recognition that the combination of aid and the peace agreement provided an unparalleled opportunity to set the province on a fundamentally new course, fueling a sense of opportunity in the disaster's aftermath.²⁹

Five years after the disaster, the cumulative proportions of individuals from moderate or low damage areas who reported receiving assistance in the form of money, food, and other goods were similar to the proportions among those from heavily damaged areas. Housing assistance, however, is concentrated among those from heavily damaged areas. As a result, the total values of transfers received over the five-year period after the tsunami are much higher among respondents from heavily damaged areas than for those in other areas.

In this setting, the geography of destruction plays a key albeit complex role in the evolution and generosity of transfers over time and space, but individual characteristics also shape receipts. Transfers from family and friends are most strongly and consistently associated with indicators of socioeconomic vulnerability based on household composition (number of elderly household members, sex and age of the household head), while transfers from government sources were most strongly associated with more direct measures of household resources (per capita expenditures), geographic location (whether the community was urban or rural), and respondent demographics (respondent's age). We also found evidence that, unlike transfers from other sources, households with higher socioeconomic status were equally if not more successful at garnering help from NGOs than were poorer, more vulnerable households.

We examine receipts from both a cumulative perspective and disaggregated by year, source, and type. This approach helps decompose the vast multi-faceted assistance effort into a description of who received what when but does not fully capture the experiences of individuals and families.

First, our description does not address the enormous agency that individuals poured into the rebuilding effort through provision of their labor, time, and emotional commitment to recovery.^{29,30} In the first two STAR follow ups 64% of individuals from heavily damaged communities reported working to clean up their property or other property within their community, in addition to providing money and in-kind help directly to friends and neighbors. Community leaders in both damaged and undamaged communities also report high levels of provision of labor by residents for rebuilding activities.

Second, in the five years after the tsunami, getting back on one's feet was a lengthy and complicated process. Individuals received assistance in multiple forms over multiple years from multiple sources. On average, individuals reported receiving help in four of the five years after the tsunami. Across all 12 possible types and sources of assistance respondents report receiving an average of between 7 and 9 combinations.

The assistance programs were developed to help victims with the daunting tasks of rebuilding their lives. Ten years after the disaster, we fielded additional survey questions on experiences with assistance and recovery and we conducted in-depth interviews to provide additional insights into how individuals looked back over the decade since the disaster. Responses confirm the overall importance of assistance programs, which stands out as critical, consistent with other work on disaster aid.³¹ Among those who received housing aid, over 90% say that it was the most important type of help, and earlier work establishes links between housing receipt and psychosocial health improvements.³² Among those who did not receive housing, food emerges as

most important. These patterns vary little across damage zones, although housing receipt is more common for those from heavily damaged areas.

In the in-depth interviews linked themes emerge around the devastating loss of family and friends, the importance of receiving housing and food, and for some, the wish for more assistance related to capital for businesses. For example, one respondent who was age 14 at the time of the tsunami, talks about what she lost in the tsunami: “My biggest loss was my mother’s death. I find it difficult to live this life without her. Next, I am also sad that I lost the place where I used to live, my house. Finally, I also lost the opportunity of going to school, that was the last loss that I had.” When asked about assistance, she remarks: “I was granted land. It was also for my brother. I don’t know how large my share is, but the land can be used to build two houses. I think this is a good house.”

Another respondent who was in her early 40s at the time of the tsunami talked about housing in answer to a question about the biggest impact of the tsunami: “It was the house loss. Even though it was not my own house, it was my family’s place of living, and we were really confused as we did not have a place to live anymore. Thus, I went here and there, and I put my best effort to get a house. Finally, I got the house assistance, but we had to move to another village. I got it from Save the Children, an NGO. My neighbor often asked me whether I was afraid of living in the village, but I was not afraid. I was just resigned to the condition.” When asked about whether additional assistance that might have helped, she replied “I think it would be better if I got financial assistance. If I got that I would be able to run a business, making cakes and putting them in shops. However, I was afraid to propose loans as I did not know how I would pay the loans.”

A man in his early 50s at the time of the tsunami discussed the process of receiving housing assistance. He notes “first of all, we bought the land. I actually had land somewhere, but it could not be built on because of its condition. Then I got this land and bought it. There were some offers

of house assistance from Habitat, YTB, and Spanish Red Cross.” This interviewee considered multiple offers for housing construction. He said that he did not accept some of the offers because they did not fit him very well, and in other cases there was not enough information about the assistance, but that ultimately the Red Cross provided assistance. He remarked that the quality of the house he received was not as good as he had expected, but it was better than some of other assistance houses from different groups and was the most beneficial and important of the assistance that he received.

We also asked respondents whether there were types of assistance they had not received that would have made recovery easier. Over three-quarters said no. Those who said yes identified either housing or, if they had received housing, business capital or work. Lastly, we asked respondents to compare their quality of life at the time of the 10-year interview relative to just before the tsunami. Most respondent report that their quality of life ten years on is somewhat or much better, and less than 10% say that it is somewhat or much worse. Interestingly, these patterns vary little by damage zone.

Although it is difficult to establish a credibly causal estimate of the relationship between receipt of aid and well-being, given efforts to direct aid to those in need, we can provide descriptive evidence regarding the relationship. In each survey round, we asked STAR respondents to identify their position on a six-step ladder of relative economic well-being. The change in responses to this question between the first and fifth follow-up rounds provides an indicator of whether respondents view themselves as having become better or worse off over that period. In Figure 7 we graph the distributions of these differences for individuals who received housing assistance by the fifth survey round and for those who did not. The distribution of the reported changes is shifted to the right for housing recipients, suggesting they view the changes in their socioeconomic situation over the post-disaster period more favorably than non-recipients.

This result is echoed in responses to questions we asked the respondents about which step on the economic ladder they thought they would occupy in a year. Optimism about one's future rises more between survey rounds one and five for individuals who benefitted from housing assistance than for those that did not, and individuals are less likely to express feelings of uncertainty about their future if they received housing aid.

Though housing was clearly important, ten years after the disaster, most respondents report being better off than they were before the tsunami (about 11% say they are worse off), and these statistics are relatively constant across damage zones. Individuals look back with gratitude for the assistance they received, which was critical both early on and as recovery proceeded, though they remain cognizant of difficulties and delays that programs faced in distributing help.

6. Conclusions

Destruction from the Indian Ocean Tsunami was catastrophic, but an ambitious well-funded program for rebuilding emerged in its wake. What lessons are revealed through analysis of assistance provided to families after this large-scale disaster? We highlight five.

First, population-level recovery was fueled by a dense network of actors providing multiple forms of help in combination with communities and individuals pro-actively engaged in rebuilding. Analyses focusing solely on one source or type of assistance risk missing a much bigger and more complicated picture. Second, there is evidence for specialization and complementarity of effort—with NGOs particularly focused on those from the most heavily-damaged areas while government programs invested across a wider geographic expanse. This suggests that public and private organizations coordinated their efforts to accomplish multiple goals. Third, although easily overlooked, less formal sources such as religious organizations, friends, and family made important contributions to recovery as well. Fourth, although corruption and leakage sometimes emerge as major issues, we find relatively little evidence that assistance

disproportionately benefited those who were better educated or better off. Finally, housing emerges as a particularly critical benefit in the eyes of recipients, underscoring results from other research on housing, as well as the Global Facility for Disaster Reduction and Recovery's prioritization of resilient housing as a key thematic area.

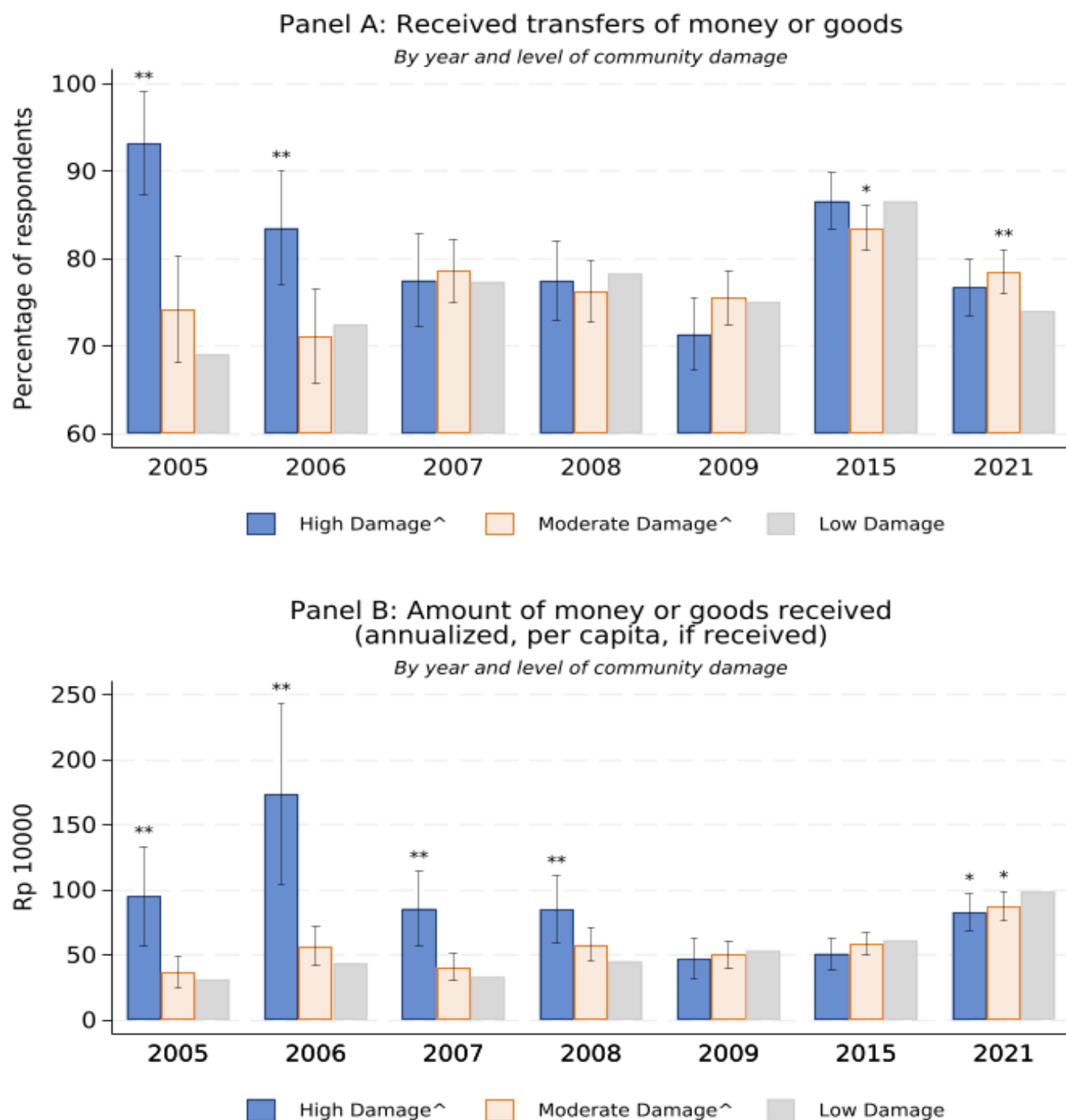
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Figure 2. Receipt of aid by year and exposure to tsunami-related damage

