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The heterogeneous impact of an 8.0 earthquake on housing quality. The case of Peruvian quake on 2007

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The case of Peruvian quake on 2007[1]

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Innovations for Poverty Action

RESUMEN

Evaluamos el impacto del terremoto del 2007 en Pisco, Perú, el de mayor fuerza registrado desde 1970. Definimos a tratados y controles usando círculos concéntricos alrededor del epicentro y usamos el modelo de diff-in-diff usando datos de encuestas de hogares (2005-2015) y tres censos poblacionales que estuvieron inusualmente próximos (2005, 2007 y 2013).

Nuestros resultados muestran que, en el corto plazo, los principales impactos destructivos se dieron en la calidad de las viviendas y en el bienestar subjetivo. Notablemente, encontramos que el impacto fue particularmente severo para las viviendas de peor material, y que la recuperación fue anti-pobre y desigualadora.

Keywords: Desigualdad, Calidad de vivienda, Desastres naturales, Evaluación de Impacto

ABSTRACT

We study the impact of the 2007 Pisco, Peru earthquake, the larger registered since 1970. We define treatment and control groups within concentric circles, and use a diff-in-diff estimator using highly detailed georeferenced microdata from both national household surveys (2005-2015) and three unusually close censuses, in 2005, 2007, and 2013.

Our findings show that, in the very short run, the main impacts are the destruction of physical infrastructure of housing and subjective wellbeing. Remarkably, we find that the destructive power of the quake was particularly severe on bad-quality houses, and that the recovery pattern was anti-poor and unequal.

Keywords: Inequality, Housing, Natural Disasters, Impact Evaluation

[1] We would like to thank Mayté Ysique and Edson Huamaní for their excellent research assistance. All remaining errors are from the authors.

I. Introduction

The negative impacts of natural disasters on economic development have been extensively documented by economic literature, exploiting both the rather exogenous nature of natural hazards and available microdata sources to assure proper identification. While this provides rigorous evidence to argue in favor of long-run prevention policies, analogous evidence is scant for mitigation and, especially, reconstruction policies, both of which inevitably deal in the short and medium run. In this paper, we seek to contribute to existing literature by providing evidence on how the negative effects of large and frequent disasters are shaped in the short and medium run.

In particular, we study immediate impacts and recovery pattern of wellbeing on the households affected by the 2007 Pisco Earthquake, exploiting the exogenous location of the quake's epicenter. We take advantage on a the household survey between 2005 and 2014 and three fortunately-timed censuses which allows us to identify short-run (2 months) effects as well as to study the recovery patterns and dynamics in the medium run (6 years).

On August 15th, 2007, an 8.0 Moment-Magnitude quake struck the Peruvian central coast, just 40 km seaward from Pisco, followed by more than 90 aftershocks only in the following three days. This disaster, which we refer to as the 2007 Pisco Earthquake, poses a good case study since it is representative of large natural disasters which are relatively frequent. In fact, since the Pisco Earthquake, more than 120 quakes of equal or higher magnitude been recorded worldwide, most of them happening in developing countries of the Pacific's 'Ring of Fire' (USGS 2015).

Further, the disaster-stricken area, Ica, was Peru's top-performing region by many standards, i.e. full employment (high- and low-skill), good infrastructure and proximity to the country's capital, and rapid and diversified growth. Notably, excluding household welfare issues, the region remained a top performer even after the 2007 Earthquake. This fact might have created the general idea of that that the quake did not have an effect on household's wellbeing, which is not necessarily true without rigorous evidence of a proper impact evaluation..

We exploit the exogenous location of the 2007 Earthquake's epicenter in order to have a credible identification of the quake's impacts on development outcomes through a diff-in-diff estimator. Specifically, we study impacts on housing, poverty, employment, health[2] and education, as measured by national household surveys and three unusually close censuses of 2005, 2007, and 2013.

In the short run, we are primarily interested in checking if such dimensions were in fact affected by the quake. By contrast, in the long run, we focus on identifying recovery effects, either resulting from government-led reconstruction efforts or household-led recovery spending. To achieve this, we use the definition from Kirchberger (2014) and consider as treated villages within 35km of epicenters of both the main quake and all aftershocks produced within the first month, while using a diff-in-diff estimator that should cancel out any pre-earthquake systematic differences between 'treatment' and 'control' groups.[3]

We find strong evidence of short-run negative impacts on the quality of housing. We find this both on the average (reduction of average number of rooms, increase in overcrowding), and on more poor-sensitive measures of housing (increase of makeshift dwellings, walls and roofs of bad quality material and presence of dirt floor in the household). Remarkably, while good housing quality seems to have been hit only in a small magnitude and then recovered in time (surpassing control mean quality in a large amount), average housing quality of the poor was more severely affected and failed to recover.

More specifically, in the medium run, we can see evidence of a recovery effect, but this has not been enough to reestablish treated areas to the pre-quake situation for most outcome variables related to bad quality of housing. Regarding housing, for instance, we still see a lower number of rooms per household and higher rates of overcrowding. Moreover, in indicators where we see an improvement over control groups, this can be hiding unequal trends since we still see higher rates of households living in bad quality houses, but at the same time, the locality has better housing conditions than control areas, showing a growing social inequality.

We find fast recovery on the impacts on public services provision and housing quality but almost no recovery in overcrowding (housing quantity). In general, we find no strong evidence of impacts on education or health in the households. At the same time, results

[2] We focus on the impacts on women, children and elderly health.

[3] Is worth mentioning that the results are robust to the definition of distance to the epicenter.

on perceptions on wellbeing are negative in the short run, but then turn out to positive in the medium run, as (economic) recovery took off.

Similarly, treated household heads report a strong negative impact on the amount of goods or actives, but no negative impacts (and even positive ones) on employment or earnings. This may explain why neither health nor education seemed to be negatively affected by the earthquake, and is suggestive about the impacts of earthquakes on regions that had, prior to the event, a positive trend on economic growth.

This paper's contribution is threefold. First, it adds up to the existing literature on the development effects of natural disasters, initially interested in households ex ante risk-management strategies,[4] but lately focused on the development effects of exposure to disasters at different stages of the life cycle[5], especially in the long run[6], as well as other ex post households' responses to disasters, such as migration[7].

Secondly, this paper particularly adds up to the evidence on causation mechanisms that explain medium- and long-run effects of natural disasters. To our best knowledge, rigorous evidence in this literature is still scarce and the few works that deal with the issue. For instance, previous research[8] have all studied short-term impacts of severe earthquakes; though have not been able to fully identify the main channels of transmission of disaster to persistent effects. Recently, only Buttenheim (2009) presents an interesting evaluation framework for identifying destruction and recovery effects, with an application to the case of Pakistan earthquake.

Third, our results also provide evidence on disaster-relief priorities. Typically, when disasters strike, either funds are insufficient to finance relevant reconstruction efforts or funds are made available but technical and bureaucratic capacities are overwhelmed. Reconstruction efforts are also likely to be driven by political interests.

In specific, we consider that the impact on housing quality might have been underestimated since most relieve funds goes to repair large infrastructure (road, schools, etc.) and to monetary poverty, since is easier for the government to invest in

[4] Lucas and Stark (1985), Rosenzweig and Stark 1989), Paulson (2000).
[5] Hoddinott and Kinsey (2001), Maccini and Yang (2009), Sanchez and Beuermann (2012).
[6] Hornbeck (2009), Caruso and Miller (2014).
[7] Yang (2008), Tse (2012), Dallman and Millock (2013).
[8] Bustelo (2011b), Valencia (2013), and Novella and Zanuso (2015).

them and harder to assign help directly to households or, more specifically, on the quality of it. In such scenario, pointing out what are the most important damages in the very short run, and in what populations these are likely to become permanent (there is evidence of the long-term impact of housing)[9], might help future disaster-relief policy, when it unavoidably is called into action.

The remainder of this paper continues as follows. Next section presents the general motivation of our work and its relevance as a case study and its general contribution to the literature. Section III presents our identification strategy and our data. Section IV presents our results. Section V presents the conclusions.

II. Motivation

On August 15th, 2007, an 8.0 MM earthquake hit the central coast of Peru, 150 km south of Lima, the country capital, with an epicenter 40km seaward from the city of Pisco. Besides being the single most powerful seism in Peru since the 1970 Ancash Earthquake, according to official estimates (FORSUR 2008), the damages it caused were not trivial: more than 600 deaths, 2,300 injured, 76,000 houses left unfit for living, and more than 90,000 households severely affected. Similarly, public infrastructure was also destroyed, with its (partial) reconstruction costing US$ 220,7 million (FORSUR 2008: p. 12), affecting public utilities, roads, schools, hospitals, and even the jail system.[10]

Accordingly, there is a widespread perception that regions affected never fully recovered from the earthquake impact, despite an astounding record of stable economic growth and employment, both before and after the earthquake. As Figure 1 shows, this perception is not without grounds: housing quality substantially worsened in areas in the first line of shock[11], when compared to nearby comparable areas, as we will explain later. Although some recovery followed, housing quality has not only seemingly lagged with respect to comparable areas, but is still below pre-disaster levels.

[9] See for example Cattaneo et al. (2009) and Katz et al. (2001).

[10] Anecdotal evidence reflect the immediate negative impacts of the earthquake on public infrastructure. First, the city of Pisco remain disconnected from Lima for at least 20 days, and thus most help had to be flown in or transported by ship. Second, destruction of a large jailhouse near the city of Chincha allowed nearly a hundred of prisoners to escape the facility.

[11] Considering 35km within the main quake or its aftershocks' epicenters, our main definition of the treatment group.

Figure 1 presents preliminary evidence of the persistent effects of the 2007 Earthquake, using data from Peru's National Household Survey. Panel (a) and (b) show the evident direct effect of housing destruction, as the share of houses with very low-quality materials (either in the roof or in the walls)[12] increased up to 20% in areas closest to the main quake and aftershocks' epicenter (0-35km from the epicenters) in comparison to areas further away (35km-70km from the epicenters), from very low baseline levels.

Despite sustained reduction in this number, it is clear that, six years later, the most affected areas remain worse-off. Panel (c) shows that, by contrast, such a persistent effect is not perceivable in terms of the presence of dirt floors, although panel (d) confirms that up to 20% of housing in the region was severely compromised by the Earthquake, since there is an increase of houses that are considered improvised, henceforth referred to as 'makeshift dwellings'.[13]

[Figure 1 here]

Importantly, such persistent effects only appear when we focus on measurements of bad housing quality. If, by contrast, we focused on measurements of moderate bad housing quality (e.g. walls not made from cement), as in panels (a) and (b) of

Figure 2, the same persistent negative effect would not be clear. This can be a clear signal that impacts have focused on the poorer households since only bad or very bad quality houses were strongly affected by the quake. More importantly, years after the quake we see an reduction on moderately bad housing but we still do not see a full recovery on bad and very bad housing caused by the quake, implying an increase on inequality on the treated area on housing quality and, in the future, potentially other socioeconomic outputs resulting from this exposure to bad housing.

Similarly, in panel (c) and (d), household daily per capita expenditure and monetary poverty status do not seem to be significantly affected by the 2007 Earthquake, which may be explained, as above, as a result of the affected region's particularly strong economic preconditions and the likely reconstruction labor demand that followed the

[12] We consider a roof of bad material is if it is from "straw", "cane or matting and mud" or other. We consider a wall of bad material if it is from matting, wood or other.

[13] Admittedly, the definition of 'improvised housing' or 'makeshift dwellings' is arbitrary in the National Household Survey, from which we borrow the term, since it is left to the surveyor to decide what is considered 'makeshift' (or inadequate for human habitat, as it is also called).

earthquake. From a pessimistic perspective, the lack of change in poverty might have made policymakers underestimate the impact of the earthquake since monetary poverty is the leading indicator in measuring social wellbeing in the country.

Figure 2 here]

Despite the magnitude of this disaster, most work has been dedicated at quantifying the disaster's direct effects, rather than its indirect ones, e.g. Bambarén y Alatrista (2009). The few attempts at identifying the quakes' indirect effects (Cairo et al. 2010 for mental health; Apoyo Consultoria 2011 for effects on sanitation; Lévano et al. 2013 for socio-environmental impacts) combine qualitative and quantitative methods, but lack proper identification strategies that assure that found effects are attributable to the 2007 Earthquake, as opposed to pre-disaster regional differences. In other words, these attempts lack a credible counterfactual, compromising both the internal and the external validity.

More broadly, the literature on development economics has only rarely dealt with short-run effects of disasters; instead, most literature has dealt with long-run effects (Skidmore and Toya 2002, Cavallo et al. 2013, Loayza et al. 2013), and there is still not a consensus on the sign of the effects (Cavallo and Noy 2011).[14] As for labor market effects, Hornbeck (2009) finds that the soil erosion caused by the Dust Bowl that struck the U.S. Great Plains in the 1930s greatly reduced agricultural labor productivity in the long run, and thus induced out-migration flows in the context of a high-mobility labor market. Neumayer and Plümper (2007) find long-run negative effects of natural disasters lower women's life expectancy more than that of men.

Access to public services is also affected by disasters, because either infrastructure is destroyed or harmed, or because certain facilities become overcrowded, e.g. hospitals, or stadiums and public spaces used to provide temporary shelter. Although there are credible results showing that better preparedness in local provision of public services reduces the potential impacts of natural disasters (e.g. Skidmore and Toya 2013), there is not much evidence on the effects of disasters on public services provision per se, e.g. Bambarén (2000) for Northern Peru in the wake of ENSO 1998. Nevertheless, it makes

[14] Recent literature, instead, suggests that, on average, disasters neither promote nor reduce growth (Cavallo et al. 2013), although effects are heterogeneous: smaller disasters may be growth spurring, but severe disasters and disasters in developing regions are growth-decreasing (Loayza et al. 2013).

sense that the destructive capacity of disasters also affects the household's access to public services, and the scarce empirical research on the subject at least suggests so (Table 7 in Glave et al. 2008).