Among baseline respondents interviewed in the 2-year or later follow-ups

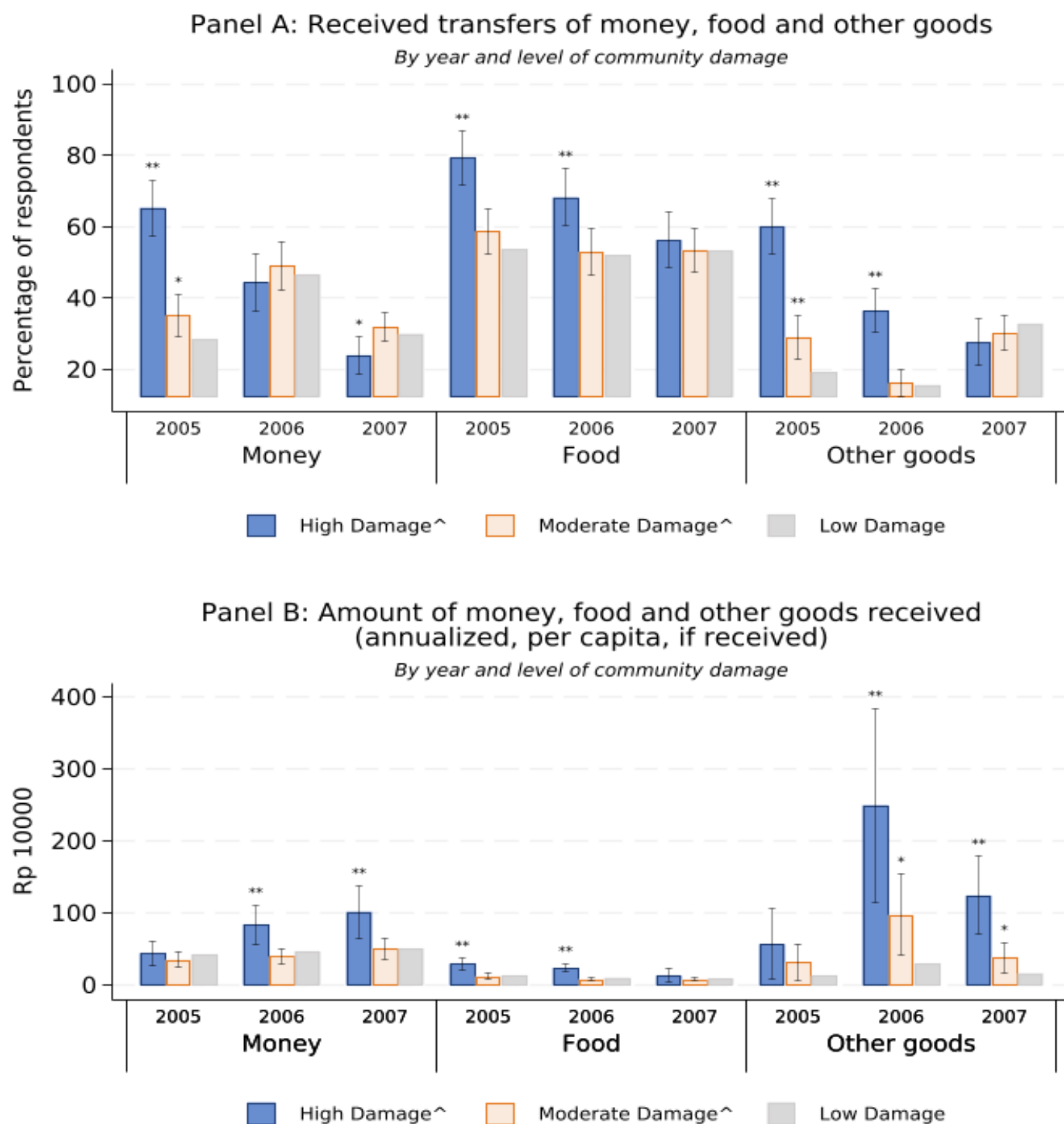


[^] indicates a group whose means in the panel are regression-adjusted.
Brackets indicate the 95% confidence interval of the regression-estimated difference with low damage group.
**/* indicate that regression-estimated difference with low damage group is statistically significant at 1/5% levels.
Among baseline respondents interviewed in the 2-year or later follow-ups

Notes: We estimated the values for the "High damage" (blue bars) and "Moderate damage" (orange bars) groups presented in the figures by estimating the difference between the means of those groups and the mean of the low damage group (grey bars) using multivariate OLS regressions of Model 1 and adding the regression-estimated difference to the low damage mean.

Figure 3. Receipt of aid by year, type, and exposure to tsunami-related damage

Among baseline respondents interviewed in the 2-year or later follow-ups



^ indicates a group whose means in the panel are regression-adjusted.

Brackets indicate the 95% confidence interval of the regression-estimated difference with low damage group.

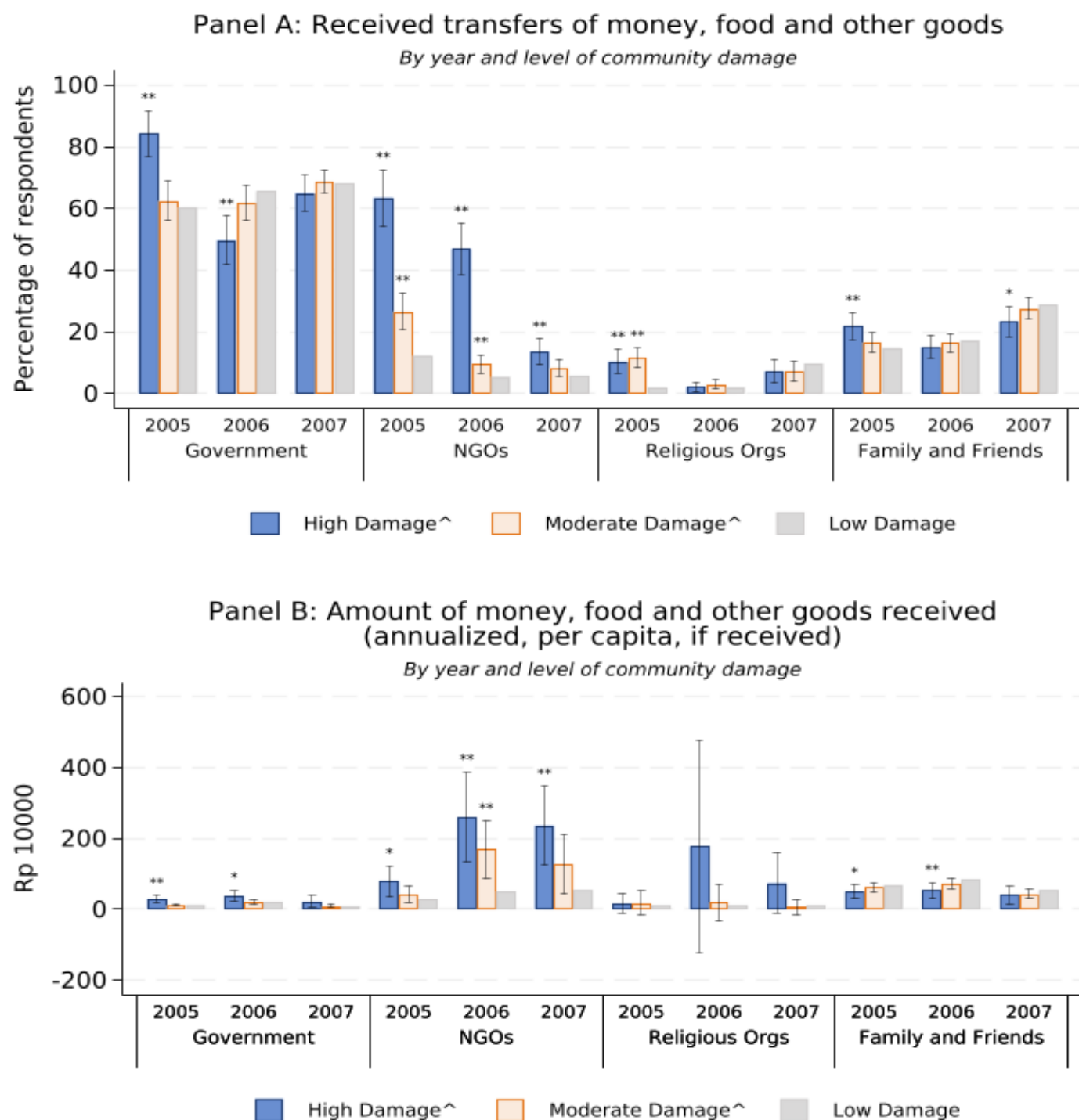
**/* indicate that regression-estimated difference with low damage group is statistically significant at 1/5% levels.

Among baseline respondents interviewed in the 2-year or later follow-ups

Notes: Exposure measured at the baseline community. Multivariable regression estimates displayed.

Figure 4. Receipt of aid by year, source, and exposure to tsunami-related damage

Among baseline respondents interviewed in the 2-year or later follow-ups



^ indicates a group whose means in the panel are regression-adjusted.

Brackets indicate the 95% confidence interval of the regression-estimated difference with low damage group.

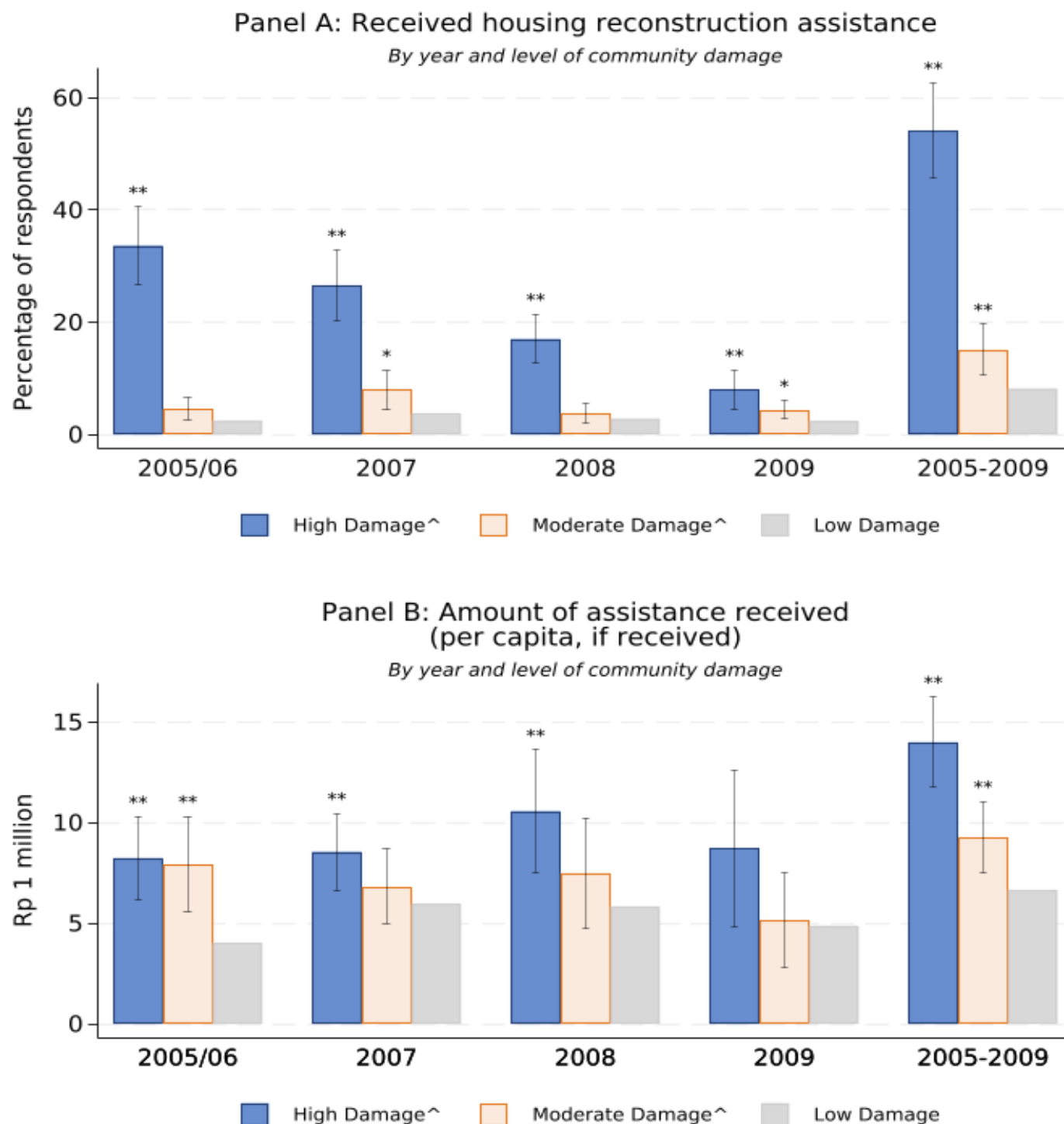
**/* indicate that regression-estimated difference with low damage group is statistically significant at 1/5% levels.

Among baseline respondents interviewed in the 2-year or later follow-ups

Net values used for Friends and Family columns.

Figure 5. Receipt of housing assistance by year and exposure to tsunami-related damage

Among baseline respondents interviewed in the 2-year or later follow-ups



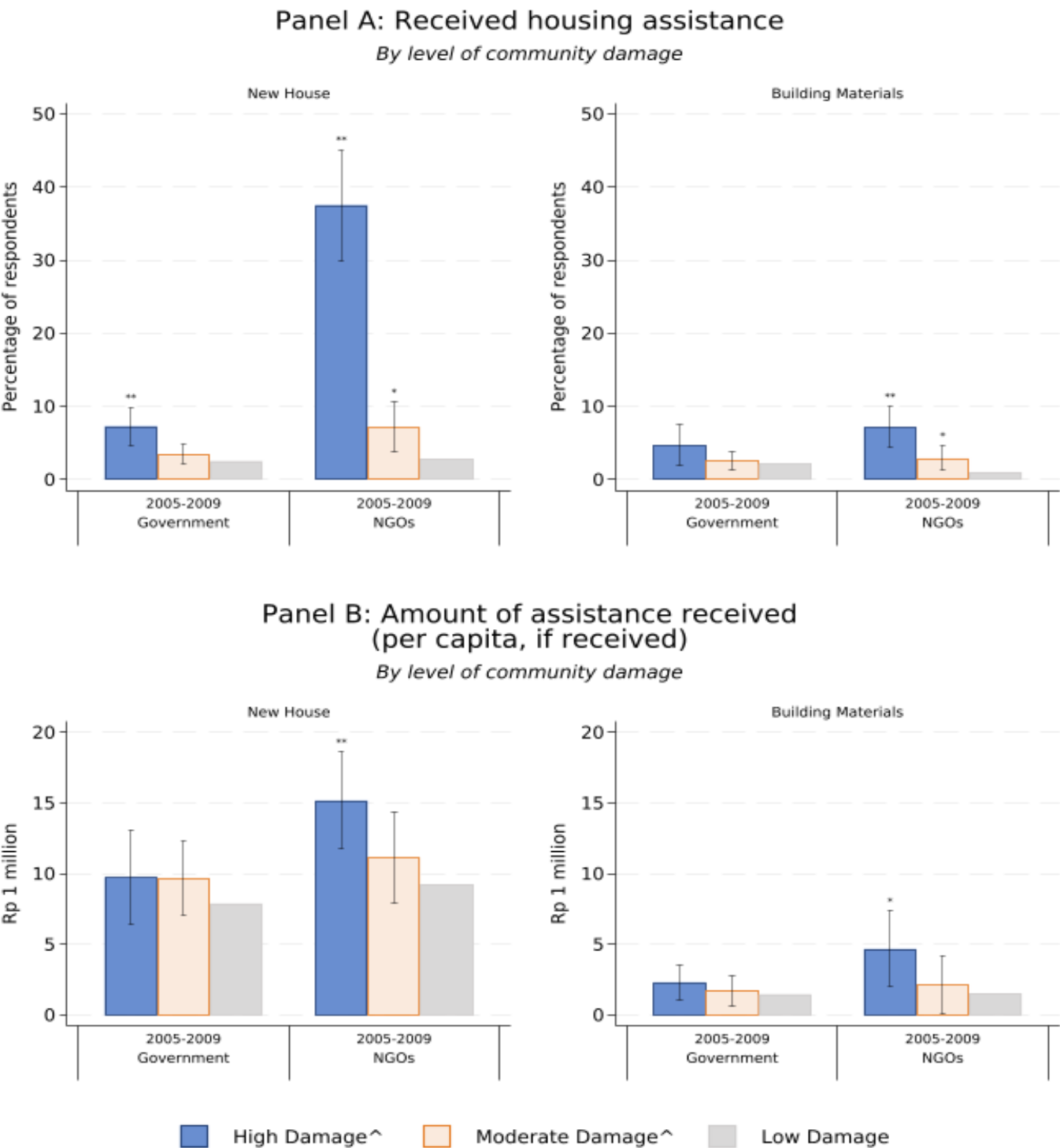
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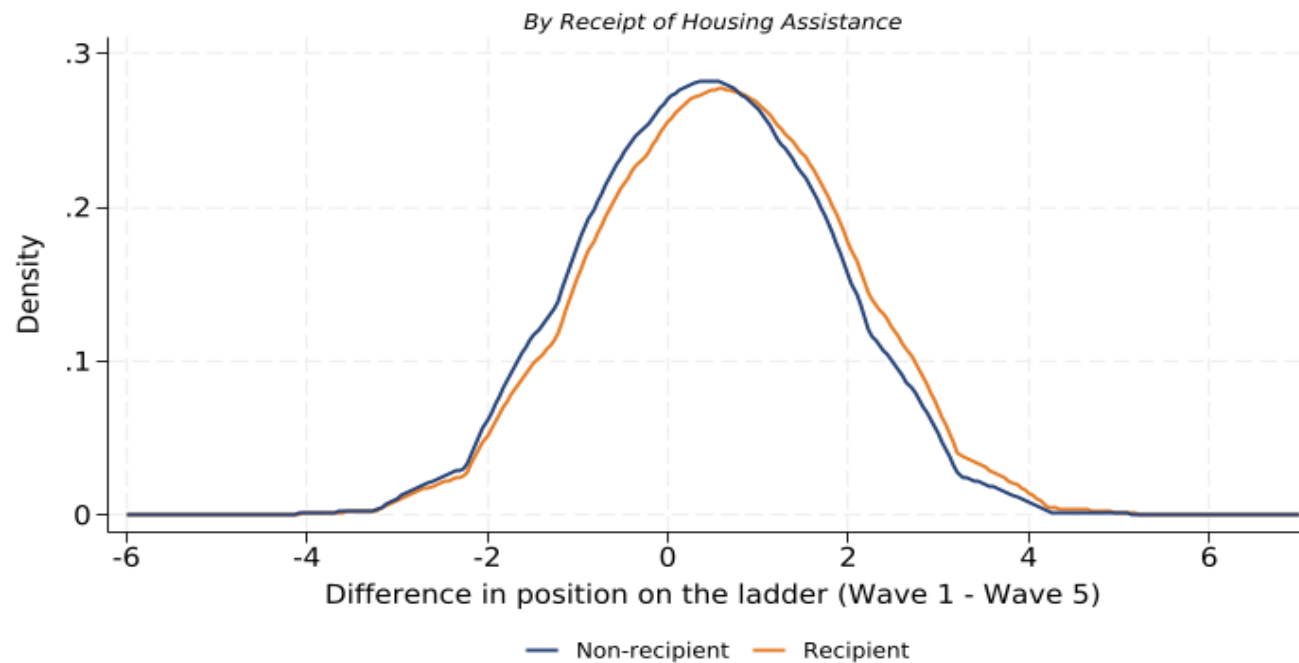
Among baseline respondents interviewed in the 2-year or later follow-ups

Figure 6. Receipt of housing assistance by source, type, and exposure to tsunami-related damage
Among baseline respondents interviewed in the 2-year or later follow-ups



^ indicates a group whose means in the panel are regression-adjusted.
 Brackets indicate the 95% confidence interval of the regression-estimated difference with low damage group.
 **/* indicate that regression-estimated difference with low damage group is statistically significant at 1/5% levels.
 Among baseline respondents interviewed in the 2-year or later follow-ups

Figure 7. Change between 2005 and 2009 in six-step ladder of economic well-being
Among baseline respondents interviewed in the 2-year or later follow-ups



Epanechnikov kernel density plot with half-width 1
Among baseline respondents interviewed in the 2-year or later follow-ups

Table 1. Receipt of Transfers by Level of Community Damage

	<i>Among baseline respondents interviewed in the 2-year or later follow-ups</i>			
	All communities	Level of baseline community damage		
		High	Moderate	Low
Damage to community in tsunami				
High damage	18.06	100.00	0.00	0.00
Moderate damage	58.80	0.00	100.00	0.00
Low Damage	23.13	0.00	0.00	100.00
Damage to housing in tsunami				
Housing destroyed	13.09	44.77	7.16	3.42
Housing damaged	24.30	22.57	27.76	16.86
Housing undamaged	62.60	32.65	65.07	79.72
Transfers- money/food/goods				
Received in 2005	76.10	89.32	74.89	69.08
Received in 2009	73.58	64.61	75.73	75.10
Received between 2005 and 2009	96.63	97.64	96.94	95.20
Value 2005-2009 (pc, Rp 10K.)	219.30	461.55	172.81	155.05
Transfers- housing				
Received between 2005 and 2009	20.32	53.37	15.56	8.24
Value 2005-2009 (pc, Rp 1 Mil.)	11.57	16.29	8.39	6.67
Transfers Post-Reconstruction				
Received in 2015	83.66	81.71	83.09	86.62
Received in 2021	73.85	71.46	74.51	74.00
N	23618	4266	13888	5464

Table 2. Receipt of Transfers by Year, Type, and Source for Respondents from Heavily Damaged Communities*Among baseline respondents interviewed in the 2-year through 15-year follow-ups*

Panel A: Food, Money, Other goods												
By Transfers Type	% Receipt (pp)					Value (annualized, per capita, if received) (Rp10k)						
	Any	Food	Money	Other		Any	Food	Money	Other			
2005	90.89	75.82	68.29	60.69		117.20	33.72	67.48	57.90			
2006	76.16	60.42	35.47	36.55		200.25	27.77	108.66	266.61			
2007	71.49	52.42	24.41	23.30		102.72	15.86	140.47	133.44			
2008	73.34	58.44	29.62	23.44		106.23	15.79	105.58	163.65			
2009	65.80	56.59	28.31	20.48		53.22	9.29	95.31	15.63			
2015	84.03	74.95	64.29	29.66		58.66	11.97	59.02	12.58			
2021	73.37	56.86	63.58	27.87		95.29	15.70	90.08	18.98			

By Transfers Source	% Receipt (pp)						Value (annualized, per capita, if received) (Rp10k)					
	Any	Govt	NGO	Relig Org	FF (Gross)	FF (Net)	Any	Govt	NGO	Relig Org	FF (Gross)	FF (Net)
2005	90.89	78.65	65.64	6.29	28.58	25.12	117.20	36.41	92.51	11.55	62.36	65.54
2006	76.16	36.99	49.02	1.75	18.83	15.94	200.25	38.12	248.74	161.87	78.36	85.81
2007	71.49	56.72	12.95	5.92	36.68	23.94	102.72	21.10	307.37	76.06	51.77	72.07
2008	73.34	56.93	6.69	5.62	45.12	28.61	106.23	15.82	630.80	6.24	65.17	92.00
2009	65.80	47.07	1.58	11.30	57.94	33.56	53.22	12.57	201.67	3.71	48.41	75.45
2015	84.03	64.16	5.18	37.42	80.16	44.25	58.66	16.48	9.09	2.80	58.50	84.08
2021	73.37	47.55	0.81	23.84	83.19	44.28	95.29	28.31	53.73	6.03	84.45	123.24

Panel B: Housing Assistance										
By Source and Type	% Receipt (pp)					Value (per capita, Rp 1 million)				
	Any	Govt	NGO	New Home	Bldg Mtl	Any	Govt	NGO	New Home	Bldg Mtl
2005-06	34.77	3.24	28.22	30.00	4.83	9.34	9.34	9.35	10.20	4.62
2007	28.14	3.16	24.01	24.41	3.73	9.70	4.22	10.67	10.85	3.05
2008	18.39	1.75	14.43	16.07	2.32	13.01	6.93	14.05	14.57	3.44
2009	8.51	3.23	4.54	5.31	3.19	10.92	4.21	18.03	15.82	2.72

Table 3. Household characteristics (from 2-year follow-up) that predict receipt of money or goods, by year

Among baseline respondents interviewed in the 2-year or later follow-ups

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]
<i>Outcome (unit)</i>	<i>Received any money or goods (pp)</i>							<i>Amount (annualized, per capita, if received) (Rp10k)</i>						
<i>Year</i>	2005	2006	2007	2008	2009	2015	2021	2005	2006	2007	2008	2009	2015	2021
Household characteristics														
<i>(at 2 year survey)</i>														
Log monthly PCE (Rp10k)	-2.4 (1.3)	-9.5 (1.3)	-10.8 (1.2)	-9.0 (1.1)	-8.1 (1.1)	-3.0 (1.0)	-3.8 (0.8)	27.4 (6.6)	33.8 (8.0)	10.9 (4.7)	15.6 (7.6)	11.0 (4.9)	16.4 (3.1)	5.6 (3.9)
Education of HH head (yea	-0.7 (0.2)	-1.1 (0.2)	-1.5 (0.2)	-1.6 (0.2)	-1.7 (0.1)	-0.9 (0.1)	-0.9 (0.1)	1.4 (0.7)	0.2 (1.6)	2.7 (0.8)	2.0 (1.0)	2.3 (0.5)	2.9 (0.5)	4.2 (0.5)
HH head is female	2.4 (1.7)	6.6 (1.8)	5.1 (1.5)	3.5 (1.5)	5.2 (1.3)	-0.1 (1.1)	-3.4 (1.1)	11.0 (8.2)	17.7 (13.7)	17.0 (7.9)	22.0 (8.9)	13.1 (5.2)	19.2 (5.8)	24.9 (5.5)
Urban community	-12.2 (2.5)	-11.9 (2.5)	-10.2 (2.0)	-10.3 (1.8)	-15.5 (1.6)	-10.5 (1.4)	-5.7 (1.2)	-9.3 (10.7)	-13.2 (17.4)	15.7 (7.6)	32.1 (9.1)	24.8 (5.2)	6.4 (4.2)	6.1 (5.9)
N	21555	21555	21310	21535	22141	21456	20448	16405	15434	16406	16459	16284	17946	15102
<i>Outcome mean of omitted categories</i>														
<i>Low community damage</i>	69.1	72.5	77.4	78.4	75.1	86.6	74	31.4	43.7	33.1	45.3	53.6	61.4	99

Note: Presented coefficients estimated using OLS regressions of the same model presented in Figure 2, which includes indicators of community damage, a set of household and individual demographic and socioeconomic characteristics, and indicators for month-year of interview. Full regression results (except month-year of interview) are available in Appendix Table 1 . Standard errors are reported in brackets and are clustered at the baseline EA to account for baseline sampling design.