In particular, the literature has dealt with the long-run effects of exposure to natural disasters on human capital accumulation. Hoddinott and Kinsey (2001), Maccini and Yang (2009) and Sanchez and Beuermann (2012) study the long-run effects of extreme weather volatility at early childhood, respectively, in for droughts in Zimbabwe, for precipitations in Indonesia and for frosts in Peru. Caruso and Miller (2014) find long-run negative effects on education and marriage market outcomes on persons directly affected by the 1970 Ancash Earthquake in Peru. More interestingly, however, they find persistent effects in children of those directly affected, this time in educational achievement and in child labor status. Accordingly, Crespo Cuaresma (2009) finds long-run negative effects of the propensity to suffer geological disasters on secondary enrollment rates in a cross-country sample of countries, possibly through both the destructive effects on educational infrastructure and the affection of the opportunity cost of the youth's time.

In the short run, however, evidence on the effects of disasters is still recent. Santos (2010) studies the effects of two earthquakes that hit El Salvador in 2001, finding that school attendance in children aged 6 to 15 was negatively affected. Bustelo (2011a) finds gendered effects of the onslaught of Tropical Storm Stan in Guatemala, as only adolescent boys' enrollment rates at ages 13 to 15 were negatively affected, in contrast to younger boys' and girls' of all ages below 15. Bustelo (2011b) presents evidence on the negative short-run effects of the 1999 Colombia Earthquake, finding that children nutrition and boys' enrollment was negatively affected by the earthquake, although no evidence is available on the causation mechanisms at play. Valencia (2013) finds evidence of negative effects of climate shocks in Colombia on students' academic performance, as measured by standardized tests, and provides some evidence that health deterioration and school destruction may be behind the final outcomes. Novella and Zanuso (2015) study the 2010 Haiti Earthquake and find an overall increase in child labor without school attendance, but due to data quality issues, cannot find significant changes in the children's time allocation.

III. Identification Strategy and Data

Definition of Treated and Control groups

In order to identify the impacts of the Pisco Earthquake, we need to assess the counterfactual i.e. examine what would have happened to the households treated had they not received treatment. For this purpose, we exploit geographical distance to the epicenter to construct our treated group.

Under some circumstances, a natural disaster may be considered as an exogenous event, and therefore with no need of a natural experiment or additional features to identify a causal relationship. Our case might not be quite the same since the most affected area is a particularly seismic area, even compared with Peru. As can be seen in Figure 3, where we present the quakes that occurred in Peru in the last 114 years, panel (a) presents quakes before August 15th, while panel (b) the ones after it. As can be seen, before the 2007 Earthquake, the southern Peruvian coast has been particularly affected by seismic activity for more than a century before the 2007 Earthquake. If, in the long run, populations selectively migrated to and from areas as a result of their seismic activity (or whatever effects it may bring about), then a simple comparison between outcomes would be insufficient to identify the causal effects of the quake.

However, while the whole area was knowingly seismic, the exact location of the 2007 Earthquake and, more importantly, its timing were impossible to know ex ante. Provided that the common trends assumption holds, then a Difference-in-Difference approach would be sufficient to identify the quake's effect.

[Figure 3 here]

Accordingly, here we make our first important assumption on the working definition of treatment and control groupds. We consider a household as affected ('treated') by the earthquake if it was geographical close to either the main quake of August 15th, 2007 (8.0 Mw moment magnitude scale) or any the 90 aftershocks that occurred in the following two months.[15] From here on, we would call "the earthquake" when we refer to this definition.

[15] Though it is possible to build more elaborated combination of the treatment (i.e. the weighted combination of the earthquake and the aftershock, weighted by both its magnitude and its distance), we consider that is not an easy task to weight them since the impact of an earthquake is neither linear in

Our second important assumption is what can be considered “being close” to the earthquake. This is not only important for academic reasons but also for empirical ones, since the narrower the definition is, the lower sample can be included in the analysis, therefore adding sample size error. Following Kirchberger’s (2014) definition, we consider a household treated if it is below 35 km from the main quake or any aftershocks in the following 2 months. [16]

Finally, it is not only important to define our treatment group, but also it is important to define our comparison or control group. The challenge here is to define a comparable-enough group of observations which are relatively free of the ‘treament’. In one side, we can consider the ones closer to our treatment as the group that is more similar to the treated, but have not been affected by the earthquake.

This definition, although, has a downside, that is that they might be affected indirectly, by its closeness to the affected area (i.e. migration flows is a possible way this localities can also be affected). In the other hand, there is no limit to what can be considered far enough therefore we choose to use the extreme opposite, the whole country. Interestingly, if both definition of a treatment group provided similar results it would mean that our results are highly robust to the definition of control group.

In Figure 4, we present the area selected for treated sample (within 35km from the epicenter of the earthquake or any of its main aftershocks), the control-sample area, i.e. between 35 and 70km (control area 1), and the rest of the country (control area 2).

[Figure 4 here]

Identification of destruction and the recovery effect

One of the main problems in identification of an earthquake’s effect is that typically the areas affected by earthquake are soon provided with assistance and social investment to mitigate the negative impacts of the earthquakes. Therefore, the evaluation of the impact of the earthquake has to face the challenge to distinguish between these two effects: the destruction and the recovery effect (which is, in essence, the distinction

changes in distance nor in changes of magnitude. Further, in terms of informing policy, the impact evaluation framework is particularly intuitive, especially so for a type of disasters with an unpredictable location.

[16] Our results are robust to marginal changes in these assumptions. In addition, we only consider aftershocks that where below 150km from the main quake.

between the short run and the medium run effects). This have demonstrated to be a difficult task to assess by many studies, which as an alternative focused on the long-run effects, which is the combination of both effects.

One of the main reasons behind the inability of differentiating the impacts lies on that most of the times there is not enough information (usual limitation of national surveys) or there is not data of enough quality (usual limitation of censuses and cross sectional data), limiting the ability to differentiate them. In our study we face this challenge by combining two different kind of datasets, census and survey, which combined allows us to distinguish, in the best way possible both effects.

We use the National Survey of Households (ENAHO, for its acronym in Spanish) from 2005 to 2014 to analyze the differential impact of the earthquake (close after August 2007), and the periods after, and therefore follow the impact over time. The hypothesis behind is that the reduction of the impact in periods after the quake are the recovery effect. From August 2005 (exactly two years before the earthquake) and July 2013 (exactly 6 years later) ENAHO national survey include observations of 286,329 households in the whole country.

As is commonly known, national surveys such as ENAHO provide vast information about quality of life, but face a serious limitation: it is hard to build representative group for small periods of time[17] and small areas inference[18].

Therefore, we complement our data with national population censuses of 2005, 2007 and 2013. It is of key importance to remark that political and exogenous reasons explain the abundance of census data in less than ten years. The latest census prior 2005 was made in 1993, almost 20 years before. The reason for the 2007 census was mainly political, as the country's president in office was not fully satisfied with both methodology and results obtained by 2005 census, and thus he ordered a new one shortly after, in 2007.[19]

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[17] For example, ENAHO 2007 was collected during the entire year, being a small part of the sample around the months short after the event. This limits our ability to construct our short run scenario.

[18] ENAHO has an inference level only to the regional level, therefore it is difficult to consider its results as representative for the radio of 35 km around the earthquake.

[19] At this point is worth mentioning that censuses of 2005 and 2007 had different collection strategies. Being 2005 the first in peruvian history to use a different approach. National censuses prior this one were all made in one single day, which the president declare a free day from labor and other social activities,

It is a remarkably coincidence that 2007 census was collected short after the occurrence of the Pisco Earthshake (October 20th, 2007), generating and excellent ex-ante scenario in 2005 census and an short-term ex-post scenario in 2007 census. The collection of 2013 census is also a generous coincidence. At the beginning of the next national government (Ollanta Humala, president from 2012 to 2016), started with a new social inclusion policy which include the creation of new national level social programs (i.e. Beca 18, Pensión 65). This new programs demanded national information from all citizens in order to be able focus social assistance on the poorest individuals. This necessity justify the collection of a new census in 2013.[20]

All three censuses give us a unique opportunity since they no longer face the limitation from national surveys, the ability of making inference on small area levels. We would consider 2005 vs 2007 the destruction effect and 2007 vs 2013 the recovery effect.

Econometric Specification

Our main estimation strategy will be Difference in Difference (DD) methodology. As was mentioned above, we would employ two different datasets: National Surveys from 2005 to 2014 and censuses of 2005, 2007 and 2013. For that reason, we would estimate two econometric models, one for each dataset.

In the case of Censuses estimations, we only have three periods of time:

- Period "-1": From July 18th and August 20th, 2005;
- Period "0": October 21st, 2007;
- Period "1": From December, 2012 to March, 2013;

Therefore, we estimate the destruction and recovery effects in two coefficients. The first one representing the impact of the earthquake or the destruction effect (variable $C07_t$) which is a dummy that takes value of 1 if localities are in periods 0 or 1. The second one

commanding that all citizens remain in their houses until they were censed. The census of 2005 took a month to be completed and soon after there was a change in government. The new president demand a new census using the past methodology of recollection.

[20] Again, is importance to remark that 2013 census did have differences with it collection strategy with 2007 census, since it was collected during around four months from December 2012 and March 2013, covering different areas in the time. In addition, since the objective of this census was to collect information for social programs, some areas were excluded since they were not from interest for social programs (mainly wealthier areas of the metropolis), finally obtaining information of around 80% of estimated national population for that year.

will present the recovery effect since is the differential effect of the earthquake in early 2013 or period 1 (variables $C13_t$).

$C07_t$ will take the value of one if the locality "i" was censed in 2007 or 2013 censuses, $C13_t$ will do the same if was censed by the 2013 census.[21] As in the previous equation, T_j is a dummy variable that take value of 1 when locality "i" is on the affected area by the earthquake (treatment have been defined above). X is a matrix that include different sets of control variables for the equation. Finally, u is a randomly distributed error variable.

This equation is presented in formula (2):

(1) $y_{it} = \beta_D T_i C07_t + \beta_R T_i C13_t + X'\delta + u_{it}$

So, our estimators of interest are β_D and β_R. The first one is the direct negative impact of the earthquake, the destruction effect. The second capture the recovery effect. The vector δ contains other coefficients to be estimated for the control variables included in the model

In the case of ENAHO estimations, we group or data in four artificial periods (originally, we had information of nine different annual surveys):

- Period "-1": From August, 2005 to July, 2007,
- Period "0": From August, 2007 to July, 2009;
- Period "1": From August, 2009 to July, 2011;
- Period "2": From August, 2011 to July, 2013;

Therefore, we estimate the destruction and recovery effects in three coefficients. The first one representing the impact of the earthquake short after the occurrence of the sinister (variable $A0_t$), which we will call the destruction effect. The other two variables will present two stages of the recovery effect (variables $A1_t$ and $A2_t$).

$A0_t$ will take the value of one if the household "i" was surveyed after August 15th, 2007, $A1_t$ will do the same if was surveyed after August 15th, 2009, and $A2_t$ will if it was surveyed after August 15th, 2011.[22]

[21] We explore other grouping strategies (more or less groups) but this combination allows us to find, what we consider, the best combination of sample size in each group and the group quantity.
[22] We explore other grouping strategies (more or less groups) but this combination allows us to find, what we consider, the best combination of sample size in each group and the group quantity.

In the other hand T_j is a dummy variable that take value of 1 when household "i" is on the area affected by the earthquake (treatment have been defined above). Our interest variables are the interaction between $A0_t$, $A1_t$ and $A2_t$ with T, representing the impact of the earthquake in different magnitudes. In other words, T_j*$A0_t$ will represent the impact of the earthquake, and the following two: T_j*$A1_t$ and T_j*$A2_t$ are the differential impacts of the earthquake of being years after the event.

X represents a matrix that include different sets of control variables for the equation. ϵ is an randomly distributed error term. The variable y_{ijt} represent the result variables for each household "i", located in area "j" in period "t". The list of result variables will be presented in the next sub-section.

This equation is presented in formula (1):

(2) $y_{ijt} = \beta_D T_j A0_t + \beta_{R1} T_j A1_t + \beta_{R2} T_j A2_t + X'\gamma + \epsilon_{ijt}$

So, our estimators of interest are β_D, β_{R1} and β_{R2}. The first one is the direct impact of the earthquake, the destruction effect. The second and the third capture the differential impact of the earthquake in the latest periods, and by doing this we can estimate the recovery effect at two different moments.

Although both capture the recovery effect, is important to understand how to interpret them. If β_D have a different coefficient sign (i.e. positive vs negative) to β_{R1} we can say that there is a recovery effect. Additionally, if β_{R2} also have a different coefficient than β_D (and is statistically significant) we can say that the recovery is getting bigger with the pass of time. If any of these coefficients have the same sign than β_D will mean an increasing destruction effect and it any is not statistically different from zero, will mean the no existence of recovery.

The vector γ contains other coefficients to be estimated for the control variables included in the model. In order to summarize the interpretation of coefficients (and its combination), we provide Table 1. In that table we can see the interpretation of the two equations (1) and (2) in panels A and B, respectively when assuming an outcome that is not desirable, such as, for example, poverty or having bad quality of housing.

In the first column, we can see the number of scenarios that are feasible. In Panel A, for example, we consider six scenarios as feasible. For example, the most probable is number 1, which is that we can see a positive impact of the earthquake (for example, an increase in poverty) and following that, a recovery impact which means that the initial positive impact is reduced in the next period of observation. This values are in columns 2 and 3, which have the sign of the estimation when is statistically significant and, otherwise, is “n.s.”, which means that is not statistically significant.