Table 4. Multivariate regressions of receipt of housing reconstruction assistance on baseline community damage and reported housing damage
Among baseline respondents interviewed in the 2-year or later follow-ups

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
<i>Sources</i>	<i>All sources</i>														
<i>Outcome (unit)</i>	<i>Received housing assistance (pp)</i>					<i>Received new home (pp)</i>					<i>Received building materials (pp)</i>				
<i>Year</i>	2005/06	2007	2008	2009	2005-09	2005/06	2007	2008	2009	2005-09	2005/06	2007	2008	2009	2005-09
<i>Community damage</i>															
High damage	17.7 (2.8)	9.2 (2.7)	7.6 (1.9)	2.7 (1.8)	23.1 (3.6)	15.6 (2.4)	7.3 (2.4)	6.8 (1.8)	0.7 (0.9)	18.1 (3.0)	2.1 (1.6)	1.8 (1.0)	0.8 (0.8)	2.1 (1.3)	6.7 (2.5)
Moderate damage	0.3 (0.9)	2.2 (1.5)	0.1 (0.9)	1.4 (0.8)	3.4 (2.0)	0.6 (0.7)	1.2 (1.4)	0.0 (0.8)	0.6 (0.5)	2.0 (1.7)	0.0 (0.7)	0.9 (0.5)	0.0 (0.4)	0.7 (0.6)	1.3 (1.1)
<i>Reported housing damage</i>															
Destroyed	30.3 (2.7)	30.2 (2.8)	14.9 (2.1)	6.1 (1.6)	48.4 (2.8)	27.5 (2.5)	27.9 (2.6)	15 (1.9)	6.4 (1.3)	49.8 (2.5)	3 (1.2)	2.4 (0.9)	-0.1 (0.6)	-0.3 (0.8)	4.6 (1.9)
Damaged	3.7 (1.2)	9.4 (1.5)	3.2 (0.8)	3.2 (1.0)	14.3 (2.1)	1.5 (0.9)	7.6 (1.4)	1.9 (0.7)	1.9 (0.9)	10.1 (1.9)	2.8 (1.0)	1.7 (0.5)	1.4 (0.5)	1.4 (0.6)	6.8 (1.2)
N	21627	21319	21537	22140	19322	21623	21319	21537	22140	19318	21623	21319	21537	22140	19318
<i>Outcome mean (omitted groups)</i>															
Low damage (comm)	2.52	3.73	2.87	2.44	8.24	1.34	3.16	1.86	1.34	5.52	1.18	0.585	1.05	1.09	3.71
Undamaged home	9.59	9.14	6.01	3.98	18.9	8.16	7.62	4.97	2.38	15.4	1.45	1.55	1.05	1.6	5.12

Note: Estimated using OLS regressions. The models include indicators of exposure, a set of household and individual demographic and socioeconomic characteristics (not reported), and indicators for month-year of interview (not reported). Standard errors are reported in brackets and are clustered at the baseline EA to account for baseline sampling design.

Appendix Table 1. Multivariate regression of receipt of money or goods on baseline community damage, by year

Outcome (unit)	Received any money or goods (pp)							Amount received (annualized, per capita, if received) (Rp10k)						
	2005	2006	2007	2008	2009	2015	2021	2005	2006	2007	2008	2009	2015	2021
High Comm. Damage	24.1*** (3.0)	11.1*** (3.3)	0.1 (2.7)	-0.8 (2.3)	-3.7* (2.1)	0.0 (1.7)	2.7* (1.6)	64.0*** (19.3)	130.2*** (35.4)	52.7*** (14.5)	39.8*** (12.9)	-6.4 (7.8)	-10.3* (6.2)	-16.1** (7.2)
Moderate Comm. Damage	5.2* (3.1)	-1.3 (2.7)	1.2 (1.8)	-2.1 (1.8)	0.4 (1.6)	-3.1** (1.3)	4.5*** (1.3)	5.5 (6.1)	13.3* (7.8)	7.7 (5.4)	12.6* (6.5)	-3.4 (5.2)	-2.6 (4.3)	-11.5** (5.8)
Number of HH members														
Log (number of hh member	-5.0*** (1.7)	-5.4*** (2.0)	-9.0*** (1.6)	-5.9*** (1.5)	-5.9*** (1.4)	-2.5** (1.1)	-2.5** (1.1)	-98.2*** (13.1)	140.0*** (17.9)	-73.9*** (8.2)	-74.3*** (10.8)	-35.6*** (6.8)	-17.6*** (6.7)	-10.9* (6.1)
Number under 15 years of age	1.5** (0.6)	-0.0 (0.7)	1.8*** (0.5)	-0.4 (0.6)	0.3 (0.5)	0.6* (0.3)	1.0*** (0.4)	9.8*** (1.7)	16.8*** (3.9)	5.4** (2.2)	3.5 (2.5)	-1.9 (1.8)	6.1*** (1.5)	6.2*** (1.6)
Number 55 years of age or older	-2.0 (1.6)	-1.4 (1.5)	1.5 (1.4)	0.3 (1.3)	0.3 (1.1)	-0.5 (0.9)	-0.6 (1.0)	10.4*** (3.7)	14.6** (6.4)	14.1*** (5.3)	6.5 (5.6)	2.5 (3.5)	10.3*** (3.8)	21.6*** (4.4)
Log monthly PCE (Rp10k)	-2.4* (1.3)	-9.5*** (1.3)	-10.8*** (1.2)	-9.0*** (1.1)	-8.1*** (1.1)	-3.0*** (1.0)	-3.8*** (0.8)	27.4*** (6.6)	33.8*** (8.0)	10.9** (4.7)	15.6** (7.6)	11.0** (4.9)	16.4*** (3.1)	5.6 (3.9)
HH Head Female	2.4 (1.7)	6.6*** (1.8)	5.1*** (1.5)	3.5** (1.5)	5.2*** (1.3)	-0.1 (1.1)	-3.4*** (1.1)	11.0 (8.2)	17.7 (13.7)	17.0** (7.9)	22.0** (8.9)	13.1** (5.2)	19.2*** (5.8)	24.9*** (5.5)
Education of Head (years)	-0.7*** (0.2)	-1.1*** (0.2)	-1.5*** (0.2)	-1.6*** (0.2)	-1.7*** (0.1)	-0.9*** (0.1)	-0.9*** (0.1)	1.4** (0.7)	0.2 (1.6)	2.7*** (0.8)	2.0** (1.0)	2.3*** (0.5)	2.9*** (0.5)	4.2*** (0.5)
Age of Head														
Under 35 years	1.4 (1.5)	2.4 (1.7)	2.2 (1.4)	2.7* (1.4)	2.4 (1.4)	0.3 (1.0)	2.9** (1.1)	7.2 (8.5)	6.8 (10.4)	3.6 (6.4)	0.4 (7.4)	-10.3** (5.0)	-27.1*** (3.7)	-26.1*** (4.6)
55 years or older	4.4* (2.4)	2.4 (2.5)	-1.0 (2.2)	1.1 (2.0)	0.8 (1.9)	0.8 (1.3)	-1.1 (1.6)	-7.3 (8.3)	4.3 (13.2)	-4.7 (8.5)	7.9 (8.7)	9.5* (5.6)	5.9 (6.4)	8.4 (6.7)
Urban community	-12.2*** (2.5)	-11.9*** (2.5)	-10.2*** (2.0)	-10.3*** (1.8)	-15.5*** (1.6)	-10.5*** (1.4)	-5.7*** (1.2)	-9.3 (10.7)	-13.2 (17.4)	15.7** (7.6)	32.1*** (9.1)	24.8*** (5.2)	6.4 (4.2)	6.1 (5.9)
Individual age at tsunami	0.0** (0.0)	-0.0 (0.0)	-0.0 (0.0)	-0.0 (0.0)	0.0 (0.0)	0.0 (0.0)	0.4*** (0.0)	-0.1** (0.1)	0.1 (0.2)	-0.2*** (0.1)	-0.3*** (0.1)	-0.5*** (0.1)	-0.5*** (0.1)	-0.6*** (0.1)
Individual is Female	-0.0 (0.4)	-0.4 (0.5)	0.6 (0.4)	0.5 (0.4)	1.8*** (0.5)	1.0** (0.4)	7.7*** (0.5)	-3.9 (2.4)	-3.3 (4.3)	-1.3 (2.5)	5.5 (3.8)	1.4 (2.2)	4.1 (2.6)	31.4*** (3.0)
N	21555	21555	21310	21535	22141	21456	20448	16405	15434	16406	16459	16284	17946	15102
Mean (low comm dmg)	69.1	72.5	77.4	78.4	75.1	86.6	74	31.4	43.7	33.1	45.3	53.6	61.4	99

Note: baseline respondents interviewed in year 2 and later surveys, coefficients estimated using OLS regressions (model for Figure 2), includes indicators of community damage, a set of household and individual demographic and socioeconomic characteristics, and indicators for month-year of interview. Standard errors are reported in brackets below each regression estimate and are clustered at the baseline EA to account for baseline sampling design.

Appendix Table 2. Multivariate regression of receipt of money or goods on baseline community damage, by year

Outcome (unit)		Received any money or goods (pp)						Amount received (annualized, per capita) if received (Rp10k)							
Year		2005	2006	2007	2008	2009	2015	2021	2005	2006	2007	2008	2009	2015	2021
Community damage															
High damage		24.1***	11.1***	1.4	1.7	-3.8	-0.0	2.8	67.6***	132.3***	52.5***	41.3***	-7.8	-11.7*	-17.1**
		(3.0)	(3.4)	(2.8)	(2.2)	(2.3)	(1.7)	(1.8)	(22.2)	(39.5)	(15.5)	(14.3)	(7.9)	(6.5)	(7.8)
Moderate damage		4.2	-1.6	1.7	-0.8	1.1	-1.9	4.8***	6.6	10.7	9.1*	12.1*	-4.1	-1.7	-11.8*
		(3.2)	(2.8)	(1.9)	(1.8)	(1.7)	(1.3)	(1.3)	(7.1)	(8.0)	(5.3)	(6.2)	(5.4)	(4.4)	(6.3)
HH characteristics, 2-yr srvy															
Number of HH members															
Log (number membe		-3.7*	-3.2	-9.5***	-5.7***	-6.6***	-2.3**	-1.2	-88.0***	135.2***	-76.4***	-83.2***	-33.5***	-16.4**	-11.1*
		(2.0)	(2.2)	(1.9)	(1.7)	(1.6)	(1.2)	(1.2)	(13.0)	(22.4)	(9.9)	(13.5)	(7.9)	(6.7)	(6.4)
Numb. under 15 year		1.5**	0.0	2.0***	-0.4	0.4	0.6*	0.7*	7.4***	16.1***	5.5**	4.3	-2.9	5.1***	4.7***
		(0.7)	(0.7)	(0.6)	(0.6)	(0.6)	(0.3)	(0.4)	(1.9)	(4.8)	(2.5)	(2.7)	(1.9)	(1.4)	(1.6)
Numb. 55 years & ol		-2.9	-1.7	0.5	-0.2	0.6	-1.3	-1.6	12.0**	10.9*	14.8**	8.3	1.0	13.1***	24.2***
		(1.8)	(1.7)	(1.5)	(1.4)	(1.3)	(1.0)	(1.0)	(4.8)	(5.9)	(6.1)	(5.8)	(4.0)	(4.0)	(4.8)
Log monthly PCE (Rp10k		-1.4	-8.2***	-11.1***	-9.7***	-8.5***	-3.5***	-3.7***	25.9***	26.0***	13.7**	16.0**	10.1**	13.5***	4.7
		(1.4)	(1.4)	(1.2)	(1.1)	(1.2)	(1.0)	(0.9)	(8.0)	(6.9)	(5.4)	(7.6)	(4.7)	(3.0)	(4.3)
Household head															
HH Head isFemale		2.0	6.6***	5.1***	4.2***	6.3***	-0.5	-2.4**	13.7*	26.8*	21.1**	23.1**	11.9**	17.0***	24.4***
		(1.9)	(1.9)	(1.6)	(1.6)	(1.3)	(1.1)	(1.1)	(8.1)	(14.9)	(9.4)	(9.9)	(5.6)	(5.9)	(5.9)
Head's Education (yr		-0.6**	-1.0***	-1.5***	-1.6***	-1.8***	-1.0***	-0.9***	1.5*	0.4	2.3***	1.9*	2.4***	3.0***	4.3***
		(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.1)	(0.1)	(0.9)	(1.5)	(0.8)	(1.0)	(0.6)	(0.5)	(0.6)
Head Age <35 yrs		0.7	2.5	1.9	3.2**	2.0	0.4	3.2***	7.3	5.9	3.5	1.1	-7.3	-29.8***	-25.4***
		(1.6)	(1.7)	(1.5)	(1.4)	(1.6)	(1.0)	(1.2)	(7.6)	(9.9)	(7.1)	(7.9)	(5.3)	(3.6)	(4.9)
Head Age 55+ yrs		6.6**	2.9	1.3	1.8	0.6	1.7	0.7	-14.2*	10.9	-11.5	3.6	12.3*	-1.9	10.4
		(2.7)	(2.6)	(2.5)	(2.2)	(2.1)	(1.4)	(1.6)	(8.4)	(16.0)	(10.8)	(8.8)	(6.3)	(6.1)	(7.4)
Urban community		-11.8***	-11.2***	-9.9***	-10.9***	-16.1***	-9.6***	-5.8***	-14.4	-10.5	17.5**	31.3***	23.0***	2.6	2.1
		(2.6)	(2.6)	(2.1)	(1.9)	(1.8)	(1.4)	(1.4)	(10.4)	(18.0)	(8.1)	(9.4)	(5.3)	(4.5)	(6.6)
Individual characteristics															
Age at time of tsunami		0.0*	-0.0	0.0	-0.0	-0.0	0.0	0.4***	-0.1***	0.2	-0.2*	-0.4***	-0.6***	-0.6***	-0.6***
		(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.2)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Female		0.1	-0.3	0.7	0.6	1.2**	1.1**	7.2***	-2.5	2.3	-1.1	6.8	1.8	3.7	30.4***
		(0.5)	(0.6)	(0.5)	(0.5)	(0.5)	(0.4)	(0.6)	(2.3)	(3.9)	(2.7)	(4.2)	(2.4)	(2.7)	(3.3)
N		17090	17090	17090	17090	17090	17090	17090	13062	12389	13290	13267	12914	14823	13026
Mean (low comm dmg)		69.9	73.3	77.8	78.6	76.5	88.2	75.3	30	42.9	29.8	40	50.6	60.6	101

Note: baseline respondents interviewed in the 2-15 year surveys, OLS regressions includes indicators comm damage indicators, household and individual demographic/socioeconomic characteristics, and indicators for month-year of interview. Standard errors in brackets, clustered at baseline EA to account for sample design.

Appendix Table 3. Multivariate regression of receipt of money on baseline community damage, by year

Outcome (unit)	Received any money (pp)							Amount (annualized, per capita) if received (Rp10k)						
	2005	2006	2007	2008	2009	2015	2021	2005	2006	2007	2008	2009	2015	2021
Community damage														
High damage	36.8***	-2.2	-6.0**	-8.8***	-5.9***	-2.3	3.8**	1.4	37.6***	50.7***	17.3	-1.0	-11.8	-17.0**
	(4.0)	(4.0)	(2.6)	(2.8)	(2.2)	(2.1)	(1.8)	(8.4)	(13.7)	(18.5)	(12.8)	(13.3)	(7.1)	(7.1)
Moderate damage	6.6**	2.4	2.1	1.6	0.3	-0.7	3.5**	-7.4	-6.8	-0.6	6.3	-4.6	-6.6	-8.8
	(3.0)	(3.4)	(2.0)	(2.4)	(1.9)	(1.7)	(1.5)	(4.9)	(4.9)	(7.8)	(7.4)	(7.0)	(4.9)	(5.7)
HH characteristics, 2-yr srvy														
Number of HH members														
Log (number members)	-8.6***	-12.5***	-13.3***	-12.0***	-4.9***	-5.2***	-0.7	-81.4***	101.6***	-80.0***	-61.7***	-39.8***	-7.2	-9.4
	(2.1)	(2.1)	(2.0)	(1.8)	(1.6)	(1.5)	(1.2)	(9.0)	(8.2)	(11.1)	(9.5)	(10.6)	(7.5)	(5.7)
Numb under 15 years of age	2.3***	3.0***	4.1***	2.2***	0.2	3.5***	1.2***	8.6***	11.4***	4.6*	2.2	-7.2**	3.4**	5.7***
	(0.8)	(0.7)	(0.8)	(0.7)	(0.6)	(0.5)	(0.4)	(2.6)	(2.4)	(2.7)	(2.6)	(2.9)	(1.5)	(1.6)
Numb 55 years & older	-3.1*	0.0	5.7***	2.6*	1.4	1.7	-0.1	14.4***	9.4**	19.2**	6.5	-2.0	7.5*	18.2***
	(1.6)	(1.7)	(1.6)	(1.6)	(1.4)	(1.2)	(1.1)	(4.4)	(4.3)	(9.0)	(6.2)	(5.3)	(3.9)	(4.2)
Log monthly PCE (Rp10k)	5.0***	-10.0***	-3.0**	-9.2***	-3.1***	-3.9***	-4.1***	31.2***	27.6***	19.6***	27.3***	16.3*	18.7***	7.7*
	(1.5)	(1.5)	(1.3)	(1.4)	(1.2)	(1.1)	(0.9)	(9.7)	(6.5)	(5.7)	(8.8)	(8.7)	(3.1)	(4.0)
HH head is female	5.8***	9.8***	12.7***	8.5***	12.6***	0.4	-2.0*	26.7***	21.7*	10.0	27.5***	3.3	16.4***	22.8***
	(2.0)	(2.0)	(2.0)	(1.8)	(1.6)	(1.5)	(1.2)	(7.5)	(12.3)	(8.5)	(8.6)	(7.8)	(6.1)	(5.7)
HH head's education	-0.3	-1.2***	-0.0	-1.1***	-0.7***	-0.9***	-0.7***	1.9***	2.4***	4.2***	3.5***	5.0***	3.9***	4.6***
	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.1)	(0.1)	(0.6)	(0.8)	(1.4)	(0.7)	(0.9)	(0.5)	(0.5)
Head Age <35 yrs	4.0**	6.0***	-0.1	3.2*	1.6	0.1	2.1	15.1**	3.8	5.1	6.9	-22.8***	-26.2***	-24.4***
	(1.8)	(1.9)	(1.8)	(1.6)	(1.6)	(1.4)	(1.3)	(6.3)	(6.7)	(9.7)	(6.1)	(8.1)	(3.7)	(4.6)
Head Age 55+ yrs	8.3***	4.2	2.6	3.6	8.2***	-0.6	0.2	-8.7	4.5	-2.6	1.3	-3.3	6.3	7.2
	(2.7)	(2.9)	(2.6)	(2.5)	(2.3)	(2.0)	(1.7)	(6.4)	(10.3)	(16.7)	(9.9)	(9.2)	(7.2)	(6.4)
Urban community	2.4	-1.6	13.1***	2.0	2.1	-5.4***	-5.8***	9.0	7.0	3.9	33.1***	21.3***	6.4	12.2**
	(2.8)	(2.6)	(2.1)	(2.0)	(1.5)	(1.7)	(1.4)	(7.4)	(9.3)	(10.5)	(8.9)	(7.6)	(4.6)	(6.0)
Individual characteristics														
Age at time of tsunami	-0.0	-0.0	-0.0	-0.0	-0.0*	0.0**	0.5***	-0.2**	-0.2**	-0.4***	-0.6***	-1.0***	-0.7***	-0.9***
	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Female	-0.6	-1.0*	0.8	1.2**	2.5***	2.0***	8.7***	0.4	1.1	-1.9	1.1	1.7	1.2	29.0***
	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	(0.6)	(2.3)	(2.9)	(4.2)	(3.4)	(4.0)	(2.7)	(2.9)
N	21555	21555	21310	21535	22141	21456	20448	8473	9996	6553	9401	7762	14638	12989
Mean (low comm dmg)	28.6	46.7	30	45.6	36	69.8	63.4	42.9	46.7	51.2	54.3	81.1	60.7	91.7

Note: Among baseline respondents interviewed in the 2-year or later follow-ups Presented coefficients estimated using OLS regressions of the same model presented in Figure 2, which includes indicators of community damage, a set of household and individual demographic and socioeconomic characteristics, and indicators for month-year of interview. Standard errors are reported in brackets below each regression estimate and are clustered at the baseline EA to account for baseline sampling design.

Appendix Table 4. Multivariate regression of receipt of food on baseline community damage, by year

Outcome (unit)		Received any food (pp)						Amount (annualized, per capita) if received (Rp10k)							
Year		2005	2006	2007	2008	2009	2015	2021	2005	2006	2007	2008	2009	2015	2021
Community damage															
High damage		25.6***	16.1***	3.0	0.3	-4.7*	-1.0	-1.8	16.6***	14.0***	3.8	3.9	-1.0	2.0**	-0.9
		(3.8)	(4.1)	(4.0)	(3.6)	(2.4)	(2.5)	(2.0)	(3.9)	(2.9)	(4.6)	(3.7)	(1.4)	(1.0)	(1.2)
Moderate damage		5.1	0.9	0.2	-2.0	0.0	-5.1***	3.1*	-0.5	-1.7	-1.1	0.1	-0.9	1.3*	-1.5
		(3.2)	(3.3)	(3.1)	(3.0)	(1.9)	(1.7)	(1.6)	(1.7)	(1.1)	(1.3)	(1.6)	(1.0)	(0.7)	(1.0)
HH characteristics, 2-yr srvy															
Number of HH members															
Log (number members)		-3.3*	-2.0	-7.0***	-3.3*	-5.0***	-2.4*	-5.5***	-21.8***	-17.4***	-9.6***	-12.5***	-9.0***	-7.4***	-4.1***
		(1.9)	(2.0)	(2.1)	(1.9)	(1.5)	(1.4)	(1.4)	(1.8)	(1.8)	(1.1)	(2.3)	(1.3)	(1.4)	(1.1)
Numb under 15 years of age		0.6	-0.8	0.4	-0.3	0.2	-0.7	1.2***	2.0***	2.2**	-0.2	0.6	0.9**	1.2***	0.8**
		(0.7)	(0.8)	(0.7)	(0.7)	(0.6)	(0.5)	(0.4)	(0.4)	(1.0)	(0.8)	(0.7)	(0.4)	(0.3)	(0.3)
Numb 55 years & older		-0.4	-0.5	-0.1	-0.4	0.6	-0.3	1.1	0.7	1.4	2.8	1.0	3.0***	3.7***	3.6***
		(1.8)	(1.6)	(1.6)	(1.5)	(1.2)	(1.2)	(1.2)	(0.8)	(1.0)	(2.6)	(1.1)	(0.9)	(0.8)	(0.9)
Log monthly PCE (Rp10k)		-3.1*	-8.3***	-3.4*	-6.5***	-9.1***	-3.9***	-5.1***	4.2***	1.8*	-0.3	-1.5	-0.6	0.6	-0.7
HH head is female		3.1	3.8**	0.3	2.3	1.9	-0.5	-2.3*	-1.9	0.5	2.6	3.2	3.3***	4.6***	5.1***
		(2.0)	(1.9)	(2.0)	(1.7)	(1.5)	(1.2)	(1.3)	(1.5)	(1.5)	(3.5)	(2.3)	(1.1)	(1.1)	(1.1)
HH head's education		-0.6***	-0.8***	-1.6***	-1.6***	-2.0***	-1.5***	-1.1***	-0.0	-0.0	0.3	-0.1	-0.0	-0.2***	0.2**
		(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.2)	(0.1)	(0.1)	(0.3)	(0.3)	(0.1)	(0.1)	(0.1)	(0.1)
Head Age <35 yrs		-0.6	-2.3	3.0	-0.2	3.6**	1.6	1.5	1.0	1.2	-4.9**	-1.8	-4.1***	-2.9***	-3.2***
		(1.7)	(1.9)	(1.9)	(1.7)	(1.5)	(1.3)	(1.3)	(1.4)	(1.2)	(2.3)	(1.8)	(0.7)	(0.7)	(1.0)
Head Age 55+ yrs		0.8	1.6	0.1	0.4	-1.0	-0.5	-0.2	0.8	0.2	-5.7	-0.8	-0.8	-0.6	2.6*
		(2.5)	(2.6)	(2.6)	(2.2)	(2.0)	(1.7)	(1.8)	(1.7)	(1.3)	(4.7)	(1.3)	(1.3)	(1.2)	(1.5)
Urban community		-22.5***	-21.7***	-22.8***	-15.8***	-19.8***	-14.8***	-7.4***	-3.7	-2.3	4.3	-1.6	0.7	-0.4	-2.1*
		(2.9)	(2.9)	(2.8)	(2.7)	(1.8)	(1.8)	(1.4)	(2.5)	(1.8)	(3.5)	(1.4)	(0.9)	(0.8)	(1.2)
Individual characteristics															
Age at tsunami (10 years)		0.1***	0.0	0.0***	0.1***	0.1***	0.1***	0.3***	0.0*	0.0	0.1	0.0*	0.0*	0.1***	0.1***
		(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)
Female		0.2	0.2	0.9*	0.7	1.3**	0.7	4.0***	-0.5	-0.3	0.6	1.3	0.5	0.5	2.6***
		(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	(0.5)	(0.6)	(0.4)	(0.4)	(0.8)	(0.9)	(0.5)	(0.5)	(0.6)
N		21555	21555	21310	21535	22141	21456	20448	13024	11442	11349	13164	14498	15917	12316
Mean (low comm dmg)		53.8	52.2	53.4	63.5	67.6	78.9	62.3	13	10.2	9.32	11.3	12	9.7	16.2

Note: Among baseline respondents interviewed in the 2-year or later follow-ups Presented coefficients estimated using OLS regressions of the same model presented in Figure 2, which includes indicators of community damage, a set of household and individual demographic and socioeconomic characteristics, and indicators for month-year of interview. Standard errors are reported in brackets below each regression estimate and are clustered at the baseline EA to account for baseline sampling design.