As it can be possible to see between rows 1 to 6, not only recovery is plausible, but also is that there is no recovery at all or even a worsening of the impact on time. Even when these scenarios are possible, they are unlikely or, in case are found, need a case-by-case interpretation.

In our census-level estimations is not possible to detect if the recovery accelerated in time or, in turn, have decrease it speed, therefore in panel A all values in the column 5 are “Not possible to detect”, but they will be available in panel B. Finally, column 6, presents the possible impact of the earthquake (combining both destruction and recovery effect) in the long-run. Only in the first scenario (paradoxically, the most probable one) is not clear which sign this impact will be in the long-run since will depend on the magnitude of both β_D and β_R.

Table 1. Summary of possible interpretation of the dynamic impact of Earthquake for a non-desirable variable

Panel A: National Censuses estimation (2005, 2007 and 2013)					
	β_D	β_R	Interpretation	Trend in recovery/worsening?	Possible impact on the long-run?
1	+	-	Destruction Impact, Recovery Impact	Not possible to detect	Not clear, depends on magnitude
2	+	n.s.	Destruction Impact, no recovery nor worsening	Not possible to detect	Negative
3	+	+	Destruction Impact, Worsening Impact	Not possible to detect	Negative
4	n.s.	-	No destruction, Recovery Impact	Not possible to detect	Positive
5	n.s.	+	No destruction, Worsening Impact	Not possible to detect	Negative
6	n.s.	n.s.	No Impact	Not possible to detect	No effect
Panel B: National Surveys (2005-2014)					

Table 1. Summary of possible interpretation of the dynamic impact of Earthquake for a non-desirable variable

	β_D	β_{R1}	β_{R2}	Interpretation	Trend in recovery/worsening?	Long-run
1	+	-	-	Destruction Impact, Increasing recovery	Accelerating	Not clear, depends on magnitude
2	+	n.s.	-	Destruction Impact, Recovering	Only one observation Starting late	Not clear, depends on magnitude
3	+	-	n.s.	Destruction Impact, Recovering	Only one observation Starting early	Not clear, depends on magnitude
4	+	-	+	Destruction Impact, Decreasing recovery	Decelerating	Not clear, depends on magnitude
5	+	+	+	Destruction Impact, Increasing Worsening	Accelerating	Negative
6	+	n.s.	+	Destruction Impact, Worsening	Only one observation Starting late	Negative
7	+	+	n.s.	Destruction Impact, Worsening	Only one observation Starting early	Negative
8	+	+	-	Destruction Impact, Decreasing worsening	Decelerating	Not clear, depends on magnitude
9	+	n.s.	n.s.	Destruction Impact, no recovery nor worsening	Does not apply	Negative
10	n.s.	-	-	No destruction, Increasing recovery	Accelerating	Positive
11	n.s.	n.s.	-	No destruction, Recovering	Only one observation Starting late	Positive
12	n.s.	-	n.s.	No destruction, Recovering	Only one observation Starting early	Positive
13	n.s.	-	+	No destruction, Decreasing recovery	Decelerating	Not clear, depends on magnitude
14	n.s.	+	+	No destruction, worsening with time	Accelerating	Negative
15	n.s.	n.s.	+	No destruction, worsening with time	Only one observation Starting late	Negative
16	n.s.	+	n.s.	No destruction, worsening with time	Only one observation Starting early	Negative
17	n.s.	+	-	No destruction, Decreasing worsening	Decelerating	Not clear, depends on magnitude

Table 1. Summary of possible interpretation of the dynamic impact of Earthquake for a non-desirable variable

18	n.s.	n.s.	n.s.	No Impact	Does not apply	Does not apply

We present Survey-level estimation possible in panel B. The interpretation is pretty similar to panel A, with the difference in the interpretation in the trend of the recovery or worsening. More specifically, β_{R2} is the latter period of time of the recovery time, it means that when it shares the sign of β_{R1} is reinforcing the recovery or worsening impact on time.

Expanding the example given for panel A, the most probable scenarios are 1 and 4. The first is a fast recovering impact, meaning that the observed recovery is more concentrated in the latest years of analysis, and scenario 4 means that the recovery is decelerating its speed. In both cases we can talk about a recovery, but what is different is the trend of it. Similarly as the case of scenario 1 in panel A, we cannot tell, only with the signs, what will be the probable impact in the long-run, it will depend on the magnitude of the three coefficients: β_D, β_{R1} and β_{R2}.

As can be inferred from the lines above, the shape of the impact can vary in many ways, and it is necessary high detail data in order to be able to detect and interpret correctly most of the coefficients. Therefore, our combination of sources of data is a great advantage since most of the cases is not possible to have both high detailed data of surveys and large sample sizes of censuses for the same periods of time. Reading the results of Panel A and B, simultaneously will give us high confidence on the results when they present similar estimates.

Finally, is worth mentioning that each of these regressions will be analyzed in three different specifications. The first one will be the “pure” DD analysis, not including any control variable in the regression. The second include fixed effects for provinces and the third includes socioeconomic controls at household level (Household head characteristics such as education, age, insurance tenancy, i.e.).

Result Variables

In Table A.1, we present the list of result variables included in the analysis. This can be categorized in five main groups: Quality of housing, Household Head perceptions, education and vulnerable member’s health.

We consider that although there are multiple outcomes that could be affected directly or indirectly by the Earthquake occurrence, this are the main causal mechanism or impact. Since it is expect a strong negative impact in housing quality and in public services provision (sewerage, drinking water, electricity, health and education).

IV. Results

Our results are in Tables A2 and A3, in the Annex. Due to the vast quantity of estimates and coefficients in this section, we would summarize principal findings in the following sub-sections:

- Poverty and household expenditure
- Household head perceptions on wellbeing,
- Quality of housing and public services, and
- Education and health

In the following lines we will be making continuous reference to the afore mentioned tables but for simplicity in the narrative we will focus on results from the column (3) in that tables, and with more emphasis on the results for the sample below 70 km distance from the quake, since it is our most reliable estimate.

Poverty and household expenditure

We find that the Pisco earthquake reduce both gross and monetary per capita expenditure on small magnitude, being the estimated negative impact of around 2 per cent. Also, we find a positive impact on poverty, but not statically significant.

Therefore, we do not find an important negative impact of the earthquake on consumption and poverty, but we cannot find any recovery trend. In order to analyze the potential reasons behind is important to analyze that the main channels of impact of the earthquake, which are housing quality and provision of public services, not employment nor economic growth. This will be argue in the following lines.

Household head perceptions on wellbeing

a. *Destruction Impacts*

We find strong evidence of negative impacts of the quakes on subjective wellbeing. Affected household's heads increase in 12-16 pp. the percentage that consider that their family is worse-off than the year before as a consequence of the quake and there is also an increase of 6-9 pp. in the percentage that consider that the community is worse off.

Between the group that affirms being worse, there is an increase of 15-25 pp. on the percentage that affirm that the reason for this is the recently occurrence of a natural disaster (no impacts found for a loss of a job or diseases). Additionally, the ones affected also increase in 18-20 pp. the percentage that affirm that a recent negative shock (i.e. natural disaster) affected them on the amount of goods in the house, and an increase of 21-32 pp. in the percentage affirming that negatively affected them on both goods possession and earnings/income. Conversely, there is a reduction on the percentage that is negatively affected by the latest negative shock only on income. Which confirms our hypothesis that the main mechanism of impact is housing.

Intriguingly, we found that the household where the HH affirm that has been an economic improvement with respect to the year before, there is an increase on 9 pp. on the percentage that say that is because of donations. Is intriguing, since is not clear to be a consequence of the quake or only a consequence of badly focalized social assistance. In addition, we found an increase on trust on governmental institutions of 11 pp.

b. Recovery Impacts

Most of the earthquake impacts tend to disappear in time. The reasons behind can be explained mainly on earnings/income. For instance, in the years following the quake, we found an increase on the percentage of household’s head that affirm that their family situation is better off than 12 years before. Moreover, when analyzing the reasons behind the improvement, we find an increase of 11 pp. on the percentage that affirm income increase is the main reason, but this is not statistically significant.

<u>Quality of Housing and Public Services</u>

a. Destruction Impacts

The most robust impacts found in this study are mainly related to housing quality. In specific, we find a short run impact of 8 to 12 percentage points in overcrowding indicator on the house (having more than 3.4 persons per bedroom in the house). Similarly, the ratio of persons over rooms was also affected with an increase in the short run of between 0.4 and 0.6.

Analyzing the components of this indicator by separate, we find that there is not an important impact on the number of persons in the house, but there is a significant reduction of 0.5 rooms in average for the treated. If we take in consideration that control mean is 3 rooms per house, the relative impact in the short run is a destruction of about 20% of rooms in affected houses.

Even more interestingly, we find a significant positive impact on the percentage of houses that are makeshift, of about 8 to 12 percentage points, that, considering that in that the control mean is close to zero; can be interpret as the impact of the earthquake on the destruction of houses.

These impacts are related to quantitative impacts on the stock of houses or rooms to live in the affected areas, nevertheless, is important to consider also the qualitative impacts on remaining houses.

In that sense, we find virtually no impacts (or even opposite impacts) on the percentage of houses with wall or roof built with different material than cement, but we do find significant impacts on the percentage of houses built with bad quality material such as mat or wood (bad or very bad quality). In specific, we estimate that affected households that were built with cement material were almost no affected, but the ones built with lower quality material were substituted with worse-off material houses, creating an increase on the share of these houses of around 15 to 20 percentage points while not affecting the share of cement built houses. Accordingly, there is also a smaller but statistically significant impact on the share of houses with dirt floor of 9 percentage points.

We find virtually no impacts on public services access such as sewerage, water, electricity or telecommunications (again, we even find counterintuitive impacts). We argue that this could be partially explained in a fast reaction of state on this matter, nevertheless this is still a working hypothesis.

b. Recovery Impacts

In terms of quantitative measurement of housing, we can say that there has been a slow process of recovery from the earthquake. More specifically, in the last period (2013 for census and 2011-2014 for survey) we still find that there is an increase on 0.25 rooms, and have a reduction on the ratio of persons over rooms of about 0.25, in both indicators, this recovery is not enough to compensate for the destruction. In terms of the overcrowding indicator, we don’t find a recovery evidence.

This is not the same situation in the case of qualitative measurement of housing, since there has been a robust reduction on the share of house’s walls and ceiling built with materials different from cement compared to the control group (about 10 and 5 percentage points, respectively). At the same time, we see a reduction on houses with dirt floor of about 11 to 15 percentage. Meaning that in these indicators recovery has been largely superior to destruction effect.

It is important to remark that this means not only recovering from the destruction of the earthquake, but also surpassing the control group (i.e., not affected households). Therefore generating a positive “net” gain from the earthquake.

This, nevertheless, is not the whole picture, since we still maintain the impact of the earthquake on the share of walls of bad material and roofs of bad material. We find that 6 years later to the event, affected households are still, in average, worse off to the control group in terms share with bad quality construction material (i.e. only 3 to 12 percentage points of recovery in walls of bad quality and 6 percentage points in ceilings of bad quality).

Therefore, we find that in 2013 affected areas have, at the same time, a bigger share of houses of cement from the control group and a bigger share of bad quality material houses than the control group. One plausible explanation is that middle quality houses are being replaced with new better quality houses, but this cannot be afforded by a group that maintain their low quality houses, not being able even to get a middle quality one.

This hypothesis is also consequent with the lack of recovery on the share of house that are makeshift (now is only a recovery of 6 to 8 pp.)

Again, in the case of public services of electricity, water, sewerage and ICTs, we do not find any statistically significant impact. As we mentioned above, this can be expected since public infrastructure is harder to be affected than houses, and in the short run, is more eagerly attended due its relative easiness to solve from the central government.

Education and Health

We have not find robust impacts on education and health outcomes, only on vaccination and on presence of chronic diseases on children. More specifically:

- An increase of 5 pp. on the presence of chronic diseases on children,
- A reduction on children vaccination of 18 to 22 pp.,
- A reduction on Women vaccination of 5 to 6 pp.,
- A reduction on Elderly vaccination of 7 to 9 pp.,
- Reduction of children under medical treatment of 15 pp.,

Most of these impacts disappeared in the the following periods. Therefore, with this evidence is possible to argue that the earthquake did had an effect on human capital formation but the evidence is still not enough to be certain about it. One alternative hypothesis is that the effect do exist, but it is not equally distributed between the affected households, and therefore is harder to be found.

V. Conclusions

We find strong evidence on short-run negative impacts of the Pisco Earthquake on quality of housing. Both in increasing the quantitative deficit (reduction of average number of rooms, increase in overcrowding) but also there is an increase in the qualitative deficit (increase of makeshift dwellings, walls and roofs of bad quality material and presence of dirt floor in the household). Remarkably, impacts look to have focused on the poorer households.

We also find that there was virtually no impacts on earnings/income, poverty, public services provision, education or health (except with few outcomes). Our principal hypothesis is that particular conditions of the affected area (high levels of employment and accelerated economic growth) and potential fast reaction (and focalized) of central state on public services are the main reasons behind the lack of findings on these outcomes.

Nevertheless, we do find impacts on household's heads perceptions that quality of life for their families and communities did get worse. In addition, they affirm that the negative impact was throw the loss of actives but not due to income losses. Which support our hypothesis that even with the quake, economic conditions in the affected area continue to be positive and, therefore, this mitigated the potential negative impacts of the disaster.

In the medium run, we can see evidence of a recovery effect, but this has not been yet able to reestablish treated areas to prior earthquake situation in housing. We still see a lower number of rooms per household and higher rates of overcrowding compared to pre-disaster status.

}It is interesting to remark that at the same time we observe and increase in the amount of good-quality housing, where we did not see a negative impact but we do see a recovery effect. In othe words, after the earthquake we see an increasing improvement in some indicators over control groups.

We interpret these evidence as a signal that recovery trends can be unequal since we still see higher rates of households living in bad quality houses, but at the same time, the locality has better housing conditions than control areas, showing a growing social inequality.

We consider our study to be contributing with a growing literature that analyze not only the long-run effects of earthquakes, but also how they are shaped in the short and medium run, particularly, we consider that the combined use of census and household data is useful to overcome the usual limitations when trying to estimate these impacts.

Our case study is particularly interesting one since it was a fast-growing region with low unemployment and poverty rates, which maintain its position as a leading region in the country. We believe that this positive conditions may have created the idea that the negative impact of the disaster was not enormous (since it wasn't an increase nor in unemployment nor in poverty), but might have underestimate the impact on housing deficit (quantitatively and qualitatively), which in turn might have long-run consequences on children development.

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VII. Annexes

Figure 1. Housing quality measurements, before and after the Earthquake, 2005-2013

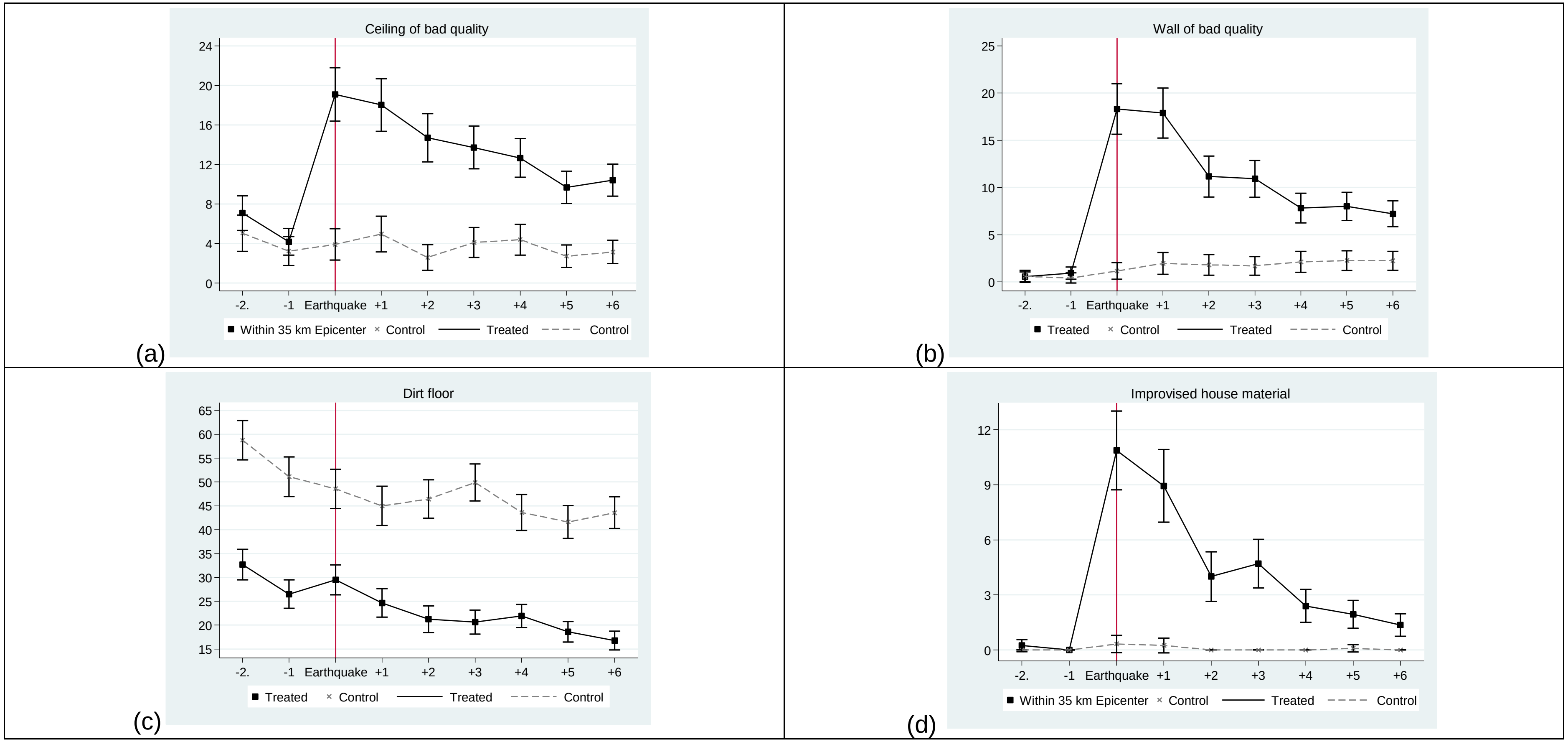

Figure 2. Housing quality measurements, before and after the Earthquake, 2005-2013

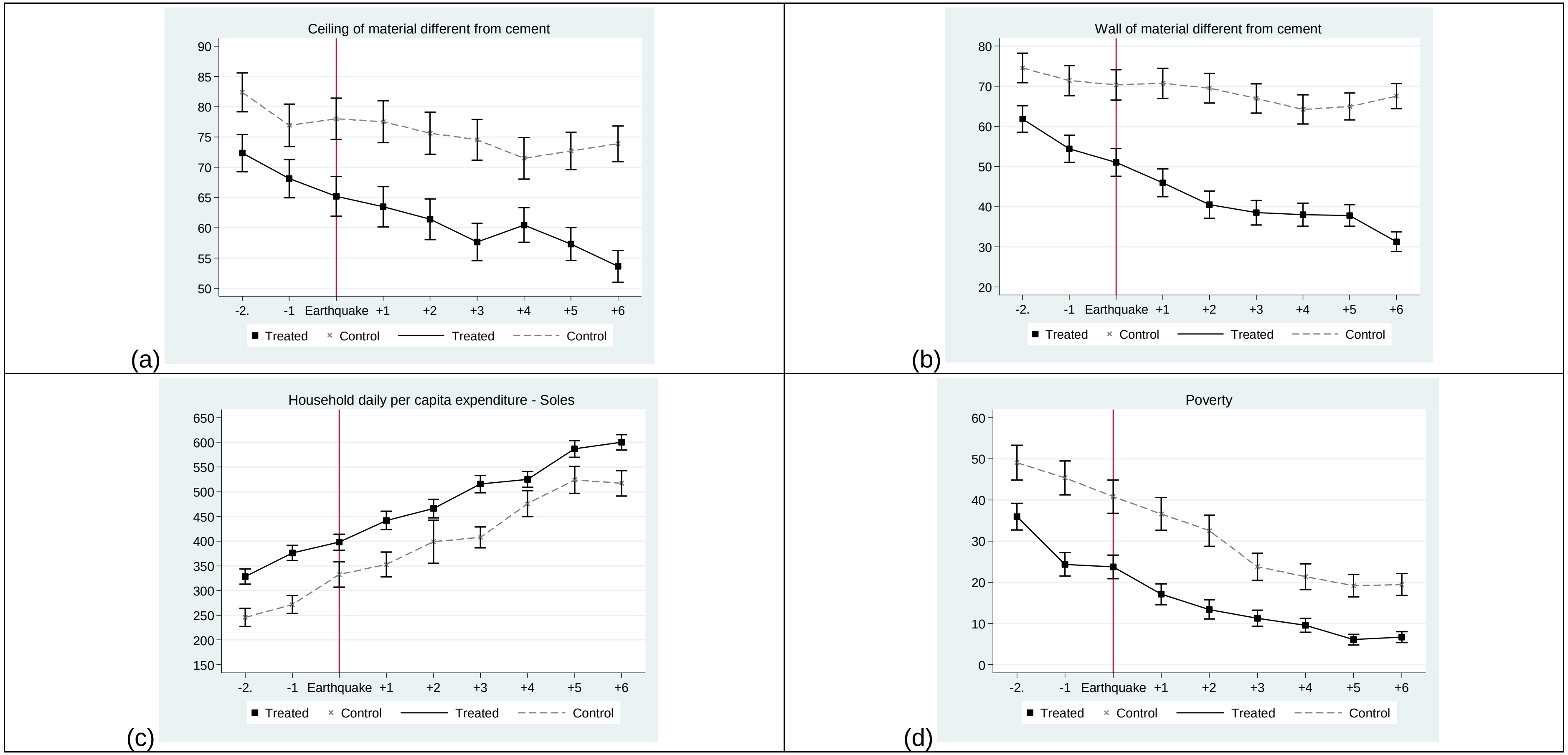

Figure 3. Peru's seismic history: (a) before (1900-2007), and (b) after (2007-2015) the 2007 Pisco Earthquake

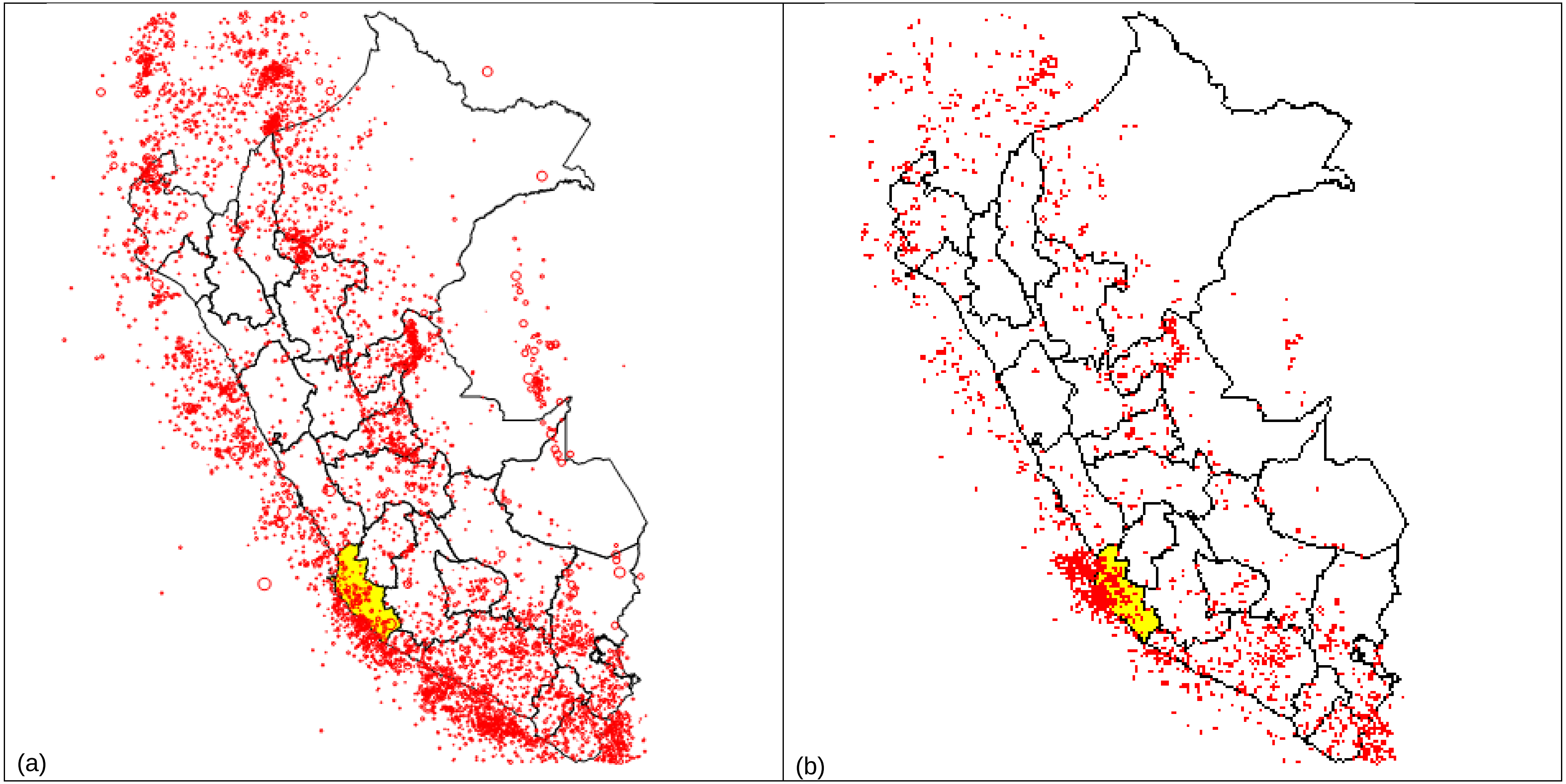

Figure 4. Definition of treatment and control, based on the distance to the Pisco Earthquake and its main aftershocks' epicenters