Appendix Table 5. Multivariate regression of receipt of other goods on baseline community damage, by year

Outcome (unit)	Received any goods (pp)							Amount (annualized, per capita) if received (Rp10k)						
	2005	2006	2007	2008	2009	2015	2021	2005	2006	2007	2008	2009	2015	2021
Community damage														
High damage	40.8*** (4.0)	20.8*** (3.1)	-5.2 (3.3)	1.1 (3.0)	5.6*** (2.1)	2.0 (1.9)	-1.9 (1.7)	44.1* (25.1)	220.1*** (68.7)	108.1*** (27.7)	127.3*** (34.4)	-10.8 (10.9)	-3.8 (3.1)	-4.4* (2.3)
Moderate damage	9.8*** (3.1)	0.6 (2.0)	-2.7 (2.5)	1.9 (2.7)	3.9** (1.8)	-1.1 (1.6)	-1.7 (1.3)	19.0 (12.8)	68.0** (28.7)	21.8** (10.7)	25.6* (15.5)	-1.7 (10.4)	3.4 (3.6)	-4.6** (2.1)
HH characteristics, 2-yr srvc														
Number of HH members														
Log (number members)	-4.1** (1.8)	-3.5** (1.7)	-8.2*** (1.8)	-0.9 (1.7)	-1.7 (1.3)	-0.2 (1.5)	-1.8 (1.3)	-50.4** (25.4)	-149.9** (58.8)	-35.2** (14.3)	-49.7* (25.5)	-5.5 (4.3)	-13.3* (6.8)	-1.8 (4.3)
Numb under 15 years old	2.4*** (0.7)	1.6** (0.6)	4.0*** (0.6)	-0.4 (0.6)	-0.3 (0.4)	-1.2** (0.5)	0.1 (0.5)	3.6 (2.5)	13.4 (12.5)	-2.0 (3.7)	-6.7 (5.3)	-0.9 (2.1)	3.6** (1.6)	0.6 (0.8)
Numb 55 years & older	-0.3 (1.4)	-0.2 (1.2)	4.5*** (1.7)	2.0 (1.4)	2.3* (1.3)	1.5 (1.2)	3.0*** (1.1)	9.6 (8.2)	9.0 (28.7)	-6.9 (6.1)	-10.8 (14.1)	-4.8 (5.7)	1.6 (3.6)	1.9 (1.3)
Log monthly PCE (Rp10k)	2.8* (1.6)	1.2 (1.2)	-9.0*** (1.5)	0.0 (1.3)	1.7* (0.9)	0.5 (1.1)	-1.8** (0.9)	9.3** (4.7)	30.9 (19.7)	7.5 (9.3)	5.1 (15.3)	3.4 (5.1)	1.2 (3.2)	3.2*** (1.2)
HH head is female	-1.0 (1.8)	5.2*** (1.6)	4.7** (2.0)	4.0** (1.6)	1.5 (1.3)	0.2 (1.4)	-0.6 (1.3)	-8.6 (12.4)	-30.1 (35.5)	-2.3 (16.8)	-33.1 (20.5)	-8.0 (6.6)	9.5 (7.2)	2.9 (1.9)
HH head's education	-0.6*** (0.2)	-0.7*** (0.2)	-0.9*** (0.2)	-0.3 (0.2)	-0.1 (0.1)	-0.2 (0.2)	-0.4*** (0.1)	1.4 (1.2)	-2.1 (4.7)	1.0 (1.3)	0.0 (2.7)	-2.0** (0.9)	0.2 (0.4)	0.5*** (0.2)
Head Age <35 yrs	4.7*** (1.7)	2.3* (1.4)	3.7** (1.6)	0.4 (1.6)	0.6 (1.3)	-1.4 (1.4)	-4.0*** (1.2)	-12.7 (13.3)	-17.0 (26.5)	11.1 (12.3)	-4.4 (21.6)	12.6 (10.0)	-4.0 (3.7)	-2.9 (2.2)
Head Age 55+ yrs	-1.4 (2.6)	-1.2 (2.1)	-2.2 (2.6)	0.6 (2.3)	1.7 (2.1)	3.7* (2.0)	-2.1 (1.9)	-16.2 (19.3)	13.0 (51.2)	-0.3 (10.4)	16.2 (21.8)	14.9* (7.7)	2.5 (5.1)	-0.0 (2.6)
Urban community	-12.7*** (2.8)	-4.3** (2.0)	0.8 (2.2)	4.1 (2.5)	-5.0*** (1.4)	-5.1*** (1.4)	-4.7*** (1.3)	-20.7 (13.8)	-31.3 (51.1)	-15.8 (11.3)	5.8 (19.6)	-0.1 (4.7)	3.7 (3.6)	-3.3** (1.7)
Individual characteristics														
Age at tsunami (10 years)	0.1*** (0.0)	0.0** (0.0)	0.0 (0.0)	0.0 (0.0)	0.1*** (0.0)	0.1*** (0.0)	0.2*** (0.0)	0.1 (0.1)	0.9* (0.5)	-0.1 (0.1)	0.0 (0.2)	-0.1 (0.1)	0.1 (0.1)	-0.0 (0.0)
Female	-0.1 (0.5)	-0.6 (0.4)	0.7 (0.5)	1.0** (0.4)	0.5 (0.4)	2.2*** (0.5)	5.4*** (0.5)	-6.6 (4.9)	-7.7 (13.1)	-5.8 (4.3)	7.6 (10.3)	-2.9 (2.2)	2.2 (2.1)	2.1 (1.4)
N	21555	21555	21310	21535	22141	21456	20448	6957	4223	6457	4899	4014	5563	5991
Mean (low comm dmg)	19.3	15.7	32.9	20.1	14.8	26.9	31.3	12.9	29.7	16.4	20.3	26	15.3	22.6

Note: Among baseline respondents interviewed in the 2-year or later follow-ups Presented coefficients estimated using OLS regressions of the same model presented in Figure 2, which includes indicators of community damage, a set of household and individual demographic and socioeconomic characteristics, and indicators for month-year of interview. Standard errors are reported in brackets below each regression estimate and are clustered at the baseline EA to account for baseline sampling design.

Appendix Table 6. Multivariate regression of receipt of all money and goods from Government on baseline community damage, by year

Outcome (unit)	Received any money or goods (pp)							Amount (annualized, per capita) if received (Rp10k)						
	2005	2006	2007	2008	2009	2015	2021	2005	2006	2007	2008	2009	2015	2021
Community damage														
High damage	24.0*** (3.8)	-15.8*** (4.0)	-3.2 (3.0)	-3.8 (2.7)	-4.2 (2.7)	-1.3 (2.3)	5.9** (2.6)	16.5*** (4.8)	16.7** (8.2)	12.5 (8.8)	1.2 (3.9)	-0.9 (3.5)	2.5 (2.9)	-1.0 (2.8)
Moderate damage	2.2 (3.3)	-3.8 (2.9)	0.3 (1.9)	-2.4 (2.1)	1.4 (2.1)	-1.0 (1.6)	5.4** (2.2)	-0.6 (1.8)	0.4 (3.3)	1.0 (1.5)	3.4 (2.2)	-0.1 (2.2)	3.9** (1.7)	1.7 (2.9)
HH characteristics, 2-yr srvy														
Number of HH members														
Log (number membr	3.2* (1.8)	6.1*** (2.1)	1.4 (1.8)	0.6 (1.7)	-2.9* (1.7)	-0.5 (1.4)	-4.5*** (1.4)	-16.1*** (3.3)	-56.9*** (12.8)	-8.6** (4.1)	-13.1*** (4.5)	-5.0*** (1.8)	-4.0 (3.8)	-5.5* (3.1)
Numb < 15 years olc	1.1 (0.7)	-0.9 (0.7)	1.2* (0.6)	-0.2 (0.6)	0.7 (0.6)	0.8* (0.5)	1.5*** (0.5)	0.3 (0.8)	7.3*** (2.4)	0.9 (0.9)	0.4 (1.1)	-1.0* (0.5)	1.8** (0.8)	1.6** (0.7)
Numb 55 years & ol	-3.4** (1.7)	-1.5 (1.6)	0.8 (1.4)	-0.9 (1.4)	-0.1 (1.3)	-2.3** (1.1)	-3.2*** (1.2)	-0.8 (1.3)	10.3* (5.4)	1.5 (1.7)	1.0 (2.4)	1.0 (1.6)	0.7 (1.7)	2.6 (2.1)
Log monthly PCE (Rp10l	-3.0** (1.4)	-13.0*** (1.4)	-10.5*** (1.3)	-8.8*** (1.2)	-10.2*** (1.2)	-5.5*** (1.1)	-6.3*** (1.1)	3.7** (1.7)	5.1 (4.1)	-2.1 (2.8)	0.3 (2.9)	0.7 (1.5)	2.8 (1.8)	-3.6 (2.4)
HH head is female	1.2 (1.9)	3.3* (1.9)	2.2 (1.7)	-1.0 (1.6)	0.1 (1.5)	-0.9 (1.3)	-2.1* (1.3)	3.2 (3.4)	0.2 (5.9)	8.5 (5.2)	6.5* (4.0)	1.9 (1.9)	6.8** (3.3)	5.4 (4.7)
HH head's education	-0.7*** (0.2)	-1.2*** (0.2)	-2.0*** (0.2)	-2.3*** (0.2)	-2.3*** (0.2)	-2.0*** (0.1)	-1.2*** (0.1)	-0.1 (0.2)	0.1 (0.8)	0.8*** (0.3)	0.2 (0.3)	0.0 (0.2)	0.7** (0.3)	0.7* (0.4)
Head Age <35 yrs	0.4 (1.7)	-0.4 (1.7)	2.7* (1.5)	2.5 (1.5)	3.4** (1.6)	6.3*** (1.2)	8.0*** (1.4)	3.0 (2.3)	-3.5 (4.5)	1.6 (2.9)	-2.9 (2.1)	3.6 (3.1)	-2.5 (2.4)	-1.9 (2.4)
Head Age 55+ yrs	5.3** (2.6)	2.0 (2.6)	-4.5** (2.2)	-1.0 (2.2)	-4.0* (2.2)	-0.9 (1.8)	0.4 (2.0)	0.7 (1.6)	3.3 (6.9)	2.4 (3.3)	0.7 (4.5)	-1.4 (1.9)	1.6 (3.7)	5.1 (3.2)
Urban community	-17.5*** (2.7)	-14.5*** (2.8)	-16.4*** (2.1)	-19.7*** (2.2)	-21.6*** (1.9)	-13.0*** (1.6)	-9.9*** (1.7)	-1.3 (2.3)	6.9 (8.5)	5.1 (3.8)	-2.4 (2.3)	-2.4 (1.6)	3.3 (2.5)	-0.0 (2.4)
Individual characteristics														
Age at tsunami (10 year	0.1*** (0.0)	0.0*** (0.0)	0.1*** (0.0)	0.1*** (0.0)	0.2*** (0.0)	0.1*** (0.0)	0.5*** (0.0)	0.0 (0.0)	0.1** (0.1)	-0.0 (0.0)	0.0** (0.0)	0.0 (0.0)	0.0 (0.0)	-0.1 (0.1)
Female	-0.3 (0.5)	0.5 (0.5)	0.5 (0.5)	0.8* (0.5)	2.0*** (0.5)	1.2** (0.5)	4.1*** (0.6)	1.0 (0.9)	0.0 (1.8)	-1.8 (1.1)	-0.7 (1.0)	-0.6 (0.6)	-0.2 (1.1)	6.1*** (1.4)
N	21555	21555	21310	21535	22141	21456	20448	13954	12470	14097	13917	12697	14618	9682
Mean (low comm dmg)	60.4	65.5	68.2	67	58.9	70.3	46.7	12.9	21.3	8.7	13.9	12.7	15.9	28.9

Note: Among baseline respondents interviewed in the 2-year or later follow-ups Presented coefficients estimated using OLS regressions of the same model presented in Figure 2, which includes indicators of community damage, a set of household and individual demographic and socioeconomic characteristics, and indicators for month-year of interview. Standard errors are reported in brackets below each regression estimate and are clustered at the baseline EA to account for baseline sampling design.