Table A1. List of Result Variables by its availability on surveys or censuses

Variable	Definition	Available in	
		National Surveys (2005-2013)	**Censuses (2005, 2007, and 2013)**
Quality of Housing and Public Services in the household			
Access to medium quality sewerage	Dummy variable that takes the value of 1 if the household has a drain connected to public system at dwelling, 0 otherwise.	Yes	Yes
Access to low quality sewerage	Dummy variable that takes the value of 1 if the household only uses cesspool or latrine, 0 otherwise.		
Access to medium quality water service	Dummy variable that takes the value of 1 if the household has access to piped water from public system at dwelling, 0 otherwise.	Yes	Yes
Access to low quality water service	Dummy variable that takes the value of 1 if the household has access only to river water, well or cistern, 0 otherwise.		
ICT on the household	ICT in the home Dummy variable that takes the value of 1 if the household has any ICT at home, 0 otherwise.	Yes	Yes
Electricity in the household	Electricity in the home Dummy variable that takes the value of 1 if the household has electricity at home, 0 otherwise.	Yes	Yes
People on the house	Continuous variables of the sum of people on the house.	Yes	Yes
Number of rooms in the house	Continuous variables of the sum of bedrooms in the house.	Yes	No
Number of bedrooms in the house	Continuous variables of the sum of bedrooms in the house.	Yes	Yes
Ratio of people on number of bedrooms	A continuous variable that capture the ratio of people on bedrooms.	Yes	Yes
Overcrowding in the household	Dummy variable that takes the value of 1 if the household is overcrowded (if the ratio of people on number of bedrooms is bigger that 3.4), 0 otherwise.	Yes	Yes
Rental housing	Dummy variable that takes the value of 1 if the house where they are living its rented, 0 otherwise.	Yes	No
Ownership of housing	Dummy variable that takes the value of 1 if the house they are living in its own, 0 otherwise.	Yes	No
Makeshift dwelling	Dummy variable that takes the value of 1 if the house they is from improvised material, 0 otherwise.	Yes	Yes
Proper housing material	Dichotomous variable that takes the value of 1 if the household has adequate material floor, walls and roof of the house, 0 otherwise.	Yes	Yes
Wall of different material from cement	Dichotomous variable that takes the value of 1 if the household has a material of the external wall different from cement, 0 otherwise.	Yes	Yes

Table A1. List of Result Variables by its availability on surveys or censuses			
		Available in	
Variable	**Definition**	**National Surveys (2005-2013)**	**Censuses (2005, 2007, and 2013)**
Wall of material of bad material (wood or worst)	Dichotomous variable that takes the value of 1 at the household if the external wall material if wood or worst, 0 otherwise.	Yes	Yes
Ceiling of different material from cement	Dichotomous variable that takes the value of 1 if the household has a material of the roof different from cement, 0 otherwise.	Yes	Yes
Ceiling of material of bad material (wood or worst)	Dichotomous variable that takes the value of 1 at the household if the roof material if wood or worst, 0 otherwise.	Yes	Yes
Logarithm of the number of houses in the locality	Continuous variable of the logarithm of the number of houses in the locality.	No	Yes
	Poverty and household expenditure		
Logarithm of per capita household expenditure (gross)	Continuous variable of the logarithm of household per capita gross expenditure.	Yes	No
Logarithm of per capita household expenditure (monetary)	Continuous variable of the logarithm of household per capita monetary expenditure.	Yes	No
Poverty	Dummy variable that takes the value of 1 if household is under poverty condition	Yes	No
	Household Head Perceptions on Wellbeing		
Enough earnings to save	Dichotomous variable that takes the value of 1 if the household head says that household earnings allows them to save money, 0 otherwise.	Yes	No
Negative change in wellbeing of household	Dichotomous variable that takes the value of 1 if the household head says that household is worse-off compared with 12 months earlier, 0 otherwise.	Yes	No
Negative change in wellbeing of the community	Dichotomous variable that takes the value of 1 if the household head says that community is worse-off compared with 12 months earlier, 0 otherwise.	Yes	No
If there was an improvement, it was because of more employment	Dichotomous variable that takes the value of 1 if the household head says that household is better-off compared with 12 months earlier and that was caused by an increase in employment, 0 otherwise.	Yes	No

Table A1. List of Result Variables by its availability on surveys or censuses			
		Available in	
Variable	**Definition**	**National Surveys (2005-2013)**	**Censuses (2005, 2007, and 2013)**
If there was an improvement, it was because of better earnings	Dichotomous variable that takes the value of 1 if the household head says that household is better-off compared with 12 months earlier and that was caused by an increase in earnings, 0 otherwise.	Yes	No
If there was an worsening, it was because of a new disease in the household	Dichotomous variable that takes the value of 1 if the household head says that household is worse-off compared with 12 months earlier and that was caused by an the occurrence of a disease in the household, 0 otherwise.	Yes	No
If there was an worsening, it was because of a natural disaster	Dichotomous variable that takes the value of 1 if the household head says that household is worse-off compared with 12 months earlier and that was caused by the occurrence of a natural disaster, 0 otherwise.	Yes	No
If there was an worsening, it was because of the loss of jobin the household	Dichotomous variable that takes the value of 1 if the household head says that household is worse-off compared with 12 months earlier and that was caused by the loss of job of a member of the household, 0 otherwise.	Yes	No
If there was an worsening, it was because other causes	Dichotomous variable that takes the value of 1 if the household head says that household is worse-off compared with 12 months earlier and that was caused by other causes different from diseases, natural disasters or loss of jobs, 0 otherwise.	Yes	No
Fall on earnings in last year	Dichotomous variable that takes the value of 1 if the household head considers that there has been a fall on household earning in the last 12 months, 0 otherwise.	Yes	No
Fall on goods possesion in last year	Dichotomous variable that takes the value of 1 if the household head considers that there has been a fall on household earning in the last 12 months, 0 otherwise.	Yes	No
Fall on earnings and goods possesion in last year	Dichotomous variable that takes the value of 1 if the household head considers that there has been a fall on the quantity of goods in the household in the last 12 months, 0 otherwise.	Yes	No
Trust in government institutions	Dichotomous variable that takes the value of 1 if the household head trust in governmental institutions, 0 otherwise.	Yes	No
Children and Adolescent Education			

Table A1. List of Result Variables by its availability on surveys or censuses			
		Available in	
Variable	**Definition**	**National Surveys (2005-2013)**	**Censuses (2005, 2007, and 2013)**
School Enrollment	Dummy variable that takes the value of 1 if the children or adolescent is currently enrolled in school that year, 0 otherwise.	Yes	No
School Attendance	Dummy variable that takes the value of 1 if the children or adolescent is currently attending in school that year, 0 otherwise.	Yes	No
School delay	Dummy variable that takes the value of 1 if the children or adolescent is currently delayed from his adequate school grade, 0 otherwise.	Yes	No
School approval	Dummy variable that takes the value of 1 if the children or adolescent approved last year, 0 otherwise.	Yes	No
Educational achievement	Continuous variable for school years of children or adolescent.	Yes	No
Logarithm of Educational expenditure	Continuous variable of the logarithm of household educational expenditure.	Yes	No
Vulnerable Groups Health (Children, Elderly and Women)			
Chronic diseases	Dummy variable that takes the value of 1 if the individual has a chronic discomfort or disease (such as arthritis, hypertension, asthma, rheumatism, diabetes, tuberculosis, HIV, cholesterol, etc.)	Yes	No
Relapse on chronic diseases	Dummy variable that takes the value of 1 if the individual had a relapse of a chronic disease.	Yes	No
Vaccination	Dummy variable that takes the value of 1 if the individual received any kind of vaccine.	Yes	No
Symptom or discomfort	Dummy variable that takes the value of 1 if the individual had a symptom or discomfort (cough, headache, fever, nausea) in the past month.	Yes	No
Receive some medical control	Dummy variable that takes the value of 1 if the individual received some kind of medical supervision.	Yes	No
Attended the health center if the child was sick	Dummy variable that takes the value of 1 if a mother took her child to a health center if the child was sick	Yes	No
Got medical treatment	Dummy variable that takes the value of 1 if the individual received treatment itself was ill and went to a health center	Yes	No

Elaboration: Own

Note: For Censuses analysis we would use averages in the locality.

Table A2. Results for Censuses Analysis for 2007 (short-term or destruction effect) and 2013 (medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
Access to medium quality sewerage	C07*T	β	42.80***	-1.01	-1.8	-2.49**	39.39***	-4.34	-3.77	-3.27
		σ	-0.25	-1.72	-1.37	-1.07	-1.55	-2.81	-2.61	-2.25
	C13*T	β		3.32**	3.55***	3.21***		3.51	2.25	2.26
		σ		-1.41	-1.12	-0.88		-2.38	-2.22	-1.91
Access to low quality sewerage	C07*T	β	54.32***	1.54	2.26	2.89	56.42***	5.77	5.31	4.81
		σ	(1.92)	(7.08)	(6.47)	(5.33)	(9.75)	(14.82)	(11.02)	(7.57)
	C13*T	β		-3.24	-4.11	-4.43		-3.55	-2.27	-1.71
		σ		(6.04)	(5.46)	(4.40)		(12.16)	(8.95)	(5.89)
Access to medium quality water service inside the house	C07*T	β	55.89***	-0.89	-1.46	-1.88	62.12***	-1.29	-0.92	-0.80
		σ	(1.30)	(5.20)	(4.22)	(3.29)	(3.58)	(8.54)	(6.12)	(4.62)
	C13*T	β		-1.44	-0.70	-0.54		0.13	-0.16	-0.57
		σ		(4.65)	(3.70)	(2.87)		(7.75)	(5.89)	(4.80)
Access to medium quality water service outside the house	C07*T	β	7.65***	2.40**	2.49***	2.50***	9.48***	4.01**	4.09**	4.35***
		σ	(0.46)	(0.97)	(0.96)	(0.96)	(1.76)	(2.22)	(1.70)	(1.45)
	C13*T	β		0.93	0.63	0.67		-2.36	-2.65	-2.68
		σ		(0.79)	(0.84)	(0.84)		(3.06)	(2.49)	(2.20)
Access to low quality water service	C07*T	β	31.07***	-2.48	-1.95	-1.61	23.09***	-4.66	-5.10	-5.48
		σ	(1.14)	(4.70)	(3.60)	(2.82)	(3.76)	(8.60)	(6.03)	(4.25)
	C13*T	β		1.04	0.54	0.30		3.66	4.32	4.58

Table A2. Results for Censuses Analysis for 2007 (short-term or destruction effect) and 2013 (medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
		σ		(4.27)	(3.25)	(2.57)		(8.02)	(5.85)	(4.30)
Electricity in the household	C07*T	β	65.83***	-5.72	-6.24**	-6.59***	79.45***	-2.87	-2.67	-2.38
		σ	(1.40)	(3.64)	(2.96)	(2.08)	(3.56)	(6.12)	(4.39)	(2.96)
	C13*T	β		1.56	2.12	2.39		5.40	5.05	5.06**
		σ		(2.85)	(2.24)	(1.65)		(4.86)	(3.42)	(2.34)
Overcrowding in the household	C07*T	β	51.45***	11.94***	12.18***	12.38***	48.70***	7.40**	7.34***	7.46***
		σ	(0.81)	(1.90)	(1.83)	(1.51)	(1.85)	(3.01)	(2.36)	(2.19)
	C13*T	β		-4.43***	-5.10***	-5.11***		-0.29	-0.53	-0.47
		σ		(1.37)	(1.35)	(1.06)		(2.31)	(2.06)	(1.89)
Person per Household	C07*T	β	4.28***	0.01	0.01	0.01	4.16***	0.14	0.14	0.15
		σ	(0.01)	(0.06)	(0.05)	(0.06)	(0.06)	(0.17)	(0.12)	(0.11)
	C13*T	β		-0.15**	-0.07	-0.06		-0.29**	-0.28**	-0.23**
		σ		(0.06)	(0.05)	(0.06)		(0.16)	(0.12)	(0.11)
Ratio of people on number of bedrooms	C07*T	β	2.81***	0.57***	0.58***	0.58***	2.56***	0.57***	0.57***	0.58***
		σ	(0.03)	(0.08)	(0.07)	(0.05)	(0.05)	(0.09)	(0.09)	(0.06)
	C13*T	β		-0.18**	-0.19**	-0.18***		-0.30***	-0.32***	-0.28***
		σ		(0.08)	(0.07)	(0.04)		(0.09)	(0.09)	(0.06)
Number of rooms in the house	C07*T	β	3.02***	-0.55***	-0.56***	-0.57***	3.22***	-0.63***	-0.63***	-0.64***
		σ	(0.03)	(0.13)	(0.13)	(0.10)	(0.05)	(0.16)	(0.14)	(0.12)
	C13*T	β		0.05	0.10	0.10		0.25	0.27**	0.25**

Table A2. Results for Censuses Analysis for 2007 (short-term or destruction effect) and 2013 (medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
		σ		(0.14)	(0.13)	(0.10)		(0.16)	(0.14)	(0.12)
Makeshift dwelling	C07*T	β	1.10***	9.01***	8.91***	8.89***	0.30***	8.56***	8.48***	8.46***
		σ	(0.23)	(1.57)	(1.38)	(1.37)	(0.11)	(1.56)	(1.37)	(1.36)
	C13*T	β		-6.27***	-6.31***	-6.29***		-6.32***	-6.38***	-6.31***
		σ		(1.76)	(1.28)	(1.27)		(1.76)	(1.28)	(1.26)
Proper housing material	C07*T	β	24.18***	-0.29	-0.80	-1.11	20.03***	-1.01	-0.52	-0.17
		σ	(1.63)	(6.73)	(4.89)	(4.16)	(4.93)	(9.40)	(6.54)	(4.63)
	C13*T	β		17.97***	19.30***	19.45***		18.25**	17.62***	17.34***
		σ		(6.13)	(4.25)	(3.54)		(8.88)	(6.28)	(4.48)
Wall of different material from cement	C07*T	β	67.36***	0.77	1.30	1.67	72.39***	4.13	3.57	3.15
		σ	(1.94)	(8.11)	(5.95)	(5.24)	(5.79)	(11.37)	(7.95)	(5.83)
	C13*T	β		-14.67**	-16.10***	-16.28***		-16.59**	-15.90**	-15.54***
		σ		(6.79)	(4.76)	(4.07)		(9.99)	(6.94)	(4.92)
Wall of material of bad material (wood or worst)	C07*T	β	11.50***	13.43***	13.47***	13.65***	2.11***	13.43***	13.24***	13.38***
		σ	(1.08)	(2.57)	(1.93)	(1.81)	(0.77)	(2.37)	(1.71)	(1.65)
	C13*T	β		-3.91	-2.86	-2.68**		-3.47	-3.35**	-2.88**
		σ		(3.27)	(1.91)	(1.59)		(3.21)	(1.69)	(1.56)
Dirt floor	C07*T	β	52.32***	7.43	7.99**	8.39**	57.85***	9.64	9.13	8.66
		σ	(1.63)	(5.57)	(4.29)	(3.45)	(7.16)	(11.38)	(8.64)	(5.56)
	C13*T	β		-8.94**	-10.57***	-10.85***		-12.34	-11.71	-11.21**

Table A2. Results for Censuses Analysis for 2007 (short-term or destruction effect) and 2013 (medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
		σ		(5.19)	(3.80)	(3.00)		(9.86)	(7.40)	(4.62)
Log Number of households in the location	C07*T	β	7.25***	0.17	0.12	0.08	6.96***	-0.08	-0.04	0.01
		σ	(0.18)	(0.63)	(0.51)	(0.45)	(0.63)	(1.09)	(0.72)	(0.49)
	C13*T	β		-0.07	0.08	0.12		0.51	0.37	0.36
		σ		(0.60)	(0.48)	(0.43)		(1.04)	(0.71)	(0.49)
N		C		130,108	130,108	130,108		3,571	3,571	3,571
		T		1,936	1,936	1,936		1,936	1,936	1,936

Note 1: Impact estimation coefficients are presented in rows with “β”, standard deviation of the estimates are presented in rows with “σ”, it values are presented between parentheses and coefficients that are statistical significant include "*", "**" or "***" depending on the level of significance.