Appendix Table 7. Multivariate regression of receipt of all money and goods from Religious organizations on baseline community damage, by year

Outcome (unit)		Received any money or goods (pp)						Amount (annualized, per capita) if received (Rp10k)							
Year		2005	2006	2007	2008	2009	2015	2021	2005	2006	2007	2008	2009	2015	2021
Community damage															
High damage		8.3***	0.1	-2.6	-2.6*	-4.1**	-4.1	0.6	4.3	167.2	62.4	-6.2	-1.9	-0.2	0.1
		(2.1)	(0.8)	(1.9)	(1.4)	(2.0)	(3.8)	(2.6)	(13.8)	(152.8)	(43.7)	(10.3)	(2.4)	(0.3)	(1.8)
Moderate damage		9.5***	1.0	-2.6	-3.0**	-4.8***	-8.5***	5.3**	5.5	9.1	-4.6	13.1*	-2.4	0.9**	-0.8
		(1.6)	(0.7)	(1.7)	(1.2)	(1.5)	(3.0)	(2.1)	(17.6)	(26.6)	(11.0)	(7.6)	(2.7)	(0.4)	(1.0)
HH characteristics, 2-yr srvy															
Number of HH members															
Log (number members)		-3.3***	0.4	-2.5**	-2.5***	-1.6	-6.0***	-0.4	-2.9	-59.1	8.0	-31.6	-6.5**	-1.4***	-3.6*
		(1.3)	(0.7)	(1.0)	(0.9)	(1.1)	(1.7)	(1.3)	(11.3)	(83.0)	(17.9)	(20.0)	(2.5)	(0.5)	(1.8)
Numb < 15 years old		2.3***	-0.1	0.8**	0.2	-0.1	-0.0	0.0	2.0	19.0	-11.4	-0.9	-0.6	0.4**	0.8
		(0.5)	(0.2)	(0.4)	(0.3)	(0.5)	(0.7)	(0.4)	(1.2)	(13.9)	(7.4)	(2.6)	(1.0)	(0.2)	(0.6)
Numb 55 years & older		2.8**	-0.3	1.0	0.1	0.1	-0.7	-0.6	-5.0	-20.5	16.1	11.2	-1.5	0.9**	0.9
		(1.2)	(0.6)	(1.0)	(0.7)	(1.1)	(1.4)	(1.1)	(5.8)	(33.9)	(18.5)	(8.5)	(1.7)	(0.4)	(1.0)
Log monthly PCE (Rp10k)		-4.3***	-1.6***	-1.6**	-0.3	-2.4***	-3.5**	-0.0	25.8	37.3	-5.2	-4.0	-3.8	1.2**	-0.8
		(1.2)	(0.5)	(0.7)	(0.7)	(0.9)	(1.5)	(1.0)	(21.7)	(33.7)	(15.4)	(4.0)	(3.2)	(0.6)	(0.9)
HH head is female		3.4***	2.0***	3.1**	3.1***	5.4***	2.5	0.4	0.2	83.3	37.2	-19.7*	-1.4	1.6***	3.8**
		(1.2)	(0.7)	(1.2)	(1.0)	(1.3)	(1.7)	(1.4)	(3.5)	(86.2)	(28.7)	(11.6)	(2.0)	(0.6)	(1.9)
HH head's education		-0.2	-0.1	-0.3***	-0.2***	-0.4***	-0.7***	-0.6***	0.4	13.5	2.9	0.5	0.2	-0.1	0.1
		(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.2)	(0.1)	(0.5)	(8.6)	(2.0)	(1.0)	(0.2)	(0.1)	(0.1)
Head Age <35 yrs		0.4	0.2	-0.6	-2.5***	0.7	-1.2	3.5***	-4.4	22.8	3.6	2.5	-2.8	-0.3	-2.5
		(1.0)	(0.5)	(1.1)	(0.8)	(1.2)	(1.6)	(1.2)	(5.6)	(51.2)	(26.4)	(11.1)	(2.6)	(0.4)	(1.6)
Head Age 55+ yrs		-1.0	1.4	-1.9	0.8	-0.5	0.2	2.4	-0.0	64.4	-39.7	-3.8	-0.0	0.1	1.6
		(1.8)	(1.1)	(1.6)	(1.3)	(1.8)	(2.2)	(1.8)	(4.7)	(84.3)	(30.5)	(5.5)	(1.0)	(0.5)	(1.3)
Urban community		0.2	3.2***	-2.5**	-0.9	-1.6	-6.4***	4.3**	-42.3	86.6	-41.6*	16.6	1.2	0.7	-0.6
		(1.6)	(0.9)	(1.2)	(0.9)	(1.3)	(2.4)	(1.8)	(36.4)	(121.8)	(23.9)	(12.6)	(1.2)	(0.4)	(1.3)
Individual characteristics															
Age at tsunami (10 year)		0.0**	0.0	0.0*	0.0***	0.0***	0.2***	0.2***	-0.0	-0.6	-0.1	-0.3*	-0.0	-0.0	-0.0
		(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.7)	(0.1)	(0.2)	(0.0)	(0.0)	(0.0)
Female		0.3	-0.3*	-0.0	0.1	0.6	1.0*	2.7***	-1.0	-19.0	-0.9	-2.1	-1.0	-0.2	-0.1
		(0.3)	(0.2)	(0.3)	(0.3)	(0.4)	(0.5)	(0.5)	(1.4)	(26.1)	(3.5)	(4.8)	(0.9)	(0.3)	(0.9)
N		21555	21555	21310	21535	22141	21456	20448	1764	533	1608	1485	2715	7580	4650
Mean (low comm dmg)		2.03	2.08	9.77	9.37	15.9	42.3	22.5	11.4	10.5	11.3	3.09	6.15	2.61	5.29

Note: baseline respondents interviewed in the 2 yr and later follow-ups, OLS regressions, includes comm damage indicators, household and individual demographic/socioeconomic characteristics, and indicators for month-year of interview. Standard errors in brackets, clustered at the baseline EA to account for baseline sampling design.

Appendix Table 8. Multivariate regression of receipt of all money and goods from Family and Friends on baseline community damage, by year

Outcome (unit)	Received any money or goods (pp)							Amount (annualized, per capita) if received (Rp10k)						
	2005	2006	2007	2008	2009	2015	2021	2005	2006	2007	2008	2009	2015	2021
Community damage														
High damage	8.0*** (2.6)	-2.4 (2.2)	-5.1 (3.6)	-3.4 (2.9)	-3.1 (3.1)	-6.6** (2.9)	-2.8 (2.1)	-16.7** (8.3)	-27.9*** (10.3)	-13.4 (10.3)	-11.1 (9.5)	-16.9** (7.4)	-9.4 (5.9)	-16.6*** (6.1)
Moderate damage	3.8** (1.9)	1.6 (1.9)	-0.9 (2.9)	-0.0 (2.6)	-3.1 (2.5)	-9.4*** (2.1)	-1.4 (1.5)	-8.0 (5.5)	-15.1** (6.3)	-7.8 (5.1)	1.5 (5.8)	-6.2 (5.3)	-3.4 (4.1)	-11.9** (4.7)
HH characteristics, 2-yr srvy														
Number of HH members														
Log (number members)	-16.4*** (1.7)	-18.2*** (1.5)	-17.9*** (1.9)	-7.3*** (1.8)	-3.1* (1.7)	1.8 (1.5)	-0.9 (1.2)	-93.1*** (8.8)	-93.7*** (9.0)	-68.9*** (6.5)	-64.4*** (7.3)	-27.7*** (6.9)	-14.8*** (5.5)	-1.8 (4.9)
Numb < 15 years old	2.2*** (0.6)	1.3** (0.6)	3.6*** (0.7)	0.6 (0.7)	-1.1 (0.7)	-1.8*** (0.6)	0.2 (0.4)	11.0*** (2.8)	8.3*** (3.0)	6.6*** (1.5)	3.9* (2.2)	-1.3 (1.9)	5.2*** (1.4)	4.5*** (1.4)
Numb 55 years & older	2.3* (1.3)	1.1 (1.2)	2.7 (1.7)	0.8 (1.6)	0.8 (1.6)	0.6 (1.3)	0.3 (0.9)	19.1*** (4.8)	11.7** (5.8)	11.2*** (3.5)	10.5** (4.4)	2.6 (3.7)	9.4*** (3.4)	14.4*** (3.6)
Log monthly PCE (Rp10k)	2.4** (1.2)	-1.5 (1.0)	-0.9 (1.4)	1.1 (1.3)	1.6 (1.4)	4.7*** (1.3)	-0.9 (0.8)	33.3*** (9.2)	42.6*** (10.0)	11.6** (4.8)	16.5** (7.3)	11.8** (5.0)	13.7*** (2.9)	5.0 (3.1)
HH head is female	9.6*** (1.7)	12.0*** (1.7)	6.6*** (2.0)	8.9*** (1.8)	5.8*** (1.7)	0.6 (1.4)	-0.5 (1.0)	42.6*** (8.4)	39.7*** (8.6)	28.7*** (6.6)	34.3*** (7.6)	23.1*** (5.9)	14.4*** (4.9)	18.4*** (4.2)
HH head's education	-0.0 (0.2)	0.0 (0.2)	-0.1 (0.2)	0.2 (0.2)	-0.4** (0.2)	0.0 (0.2)	-0.2* (0.1)	3.2*** (0.6)	3.8*** (1.0)	1.7*** (0.5)	2.4*** (0.6)	2.6*** (0.6)	2.9*** (0.4)	3.6*** (0.4)
Head Age <35 yrs	3.8*** (1.4)	4.4*** (1.4)	3.5* (1.9)	1.8 (1.6)	2.7 (1.6)	-2.4* (1.3)	-3.7*** (1.1)	25.1*** (5.5)	19.8*** (7.6)	5.5 (5.6)	6.1 (5.2)	-16.1*** (3.3)	-29.9*** (3.2)	-23.9*** (4.2)
Head Age 55+ yrs	2.5 (2.1)	4.0** (1.9)	8.0*** (2.9)	11.0*** (2.6)	3.8 (2.5)	-0.1 (1.9)	-1.9 (1.3)	-1.1 (9.7)	4.0 (11.2)	-2.3 (6.0)	6.5 (7.5)	14.5** (6.4)	5.5 (5.2)	3.7 (5.7)
Urban community	5.7*** (1.9)	6.1*** (1.8)	2.5 (2.3)	7.8*** (2.1)	-8.0*** (2.0)	-13.9*** (2.2)	-6.6*** (1.4)	23.4*** (5.6)	26.5*** (7.7)	33.0*** (5.8)	30.4*** (6.5)	26.7*** (5.1)	3.6 (4.1)	7.7 (4.9)
Individual characteristics														
Age at tsunami (10 years)	-0.0 (0.0)	-0.0 (0.0)	-0.0 (0.0)	-0.0 (0.0)	-0.0 (0.0)	0.0 (0.0)	0.2*** (0.0)	-0.4*** (0.1)	-0.5*** (0.1)	-0.4*** (0.1)	-0.6*** (0.1)	-0.7*** (0.1)	-0.5*** (0.1)	-0.2** (0.1)
Female	0.1 (0.5)	-1.0** (0.4)	0.0 (0.5)	0.8 (0.6)	1.5*** (0.6)	0.6 (0.5)	3.1*** (0.5)	-4.4* (2.6)	0.9 (3.1)	0.4 (2.4)	5.9* (3.2)	2.7 (2.6)	6.1** (2.4)	29.2*** (2.4)
N	21555	21555	21310	21535	22141	21456	20448	4531	4414	8173	9920	12649	16802	17318
Mean (low comm dmg)	16.5	19.8	39.3	46.8	59.3	85.6	87.1	65.2	79.1	44	56.1	58.2	55.6	90.7

Note: baseline respondents ivwd in the 2 yr or later follow-ups. OLS regressions, including indicators of community damage, household and individual demographic and socioeconomic characteristics, and indicators for month-year of interview. Standard errors are reported in brackets and are clustered at the baseline EA to account for baseline sampling design.