Note 2: * is for coefficients with 0.10 or less p-value, ** is for coefficients with 0.05 or less p-values, *** is for coefficients with 0.01 or less p-values.

Note 3: Treated sample are the localities that are below 35 km of distance from the epicenter of the main quake of August 15th or any of the 90 following aftershocks.

Note 4: Sample “Peru without Lima” includes all sample in the country excluding only the province of Lima, the capital metropolis; Sample “1K” includes only population within 35km around the earthquake

Note 5: Column (1) presents the coefficients estimated for Difference in Difference (DiD) estimates with no additional control variables included. Column (2) presents the coefficients estimated for Difference in Difference estimates including fixed effects at the province level (195, for the whole country). Column (3) presents the coefficients estimated for Difference in Difference estimates including fixed effects at the province level (195, for the whole country) and socio-demographic characteristics that are highly time-invariant. Column “Control Mean” presents the coefficient estimated for the constant in the regression presented in column (1).

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
Poverty and household expenditure										
Logarithm of per capita expenditure (Gross)	A0*T	β	1.99***	-0.02***	-0.02***	-0.02***	1.99***	-0.01	-0.01**	-0.02**
		σ	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
	A1*T	β		0.00	0.00	0.00		-0.01	0.00	0.00
		σ		(0.00)	(0.00)	(0.00)		(0.01)	(0.01)	(0.01)
	A2*T	β		0.00	0.00	0.00		-0.01**	0.00	0.00
		σ		(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.01)
Logarithm of per capita expenditure (Monetary)	A0*T	β	2.05***	-0.01***	-0.01***	-0.01***	2.04***	-0.01**	-0.01***	-0.02***
		σ	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
	A1*T	β		0.00	0.00	0.01**		-0.01**	-0.01	0.00
		σ		(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)
	A2*T	β		0.00	0.00	0.00**		-0.01**	0.00	0.00
		σ		(0.00)	(0.00)	(0.00)		(0.00)	(0.00)	(0.00)
Poverty	A0*T	β	49.43***	0.86	1.25	2.38	47.30***	-1.94	-0.46	1.42
		σ	(0.30)	(1.82)	(1.78)	(2.31)	(1.61)	(2.85)	(2.70)	(3.32)
	A1*T	β		-1.11	-1.28	-3.82**		2.67	1.63	-1.07
		σ		(1.57)	(1.55)	(2.07)		(2.56)	(2.43)	(3.09)
	A2*T	β		0.84	0.65	1.49		3.04	0.69	2.73
		σ		(1.18)	(1.15)	(1.61)		(1.97)	(1.89)	(2.48)

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
Household Head Perceptions on Wellbeing										
Enough earnings to save	A0*T	β	93.55***	0.32	0.18	0.36	96.13***	3.98**	4.13***	3.53**
		σ	(0.15)	(1.05)	(1.05)	(1.17)	(0.60)	(1.56)	(1.57)	(1.72)
	A1*T	β		0.32	0.26	0.75		-1.27	-1.45	-0.37
		σ		(1.10)	(1.10)	(1.22)		(1.74)	(1.73)	(1.91)
	A2*T	β		-1.05	-0.72	-1.96		-1.70	-1.59	-2.31
		σ		(1.21)	(1.15)	(1.41)		(1.65)	(1.63)	(1.93)
Negative change in wellbeing of household	A0*T	β	15.30***	15.47***	15.47***	15.96***	13.64***	11.68***	11.60***	12.13***
		σ	(0.23)	(1.60)	(1.60)	(2.06)	(1.08)	(2.36)	(2.35)	(2.87)
	A1*T	β		-9.08***	-9.07***	-11.09***		-5.75**	-5.66**	-8.39***
		σ		(1.64)	(1.64)	(2.07)		(2.35)	(2.35)	(2.86)
	A2*T	β		-4.26***	-4.27***	-4.24***		-5.22***	-5.22***	-4.85**
		σ		(1.03)	(1.04)	(1.30)		(1.59)	(1.58)	(1.97)
Negative change in wellbeing of the community	A0*T	β	22.32***	8.19***	7.99***	8.92***	22.14***	4.93**	4.36	5.50**
		σ	(0.26)	(1.92)	(1.92)	(2.35)	(1.35)	(2.76)	(2.75)	(3.31)
	A1*T	β		-6.86***	-6.87***	-7.75***		-0.83	-0.80	-2.82
		σ		(1.84)	(1.84)	(2.30)		(2.58)	(2.58)	(3.16)
	A2*T	β		-5.26***	-5.18***	-4.44**		-7.97***	-7.65***	-5.10**
		σ		(1.41)	(1.39)	(1.82)		(1.95)	(1.92)	(2.44)
	A0*T	β	27.69***	-12.68**	-12.15**	-19.70***	35.90***	-4.00	-3.92	-0.48

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
If there was an improvement, it was because of more employment		σ	(0.84)	(5.74)	(5.76)	(6.95)	(5.84)	(9.17)	(9.21)	(11.74)
	A1*T	β		-12.49**	-12.46**	-6.45		-17.28**	-16.96**	-10.20
		σ		(4.87)	(4.86)	(5.91)		(7.46)	(7.46)	(9.24)
	A2*T	β		-2.41	-2.21	-1.39		1.18	2.52	0.04
		σ		(4.09)	(3.80)	(5.09)		(6.14)	(5.93)	(7.84)
If there was an improvement, it was because of better earnings	A0*T	β	62.31***	16.64***	16.13***	20.17***	53.85***	3.61	2.69	-8.30
		σ	(0.92)	(5.67)	(5.72)	(6.69)	(6.11)	(9.47)	(9.53)	(11.88)
	A1*T	β		8.12	8.12	0.52		13.85**	13.09**	11.30
		σ		(4.99)	(5.01)	(5.98)		(7.86)	(7.84)	(9.64)
	A2*T	β		4.08	3.62	3.62		2.78	2.19	1.21
		σ		(4.25)	(4.01)	(5.33)		(6.49)	(6.27)	(8.16)
If there was an improvement, it was because of donations	A0*T	β	7.26***	-1.30	-1.10	1.93	7.65**	0.93	2.39	9.13**
		σ	(0.51)	(2.17)	(2.15)	(2.16)	(3.04)	(4.47)	(4.58)	(5.41)
	A1*T	β		3.56**	3.37**	4.53**		3.16	3.22	-1.38
		σ		(1.90)	(1.90)	(2.14)		(3.42)	(3.39)	(4.06)
	A2*T	β		-2.13	-1.15	-1.10		-1.54	-2.02	0.83
		σ		(1.52)	(1.53)	(1.82)		(2.33)	(2.25)	(2.94)
If there was an worsening, it was because of a new	A0*T	β	2.56***	-1.47	-1.38	-1.66	1.96***	-0.32	-0.18	-0.96
		σ	(0.10)	(0.90)	(0.90)	(1.13)	(0.41)	(1.30)	(1.31)	(1.63)
	A1*T	β		1.60	1.60	1.93		-1.73	-1.70	-1.40

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
disease in the household		σ		(1.12)	(1.12)	(1.42)		(1.69)	(1.69)	(2.10)
	A2*T	β		-2.67***	-2.81***	-2.75**		-1.27	-1.43	-1.74
		σ		(1.00)	(0.99)	(1.32)		(1.54)	(1.53)	(1.98)
If there was an worsening, it was because of a natural disaster	A0*T	β	2.57***	24.61***	24.49***	25.17***	5.78***	15.44***	16.34***	14.65***
		σ	(0.08)	(1.40)	(1.39)	(1.75)	(0.71)	(2.05)	(2.01)	(2.51)
	A1*T	β		-31.17***	-31.36***	-32.87***		-27.61***	-28.47***	-29.31***
		σ		(1.42)	(1.40)	(1.77)		(2.24)	(2.12)	(2.64)
	A2*T	β		-1.44***	-0.82**	-1.02**		5.80***	5.20***	5.78***
		σ		(0.41)	(0.38)	(0.53)		(1.36)	(1.23)	(1.57)
If there was an worsening, it was because of the loss of job in the household	A0*T	β	3.42***	-0.92	-0.75	0.04	2.55***	-2.20**	-2.01	-1.58
		σ	(0.11)	(0.79)	(0.80)	(1.01)	(0.50)	(1.23)	(1.23)	(1.47)
	A1*T	β		-0.24	-0.24	-1.43		-0.22	-0.08	-0.66
		σ		(0.76)	(0.76)	(0.97)		(1.31)	(1.31)	(1.58)
	A2*T	β		-0.33	-0.45	0.17		0.85	0.90	1.11
		σ		(0.59)	(0.59)	(0.70)		(1.01)	(1.01)	(1.19)
If there was an worsening, it was because of other causes	A0*T	β	25.93***	-12.73***	-12.66***	-11.92***	27.09***	-1.25	-1.62	2.72
		σ	(0.26)	(1.83)	(1.84)	(2.25)	(1.39)	(2.78)	(2.79)	(3.36)
	A1*T	β		24.98***	25.07***	26.95***		24.98***	25.41***	24.67***
		σ		(1.85)	(1.84)	(2.30)		(2.84)	(2.81)	(3.41)
	A2*T	β		5.22***	4.94***	3.88**		-5.56**	-5.34**	-6.19**

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
		σ		(1.38)	(1.36)	(1.80)		(2.27)	(2.22)	(2.78)
Fall on earnings in last year	A0*T	β	65.93***	-35.48***	-35.24***	-37.03***	57.69***	-39.81***	-42.05***	-45.90***
		σ	(0.60)	(3.72)	(3.62)	(4.16)	(2.99)	(5.25)	(4.85)	(5.37)
	A1*T	β		36.04***	37.05***	38.72***		32.91***	33.19***	35.46***
		σ		(3.33)	(3.26)	(4.11)		(4.57)	(4.46)	(5.29)
	A2*T	β		-4.71	-6.93**	-8.66**		3.79	1.63	0.12
		σ		(3.44)	(3.24)	(4.18)		(4.59)	(4.35)	(5.25)
Fall on goods possesion in last year	A0*T	β	16.72***	21.67***	19.98***	19.15***	9.90***	21.73***	19.82***	17.94***
		σ	(0.48)	(2.18)	(2.19)	(2.61)	(1.96)	(3.09)	(3.06)	(3.23)
	A1*T	β		-13.17***	-12.55***	-12.35***		-14.23***	-13.03***	-13.35***
		σ		(2.72)	(2.70)	(3.43)		(3.23)	(3.21)	(3.85)
	A2*T	β		2.99	4.11	4.24		-0.50	-0.05	1.77
		σ		(2.57)	(2.56)	(3.33)		(3.31)	(3.26)	(3.90)
Fall on earnings and goods possesion in last year	A0*T	β	12.50***	17.06***	19.03***	21.00***	29.61***	22.20***	27.23***	32.07***
		σ	(0.40)	(3.16)	(2.98)	(3.77)	(2.56)	(4.52)	(3.88)	(4.67)
	A1*T	β		-23.87***	-26.04***	-28.29***		-19.04***	-21.00***	-22.97***
		σ		(2.48)	(2.36)	(2.95)		(3.65)	(3.39)	(4.01)
	A2*T	β		-2.36	-1.20	0.39		-8.44***	-6.61**	-7.16**
		σ		(2.07)	(1.91)	(2.41)		(3.26)	(2.90)	(3.49)
	A0*T	β	37.91***	0.68	0.53	3.18	52.76***	9.95**	9.79**	11.07**

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
Trust in government institutions		σ	(0.52)	(2.88)	(2.89)	(3.46)	(2.79)	(4.28)	(4.28)	(5.02)
	A1*T	β		-2.15	-2.22	-2.61		2.40	2.17	1.15
		σ		(2.00)	(2.01)	(2.50)		(2.95)	(2.95)	(3.55)
	A2*T	β		-3.79**	-3.69**	-3.45		-6.81***	-7.10***	-7.08**
		σ		(1.77)	(1.73)	(2.22)		(2.58)	(2.55)	(3.15)
Quality of Housing and Public Services in the household										
Access to medium quality sewerage	A0*T	β	45.39***	5.67***	5.98***	6.06**	40.82***	5.38**	7.49***	9.15***
		σ	(0.31)	(2.06)	(2.06)	(2.47)	(1.58)	(3.03)	(2.87)	(3.33)
	A1*T	β		4.27**	4.30**	5.12**		0.24	2.14	3.56
		σ		(1.92)	(1.93)	(2.43)		(2.91)	(2.73)	(3.25)
	A2*T	β		-1.95	-1.46	-1.68		-4.17**	-1.82	-1.53
		σ		(1.63)	(1.57)	(2.07)		(2.48)	(2.29)	(2.85)
Access to low quality sewerage	A0*T	β	38.90***	-1.53	-1.43	-1.30	44.39***	1.53	-0.13	-1.03
		σ	(0.29)	(1.96)	(1.93)	(2.42)	(1.60)	(2.95)	(2.76)	(3.37)
	A1*T	β		-3.35**	-3.34**	-4.63**		2.61	1.43	0.75
		σ		(1.71)	(1.73)	(2.23)		(2.65)	(2.54)	(3.18)
	A2*T	β		0.99	0.10	-0.19		2.93	1.34	1.80
		σ		(1.31)	(1.31)	(1.77)		(2.07)	(2.01)	(2.59)
Access to medium quality water	A0*T	β	54.85***	0.69	0.71	-2.16	51.05***	5.68**	5.43**	2.78

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
service inside the house		σ	(0.30)	(1.74)	(1.67)	(2.14)	(1.61)	(2.84)	(2.71)	(3.30)
	A1*T	β		-2.27	-2.18	-1.63		-8.63***	-7.85***	-8.28**
		σ		(1.69)	(1.65)	(2.19)		(2.75)	(2.61)	(3.24)
	A2*T	β		-1.69	-1.18	-0.51		-2.27	-0.58	0.23
		σ		(1.37)	(1.35)	(1.79)		(2.27)	(2.19)	(2.75)
Access to medium quality water service outside the house	A0*T	β	6.09***	-0.49	-0.23	-0.27	15.46***	0.45	2.08	2.39
		σ	(0.15)	(0.49)	(0.49)	(0.63)	(1.16)	(1.74)	(1.69)	(1.93)
	A1*T	β		0.34	0.30	0.57		1.78	2.39	2.21
		σ		(0.62)	(0.60)	(0.78)		(1.73)	(1.69)	(1.94)
	A2*T	β		0.28	0.26	-0.22		-1.07	-1.66	-1.27
		σ		(0.51)	(0.51)	(0.67)		(1.44)	(1.42)	(1.67)
Access to low quality water service	A0*T	β	36.09***	-1.26	-1.67	1.16	29.44***	-8.50***	-10.18***	-7.63***
		σ	(0.29)	(1.64)	(1.59)	(2.08)	(1.44)	(2.60)	(2.32)	(2.95)
	A1*T	β		2.00	1.98	0.49		6.12**	4.82**	4.68
		σ		(1.58)	(1.56)	(2.12)		(2.48)	(2.18)	(2.85)
	A2*T	β		1.68	1.16	1.30		3.99**	2.84	1.84
		σ		(1.27)	(1.27)	(1.70)		(1.93)	(1.78)	(2.33)
ICT's in the household	A0*T	β	31.35***	1.60	1.79	3.57	27.46***	5.64**	6.07**	11.78***
		σ	(0.29)	(1.91)	(1.87)	(2.24)	(1.45)	(2.87)	(2.66)	(3.13)

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
	A1*T	β		-4.77***	-4.58***	-5.50***		-8.76***	-7.29***	-9.47***
		σ		(1.59)	(1.56)	(1.87)		(2.64)	(2.42)	(2.84)
	A2*T	β		-5.91***	-5.75***	-7.27***		-9.51***	-6.99***	-8.89***
		σ		(1.21)	(1.17)	(1.42)		(2.04)	(1.93)	(2.22)
Electricity in the household	A0*T	β	71.09***	-2.51**	-2.45**	-1.15	81.55***	-3.92**	-5.24***	-3.13
		σ	(0.26)	(1.18)	(1.15)	(1.53)	(1.27)	(1.91)	(1.83)	(2.32)
	A1*T	β		-2.21**	-2.10**	-2.51**		2.07	2.68**	3.78**
		σ		(0.98)	(0.97)	(1.22)		(1.47)	(1.40)	(1.80)
	A2*T	β		-3.59***	-4.06***	-5.66***		-0.72	-0.49	-1.58
		σ		(0.62)	(0.62)	(0.81)		(1.06)	(0.99)	(1.31)
Overcrowding in the household	A0*T	β	12.06***	5.18***	5.09***	8.51***	8.10***	4.71***	4.74***	7.99***
		σ	(0.19)	(1.20)	(1.20)	(1.58)	(0.81)	(1.65)	(1.65)	(2.15)
	A1*T	β		-1.35	-1.37	-2.08		-1.96	-2.08	-2.45
		σ		(1.28)	(1.27)	(1.73)		(1.68)	(1.67)	(2.24)
	A2*T	β		-0.57	-0.31	-1.62		-1.44	-1.44	-2.79
		σ		(1.01)	(1.00)	(1.39)		(1.37)	(1.35)	(1.85)
Person per Household	A0*T	β	4.16***	-0.01	0.01	0.11	3.84***	-0.16	-0.14	-0.02
		σ	(0.01)	(0.08)	(0.08)	(0.07)	(0.07)	(0.12)	(0.12)	(0.11)
	A1*T	β		0.00	0.00	-0.08		0.03	0.04	-0.03
		σ		(0.08)	(0.08)	(0.08)		(0.12)	(0.12)	(0.11)

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
	A2*T	β		0.05	0.03	0.05		0.05	0.04	-0.04
		σ		(0.07)	(0.07)	(0.07)		(0.11)	(0.11)	(0.10)
Ratio of people on number of bedrooms	A0*T	β	1.70***	0.32***	0.32***	0.47***	1.54***	0.28***	0.29***	0.44***
		σ	(0.01)	(0.05)	(0.05)	(0.06)	(0.04)	(0.07)	(0.07)	(0.08)
	A1*T	β		-0.15***	-0.15***	-0.23***		-0.15**	-0.15**	-0.23***
		σ		(0.05)	(0.05)	(0.06)		(0.07)	(0.07)	(0.08)
	A2*T	β		-0.02	-0.02	-0.06		0.01	0.01	-0.06
		σ		(0.03)	(0.03)	(0.04)		(0.05)	(0.05)	(0.06)
Number of rooms in the house	A0*T	β	3.22***	-0.38***	-0.37***	-0.46***	3.19***	-0.53***	-0.52***	-0.51***
		σ	(0.01)	(0.07)	(0.07)	(0.08)	(0.06)	(0.11)	(0.11)	(0.12)
	A1*T	β		0.12**	0.13**	0.20**		0.18	0.20**	0.19
		σ		(0.07)	(0.07)	(0.08)		(0.11)	(0.11)	(0.12)
	A2*T	β		0.09	0.08	0.13**		-0.05	-0.06	0.02
		σ		(0.06)	(0.06)	(0.07)		(0.09)	(0.09)	(0.11)
Number of bedrooms in the house	A0*T	β	1.73***	-0.28***	-0.27***	-0.30***	1.71***	-0.33***	-0.34***	-0.35***
		σ	(0.01)	(0.05)	(0.05)	(0.07)	(0.04)	(0.08)	(0.07)	(0.08)
	A1*T	β		0.15***	0.16***	0.18***		0.09	0.12	0.15**
		σ		(0.05)	(0.05)	(0.07)		(0.08)	(0.07)	(0.09)
	A2*T	β		0.01	-0.01	0.02		-0.08	-0.06	-0.03
		σ		(0.05)	(0.05)	(0.06)		(0.07)	(0.07)	(0.08)

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
Proper housing material	A0*T	β	21.26***	2.11	2.52	2.85	17.84***	1.35	2.38	3.80
		σ	(0.26)	(1.83)	(1.85)	(2.09)	(1.21)	(2.56)	(2.52)	(2.77)
	A1*T	β		3.90**	3.75**	3.83**		2.35	3.20	5.28**
		σ		(1.87)	(1.85)	(2.16)		(2.64)	(2.57)	(2.84)
	A2*T	β		2.06	2.69**	3.93**		-0.21	1.87	0.08
		σ		(1.70)	(1.59)	(1.96)		(2.39)	(2.27)	(2.63)
Wall of different material from cement	A0*T	β	67.28***	-6.56***	-7.25***	-7.50***	72.27***	-7.87***	-8.70***	-10.24***
		σ	(0.29)	(2.07)	(2.02)	(2.40)	(1.43)	(2.91)	(2.78)	(3.19)
	A1*T	β		-7.62***	-7.71***	-9.78***		-6.64**	-8.03***	-11.26***
		σ		(2.03)	(1.95)	(2.44)		(2.90)	(2.74)	(3.21)
	A2*T	β		-2.91	-3.20**	-3.24		-1.28	-4.61**	-3.05
		σ		(1.83)	(1.71)	(2.24)		(2.59)	(2.44)	(2.96)
Wall of material of bad material (wood or worst)	A0*T	β	6.97***	11.56***	10.96***	14.38***	0.54**	16.01***	15.30***	19.63***
		σ	(0.14)	(1.24)	(1.23)	(1.67)	(0.21)	(1.30)	(1.30)	(1.71)
	A1*T	β		-6.36***	-6.21***	-9.43***		-7.25***	-7.22***	-10.84***
		σ		(1.51)	(1.50)	(1.96)		(1.60)	(1.58)	(2.02)
	A2*T	β		-3.40***	-2.81***	-3.00**		-3.83***	-2.89***	-3.11**
		σ		(1.02)	(1.00)	(1.26)		(1.15)	(1.12)	(1.35)
Makeshift dwelling	A0*T	β	1.25***	10.39***	10.09***	12.22***	0.00***	9.30***	8.94***	11.35***
		σ	(0.08)	(1.01)	(0.99)	(1.35)	(0.00)	(1.02)	(1.00)	(1.34)

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
	A1*T	β		-5.39***	-5.39***	-7.53***		-5.25***	-5.26***	-7.62***
		σ		(1.19)	(1.18)	(1.55)		(1.20)	(1.19)	(1.54)
	A2*T	β		-2.34***	-2.01***	-1.85**		-2.52***	-2.18***	-2.14***
		σ		(0.69)	(0.68)	(0.82)		(0.69)	(0.68)	(0.82)
Ceiling of material different from cement	A0*T	β	77.30***	-2.31	-2.75	-3.43	79.03***	-3.65	-4.72**	-6.29**
		σ	(0.27)	(1.91)	(1.93)	(2.18)	(1.30)	(2.67)	(2.62)	(2.89)
	A1*T	β		-3.82**	-3.66**	-4.04**		-2.14	-3.02	-5.58**
		σ		(1.94)	(1.92)	(2.26)		(2.72)	(2.65)	(2.95)
	A2*T	β		-2.15	-2.96**	-3.84**		-0.08	-2.25	-0.39
		σ		(1.77)	(1.65)	(2.04)		(2.46)	(2.33)	(2.72)
Ceiling of bad material	A0*T	β	12.58***	14.71***	14.41***	17.31***	4.34***	12.53***	12.64***	15.16***
		σ	(0.19)	(1.41)	(1.40)	(1.92)	(0.57)	(1.62)	(1.59)	(2.13)
	A1*T	β		-2.82**	-2.74**	-5.00**		-3.29**	-3.30**	-5.71**
		σ		(1.58)	(1.57)	(2.08)		(1.75)	(1.72)	(2.27)
	A2*T	β		-1.34	-1.38	-0.39		-3.33**	-2.62**	-1.73
		σ		(1.38)	(1.31)	(1.80)		(1.56)	(1.48)	(1.99)
Dirt floor	A0*T	β	49.33***	2.07	2.25	3.73	56.00***	6.38**	6.91**	9.24***
		σ	(0.31)	(1.92)	(1.85)	(2.32)	(1.60)	(2.94)	(2.71)	(3.22)
	A1*T	β		-3.52**	-3.66**	-7.82***		-7.59***	-9.19***	-15.50***
		σ		(1.74)	(1.69)	(2.18)		(2.79)	(2.58)	(3.11)

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
	A2*T	β		0.19	-0.75	0.39		3.42	-0.46	1.09
		σ		(1.53)	(1.43)	(1.94)		(2.44)	(2.27)	(2.84)
Rental housing	A0*T	β	7.27***	-0.21	0.13	0.12	9.97***	1.94	2.56	1.56
		σ	(0.16)	(1.00)	(1.00)	(1.11)	(0.96)	(1.65)	(1.64)	(1.76)
	A1*T	β		-1.11	-1.14	-0.35		-0.84	-0.59	-0.16
		σ		(0.93)	(0.93)	(1.11)		(1.55)	(1.54)	(1.72)
	A2*T	β		0.52	0.39	-0.63		-1.67	-1.80	-2.47**
		σ		(0.74)	(0.74)	(0.90)		(1.31)	(1.29)	(1.48)
House ownership	A0*T	β	72.35***	3.84**	3.31**	2.53	70.02***	0.76	0.96	2.35
		σ	(0.28)	(1.94)	(1.94)	(2.24)	(1.47)	(2.83)	(2.82)	(3.15)
	A1*T	β		4.13**	4.08**	4.20**		9.14***	8.78***	6.10**
		σ		(1.86)	(1.85)	(2.22)		(2.77)	(2.75)	(3.11)
	A2*T	β		0.31	0.58	2.12		0.21	-0.46	0.84
		σ		(1.54)	(1.53)	(1.81)		(2.38)	(2.35)	(2.65)
Children and Adolescent Education										
Enrollment (6-13 years)	A0*T	β	75.63***	5.84	5.25	6.46**	70.49***	4.22	4.58	6.01
		σ	(0.52)	(3.57)	(3.49)	(3.57)	(2.67)	(4.64)	(4.43)	(4.55)
	A1*T	β		0.30	0.75	-0.56		-1.52	-0.49	-2.71
		σ		(1.87)	(1.81)	(1.82)		(2.65)	(2.53)	(2.54)
	A2*T	β		3.73**	3.00**	3.41**		-0.72	-0.25	0.45