Appendix Table 9. Multivariate regression of receipt of all money and goods from NGOs on baseline community damage, by year

<i>Outcome (unit)</i>		<i>Received any money or goods (pp)</i>							<i>Amount (annualized, per capita) if received (Rp10k)</i>						
<i>Year</i>		2005	2006	2007	2008	2009	2015	2021	2005	2006	2007	2008	2009	2015	2021
Community damage															
High damage		51.0***	41.4***	7.9***	4.3***	-0.3	-0.5	-0.6	52.5**	210.1***	181.5***	324.6**	109.4	-12.1	-29.6
		(4.6)	(4.2)	(2.0)	(1.1)	(0.7)	(1.1)	(0.4)	(21.8)	(64.9)	(56.7)	(155.3)	(72.1)	(14.5)	(57.3)
Moderate damage		14.2***	4.1***	2.6*	1.7***	0.2	-0.7	-0.4	14.7	118.4***	73.6*	36.2	32.3	7.1	-0.6
		(3.0)	(1.6)	(1.4)	(0.6)	(0.6)	(0.9)	(0.4)	(11.0)	(41.2)	(42.0)	(112.5)	(41.9)	(19.7)	(19.5)
HH characteristics, 2-yr srvy															
Number of HH members															
Log (number member)		-1.7	2.3	-2.8**	0.4	-0.4	0.4	0.1	-86.1***	246.8***	188.6***	-333.1**	-238.7**	-36.6	-5.3
		(1.8)	(1.5)	(1.1)	(0.7)	(0.5)	(0.8)	(0.3)	(32.6)	(67.1)	(54.8)	(160.8)	(111.3)	(36.1)	(35.5)
Numb < 15 years old		1.7**	0.9*	1.9***	0.5	0.5**	0.1	0.1	7.0**	15.0	2.4	-51.3	-14.9	10.6*	3.3
		(0.7)	(0.5)	(0.5)	(0.3)	(0.2)	(0.3)	(0.1)	(3.2)	(14.2)	(13.0)	(42.2)	(21.5)	(5.7)	(14.5)
Numb 55 years & older		-0.3	-0.9	-0.1	0.2	-0.2	-0.3	0.4	15.5	17.9	38.8	-39.3	-56.8	12.3	-10.8
		(1.5)	(1.1)	(0.9)	(0.6)	(0.5)	(0.6)	(0.3)	(10.1)	(25.3)	(43.1)	(87.3)	(68.8)	(23.9)	(21.5)
Log monthly PCE (Rp10k)		5.4***	6.3***	-1.6	0.4	-0.6	-0.5	-0.3	20.7***	6.3	57.1**	55.8	-65.0	11.9*	45.0
		(1.6)	(1.1)	(1.0)	(0.5)	(0.4)	(0.5)	(0.2)	(8.0)	(22.8)	(25.9)	(97.9)	(52.0)	(6.6)	(29.1)
HH head is female		-4.8***	-1.6	-1.7*	0.9	-0.4	0.3	-0.2	-23.3	8.4	-103.9**	-116.6	-51.9	25.2	4.6
		(1.5)	(1.2)	(0.9)	(0.8)	(0.5)	(0.8)	(0.3)	(15.4)	(53.2)	(48.6)	(131.4)	(79.6)	(29.9)	(20.5)
HH head's education		-0.5**	-0.3*	-0.1	0.0	-0.1	0.0	-0.0	1.5	-7.1	6.0	-16.5	-5.3	-0.6	-3.4
		(0.2)	(0.2)	(0.1)	(0.1)	(0.1)	(0.1)	(0.0)	(1.5)	(5.2)	(5.4)	(17.9)	(5.7)	(2.5)	(4.2)
Head Age <35 yrs		-0.6	0.1	0.3	-0.7	0.4	0.4	1.2***	-13.5	-6.8	-5.9	115.1	-29.2	-12.3	-7.7
		(1.5)	(1.2)	(1.1)	(0.7)	(0.7)	(0.8)	(0.4)	(17.9)	(29.8)	(35.9)	(139.3)	(62.9)	(8.7)	(17.7)
Head Age 55+ yrs		-3.6	-1.2	-0.4	0.4	-0.5	-1.1	-0.1	-22.9	-12.7	13.1	-6.4	124.3	47.5	4.3
		(2.4)	(1.8)	(1.4)	(1.0)	(0.8)	(0.9)	(0.4)	(22.6)	(54.7)	(71.5)	(127.7)	(82.1)	(34.9)	(32.9)
Urban community		-13.4***	-10.5***	-1.1	1.6**	0.1	1.1	-0.3	-25.9	-65.5	-50.9	84.5	-3.2	8.9	35.1
		(2.8)	(2.2)	(1.4)	(0.8)	(0.5)	(0.8)	(0.2)	(18.1)	(66.0)	(51.6)	(141.0)	(55.0)	(7.4)	(33.7)
Individual characteristics															
Age at tsunami (10 years)		0.0**	0.0	-0.0	-0.0***	-0.0**	-0.0*	-0.0**	0.1	1.1*	0.5	2.5**	0.9	-0.1	-0.9*
		(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.0)	(0.1)	(0.6)	(0.5)	(1.2)	(0.8)	(0.5)	(0.5)
Female		-0.9*	-0.8**	0.4	-0.0	0.1	-0.0	0.2*	-6.5	1.9	1.4	39.7	-16.7	-20.2**	-29.8
		(0.5)	(0.4)	(0.3)	(0.2)	(0.2)	(0.2)	(0.1)	(4.7)	(13.7)	(16.1)	(55.7)	(19.6)	(10.0)	(25.3)
N		21555	21555	21310	21535	22141	21456	20448	6469	3280	1844	781	635	990	244
Mean (low comm dmg)		12.4	5.49	5.81	1.46	2.8	5.21	1.63	27.5	50.4	54.5	169	58.6	30	18.9

Note: Among baseline respondents interviewed in the 2-year or later follow-ups Presented coefficients estimated using OLS regressions of the same model presented in Figure 2, which includes indicators of community damage, a set of household and individual demographic and socioeconomic characteristics, and indicators for month-year of interview. Standard errors are reported in brackets below each regression estimate and are clustered at the baseline EA to account for baseline sampling design.

Appendix Table 10: Multivariate regressions of receipt of housing assistance on baseline community damage and reported housing damage, by year

Outcome (unit)	Received housing reconstruction assistance (pp)					Received new housing construction (pp)					Received building materials (pp)				
	2005/06	2007	2008	2009	2005-09	2005/06	2007	2008	2009	2005-09	2005/06	2007	2008	2009	2005-09
Comm: high damage	17.7*** (2.8)	9.2*** (2.7)	7.6*** (1.9)	2.7 (1.8)	23.1*** (3.6)	15.6*** (2.4)	7.3*** (2.4)	6.8*** (1.8)	0.7 (0.9)	18.1*** (3.0)	2.1 (1.6)	1.8* (1.0)	0.8 (0.8)	2.1 (1.3)	6.7*** (2.5)
Comm: mod damage	0.3 (0.9)	2.2 (1.5)	0.1 (0.9)	1.4* (0.8)	3.4* (2.0)	0.6 (0.7)	1.2 (1.4)	0.0 (0.8)	0.6 (0.5)	2.0 (1.7)	-0.0 (0.7)	0.9** (0.5)	0.0 (0.4)	0.7 (0.6)	1.3 (1.1)
Hsg Destroyed	30.3*** (2.7)	30.2*** (2.8)	14.9*** (2.1)	6.1*** (1.6)	48.4*** (2.8)	27.5*** (2.5)	27.9*** (2.6)	15.0*** (1.9)	6.4*** (1.3)	49.8*** (2.5)	3.0** (1.2)	2.4*** (0.9)	-0.1 (0.6)	-0.3 (0.8)	4.6** (1.9)
Hsg Damaged	3.7*** (1.2)	9.4*** (1.5)	3.2*** (0.8)	3.2*** (1.0)	14.3*** (2.1)	1.5* (0.9)	7.6*** (1.4)	1.9*** (0.7)	1.9** (0.9)	10.1*** (1.9)	2.8*** (1.0)	1.7*** (0.5)	1.4*** (0.5)	1.4** (0.6)	6.8*** (1.2)
Number of HH members															
Log (# members)	2.5** (1.2)	0.6 (1.0)	-1.5** (0.7)	-1.1 (0.7)	0.3 (1.3)	1.6 (1.1)	0.1 (0.9)	-2.0*** (0.7)	-1.4*** (0.4)	-1.2 (1.2)	1.1* (0.6)	0.5 (0.4)	0.4 (0.4)	0.3 (0.6)	1.9* (1.0)
# < 15 years old	-0.7** (0.3)	-0.2 (0.4)	-0.1 (0.3)	0.4 (0.3)	-0.1 (0.5)	-0.8*** (0.3)	-0.1 (0.4)	0.1 (0.2)	0.5*** (0.2)	-0.0 (0.5)	-0.0 (0.2)	-0.1 (0.2)	-0.1 (0.2)	-0.1 (0.2)	-0.2 (0.4)
# 55 years & older	-0.7 (0.7)	-0.6 (0.9)	-0.6 (0.6)	-0.3 (0.6)	-0.4 (1.1)	-0.7 (0.6)	-0.3 (0.8)	-0.5 (0.5)	-0.7* (0.4)	-0.8 (1.0)	-0.2 (0.4)	-0.2 (0.4)	-0.2 (0.4)	0.4 (0.5)	0.3 (0.8)
Log monthly PCE (Rp10k)	1.5* (0.8)	-0.5 (0.7)	-0.4 (0.6)	-0.1 (0.5)	0.7 (1.1)	1.0* (0.6)	-0.4 (0.6)	-0.3 (0.6)	-0.2 (0.4)	-0.0 (0.9)	0.3 (0.5)	-0.1 (0.3)	-0.1 (0.3)	0.2 (0.4)	0.4 (0.8)
HH head is female	2.2** (1.0)	-0.7 (1.1)	-1.3 (0.9)	-0.2 (0.7)	1.6 (1.4)	1.0 (0.9)	-0.9 (1.0)	-1.1 (0.8)	-0.6 (0.5)	0.5 (1.2)	1.3* (0.7)	0.2 (0.6)	-0.0 (0.5)	0.4 (0.6)	1.3 (1.1)
HH head's education	-0.1 (0.1)	0.1 (0.1)	-0.1 (0.1)	-0.0 (0.1)	-0.2 (0.1)	-0.0 (0.1)	0.1 (0.1)	-0.1 (0.1)	-0.0 (0.1)	-0.0 (0.1)	-0.0 (0.1)	-0.0 (0.1)	-0.1 (0.0)	-0.0 (0.1)	-0.2 (0.1)
Head Age <35 yrs	-0.0 (0.9)	-0.3 (1.0)	-0.9 (0.9)	0.4 (0.8)	0.4 (1.3)	0.0 (0.8)	-0.3 (0.9)	-0.9 (0.8)	0.5 (0.7)	0.5 (1.1)	0.0 (0.5)	0.0 (0.5)	-0.0 (0.5)	-0.0 (0.5)	-0.1 (0.9)
Head Age 55+ yrs	-0.4 (1.3)	0.2 (1.6)	-0.7 (1.2)	-0.1 (1.0)	-1.5 (2.0)	-0.2 (1.1)	-0.2 (1.5)	0.2 (1.0)	0.9 (0.7)	0.1 (1.6)	-0.0 (0.8)	0.4 (0.8)	-0.7 (0.6)	-1.0 (0.8)	-1.6 (1.4)
Urban community	-3.4** (1.4)	-5.8*** (1.3)	-1.1 (1.0)	-3.5*** (0.9)	-8.4*** (1.6)	-3.1** (1.2)	-5.8*** (1.2)	-1.1 (0.9)	-1.4** (0.6)	-7.4*** (1.5)	-0.6 (0.6)	-0.1 (0.5)	-0.1 (0.5)	-2.1*** (0.6)	-2.8*** (1.1)
Ind. Age, tsunami (10 yrs)	0.0*** (0.0)	0.0** (0.0)	0.0*** (0.0)	0.0*** (0.0)	0.1*** (0.0)	0.0*** (0.0)	0.0** (0.0)	0.0*** (0.0)	0.0 (0.0)	0.0*** (0.0)	0.0* (0.0)	0.0 (0.0)	0.0 (0.0)	0.0** (0.0)	0.0*** (0.0)
Ind. Female	-0.2 (0.3)	0.3 (0.3)	-0.1 (0.3)	-0.4* (0.2)	-0.3 (0.4)	-0.3 (0.3)	0.3 (0.3)	-0.1 (0.2)	-0.1 (0.2)	-0.1 (0.4)	0.0 (0.1)	-0.0 (0.2)	-0.0 (0.1)	-0.3** (0.1)	-0.3 (0.3)
N	21627	21319	21537	22140	19322	21623	21319	21537	22140	19318	21623	21319	21537	22140	19318
Mean- Low comm dmg	2.52	3.73	2.87	2.44	8.24	1.34	3.16	1.86	1.34	5.52	1.18	0.585	1.05	1.09	3.71
Mean- undmgd home	9.59	9.14	6.01	3.98	18.9	8.16	7.62	4.97	2.38	15.4	1.45	1.55	1.05	1.6	5.12

Note: Baseline respondents interviewed in yr 2 or later follow-ups, OLS regressions. Models include indicators of exposure, household and individual demographic/socioeconomic characteristics (not reported), and indicators for iww month-year (not reported). Standard errors reported in brackets, clustered at the baseline EA to account for baseline sampling design.