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
		σ		(1.47)	(1.41)	(1.49)		(2.17)	(2.09)	(2.16)
Enrollment (14-18 years)	A0*T	β	52.85***	4.60	4.65	7.57	61.27***	9.07	9.36	6.04
		σ	(0.83)	(4.82)	(4.80)	(5.84)	(3.78)	(6.44)	(6.36)	(7.76)
	A1*T	β		-0.26	0.07	-7.83**		-1.15	-1.01	-6.54
		σ		(3.03)	(3.02)	(3.65)		(4.23)	(4.19)	(4.96)
	A2*T	β		-1.64	-2.32	-2.92		0.12	0.16	0.09
		σ		(2.65)	(2.57)	(3.38)		(3.78)	(3.74)	(4.64)
Attendance (6-13 years)	A0*T	β	66.49***	7.70**	7.02**	8.35**	63.77***	4.00	4.41	6.35
		σ	(0.59)	(3.75)	(3.65)	(3.76)	(2.85)	(4.88)	(4.59)	(4.72)
	A1*T	β		-0.62	-0.20	-1.73		0.30	1.21	-1.27
		σ		(2.06)	(2.00)	(2.02)		(2.86)	(2.71)	(2.73)
	A2*T	β		2.24	1.35	2.14		-2.44	-1.73	-0.74
		σ		(1.70)	(1.63)	(1.71)		(2.46)	(2.34)	(2.42)
Attendance (14-18 years)	A0*T	β	46.64***	1.77	1.79	4.60	52.03***	2.01	2.48	-1.50
		σ	(0.83)	(4.82)	(4.80)	(5.87)	(3.95)	(6.55)	(6.43)	(7.82)
	A1*T	β		-0.93	-0.66	-7.81**		-1.06	-0.65	-5.87
		σ		(3.12)	(3.11)	(3.77)		(4.35)	(4.30)	(5.09)
	A2*T	β		-0.89	-1.62	-2.05		2.04	2.14	3.69
		σ		(2.75)	(2.67)	(3.46)		(3.90)	(3.86)	(4.75)
School delay	A0*T	β	2.18***	-0.81	-0.70	-0.78	0.59**	-1.11	-1.03	-1.05

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
		σ	(0.17)	(0.59)	(0.59)	(0.63)	(0.35)	(0.83)	(0.83)	(0.88)
	A1*T	β		0.93**	0.88	0.86		1.08	1.05	0.98
		σ		(0.55)	(0.54)	(0.61)		(0.81)	(0.81)	(0.86)
	A2*T	β		-0.04	-0.01	-0.07		-0.49	-0.49	-0.62
		σ		(0.50)	(0.51)	(0.56)		(0.65)	(0.65)	(0.71)
School delay (14-18 years	A0*T	β	5.42***	0.30	0.61	0.14	4.91***	2.01	2.88	2.60
		σ	(0.35)	(1.13)	(1.12)	(1.48)	(1.55)	(2.06)	(2.02)	(2.50)
	A1*T	β		0.00	-0.09	0.28		-0.35	-0.65	-1.29
		σ		(0.99)	(0.99)	(1.39)		(1.54)	(1.52)	(2.05)
	A2*T	β		-0.55	-0.19	-0.64		0.15	0.63	0.50
		σ		(0.82)	(0.81)	(1.19)		(1.32)	(1.31)	(1.80)
School approval	A0*T	β	80.28***	0.36	0.15	0.07	84.40***	-0.72	-0.92	-2.49
		σ	(0.40)	(2.41)	(2.39)	(2.63)	(1.76)	(3.14)	(3.14)	(3.42)
	A1*T	β		-0.94	-1.11	-1.44		0.08	-0.24	-1.18
		σ		(1.67)	(1.67)	(1.89)		(2.26)	(2.25)	(2.47)
	A2*T	β		-0.11	-0.19	-0.37		2.51	2.24	3.80**
		σ		(1.49)	(1.48)	(1.72)		(2.07)	(2.06)	(2.30)
Educational achievement	A0*T	β	7.71***	-0.29	-0.32	-0.42**	8.43***	-0.21	-0.32	-0.34
		σ	(0.04)	(0.20)	(0.20)	(0.22)	(0.22)	(0.32)	(0.31)	(0.34)
	A1*T	β		0.05	0.02	0.15		0.32	0.34	0.48**

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
		σ		(0.14)	(0.14)	(0.15)		(0.22)	(0.21)	(0.23)
	A2*T	β		0.00	0.03	-0.10		-0.26	-0.10	-0.38**
		σ		(0.13)	(0.12)	(0.14)		(0.19)	(0.19)	(0.20)
Educational expenditure	A0*T	β	5.24***	-0.11**	-0.12**	-0.11**	5.46***	-0.09	-0.11	-0.08
		σ	(0.01)	(0.06)	(0.06)	(0.06)	(0.05)	(0.08)	(0.08)	(0.08)
	A1*T	β		-0.03	-0.03	0.01		-0.17***	-0.16***	-0.06
		σ		(0.04)	(0.04)	(0.04)		(0.06)	(0.06)	(0.06)
	A2*T	β		-0.06**	-0.06**	-0.03		-0.03	0.01	0.02
		σ		(0.04)	(0.04)	(0.04)		(0.05)	(0.05)	(0.06)
Vulnerable Groups Health (Children, Elderly and Women)										
Chronic disease	A0*T	β	9.26***	-3.58	-3.00	-3.48	4.88***	-3.20	-2.52	-2.91
		σ	(0.30)	(2.61)	(2.58)	(2.80)	(1.12)	(2.90)	(2.88)	(3.12)
	A1*T	β		4.15**	4.13**	4.01**		3.20	3.34**	3.22
		σ		(1.69)	(1.67)	(1.78)		(1.97)	(1.96)	(2.07)
	A2*T	β		-2.20	-1.89	-2.28		-2.65	-1.98	-2.10
		σ		(1.65)	(1.61)	(1.65)		(1.99)	(1.93)	(1.98)
Chronic disease (<13 years)	A0*T	β	24.07***	2.49	2.70	2.61	21.70***	3.27	3.41	4.79**
		σ	(0.33)	(1.98)	(1.98)	(2.20)	(1.58)	(2.69)	(2.69)	(2.90)
	A1*T	β		-2.62**	-2.86**	-1.51		-3.26**	-3.32**	-3.51**
		σ		(1.40)	(1.38)	(1.53)		(1.95)	(1.94)	(2.07)

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
	A2*T	β		-1.61	-1.00	-0.35		-5.31***	-4.12**	-0.49
		σ		(1.34)	(1.28)	(1.47)		(1.87)	(1.82)	(1.98)
Chronic disease in Women	A0*T	β	17.91***	1.00	1.18	0.20	13.16***	0.60	0.91	1.51
		σ	(0.22)	(1.43)	(1.43)	(1.61)	(0.96)	(1.81)	(1.81)	(2.06)
	A1*T	β		-1.14	-1.22	0.22		-1.02	-0.88	-0.28
		σ		(1.00)	(0.99)	(1.15)		(1.34)	(1.34)	(1.51)
	A2*T	β		-0.84	-0.41	0.18		-4.65***	-3.65***	-1.16
		σ		(0.98)	(0.94)	(1.13)		(1.34)	(1.30)	(1.50)
Chronic relapse (<13 years)	A0*T	β	2.56***	-0.12	0.08	-0.48	0.75**	-0.27	-0.01	-0.43
		σ	(0.16)	(1.20)	(1.20)	(1.31)	(0.40)	(1.27)	(1.28)	(1.39)
	A1*T	β		2.00**	2.01**	2.47***		1.33	1.42	1.94**
		σ		(0.88)	(0.88)	(0.95)		(0.97)	(0.97)	(1.05)
	A2*T	β		-2.02**	-1.92**	-2.25***		-2.99***	-2.59***	-2.87***
		σ		(0.80)	(0.79)	(0.86)		(1.07)	(1.00)	(1.07)
Chronic relapse in women	A0*T	β	8.65***	3.00**	3.29**	3.25**	8.63***	0.28	0.72	1.77
		σ	(0.22)	(1.40)	(1.39)	(1.55)	(1.16)	(1.95)	(1.94)	(2.10)
	A1*T	β		-0.49	-0.67	-0.19		-2.21	-2.30	-2.50
		σ		(1.03)	(1.02)	(1.16)		(1.46)	(1.46)	(1.59)
	A2*T	β		-2.29**	-1.77**	-1.50		-0.74	-0.01	1.27
		σ		(0.99)	(0.95)	(1.11)		(1.39)	(1.35)	(1.51)

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
Chronic relapse (>65 years)	A0*T	β	5.77***	2.11**	2.28***	1.73**	4.53***	-0.27	0.03	0.45
		σ	(0.13)	(0.88)	(0.88)	(1.00)	(0.63)	(1.16)	(1.16)	(1.31)
	A1*T	β		0.26	0.21	0.66		-0.19	-0.14	-0.06
		σ		(0.65)	(0.65)	(0.75)		(0.90)	(0.89)	(1.01)
	A2*T	β		-1.86***	-1.51**	-1.47**		-1.20	-0.67	-0.21
		σ		(0.63)	(0.60)	(0.73)		(0.87)	(0.84)	(0.97)
Vaccine (<13 years)	A0*T	β	28.75***	-16.33***	-16.50***	-18.19***	24.09***	-18.84***	-19.51***	-22.05***
		σ	(0.46)	(3.09)	(3.07)	(3.27)	(2.22)	(4.10)	(4.09)	(4.27)
	A1*T	β		9.22***	9.15***	9.76***		10.32***	10.03***	9.79***
		σ		(1.85)	(1.84)	(1.86)		(2.79)	(2.78)	(2.84)
	A2*T	β		6.88***	6.59***	5.56***		6.06**	5.27**	4.19**
		σ		(1.67)	(1.65)	(1.62)		(2.41)	(2.40)	(2.38)
Vaccine in women	A0*T	β	21.03***	-4.72***	-4.65***	-5.99***	20.56***	-3.16	-3.44	-6.63**
		σ	(0.31)	(1.65)	(1.64)	(1.95)	(1.57)	(2.43)	(2.43)	(2.73)
	A1*T	β		4.04***	4.08***	4.46***		6.00***	5.98***	6.80***
		σ		(0.98)	(0.98)	(1.16)		(1.48)	(1.48)	(1.71)
	A2*T	β		3.83***	3.49***	3.39***		1.26	0.58	0.68
		σ		(0.83)	(0.82)	(1.01)		(1.18)	(1.17)	(1.37)
Vaccine (>65 years)	A0*T	β	21.91***	-6.06***	-5.95***	-7.00***	19.82***	-6.66***	-6.76***	-9.62***
		σ	(0.23)	(1.37)	(1.37)	(1.59)	(1.16)	(1.91)	(1.91)	(2.19)

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
	A1*T	β		4.53***	4.57***	5.24***		6.25***	6.22***	7.63***
		σ		(0.74)	(0.74)	(0.86)		(1.14)	(1.14)	(1.33)
	A2*T	β		4.03***	3.76***	3.75***		1.83**	1.35	1.40
		σ		(0.62)	(0.61)	(0.72)		(0.90)	(0.89)	(1.04)
Symptom (<13 years)	A0*T	β	26.24***	4.83**	4.43	4.26	25.88***	2.84	3.18	2.16
		σ	(0.46)	(2.77)	(2.77)	(2.97)	(2.42)	(3.93)	(3.94)	(4.13)
	A1*T	β		-1.89	-1.66	-2.14		-1.19	-1.33	-2.50
		σ		(2.05)	(2.05)	(2.18)		(2.92)	(2.92)	(3.07)
	A2*T	β		-4.80**	-5.19***	-5.05**		-3.57	-3.27	-2.07
		σ		(1.95)	(1.91)	(2.03)		(2.73)	(2.71)	(2.84)
Symptom in women	A0*T	β	34.31***	4.49**	4.26**	4.45**	32.63***	-1.68	-1.82	-2.43
		σ	(0.37)	(2.00)	(2.02)	(2.35)	(1.89)	(2.94)	(2.96)	(3.38)
	A1*T	β		-1.69	-1.57	-1.17		-0.21	-0.15	0.83
		σ		(1.42)	(1.42)	(1.69)		(2.09)	(2.09)	(2.40)
	A2*T	β		-5.02***	-5.61***	-5.61***		-3.77**	-4.56**	-3.43
		σ		(1.36)	(1.29)	(1.59)		(1.93)	(1.88)	(2.20)
Symptom (>65 years)	A0*T	β	29.59***	5.83***	5.69***	5.50***	26.85***	2.09	2.25	1.91
		σ	(0.26)	(1.45)	(1.46)	(1.68)	(1.34)	(2.11)	(2.12)	(2.44)
	A1*T	β		-1.34	-1.22	-0.73		-2.21	-2.21	-1.65
		σ		(1.05)	(1.05)	(1.26)		(1.53)	(1.53)	(1.79)

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
	A2*T	β		-4.84***	-5.36***	-5.30***		-3.97***	-4.43***	-3.06**
		σ		(1.02)	(0.97)	(1.19)		(1.44)	(1.40)	(1.67)
Received medical attention (<13 years)	A0*T	β	99.92***	0.74**	0.73**	-0.01	100.00***	0.77**	0.75**	0.00
		σ	(0.03)	(0.44)	(0.44)	(0.03)	(0.00)	(0.44)	(0.44)	(0.01)
	A1*T	β		-0.16	-0.16	-0.20		-0.17	-0.17	-0.19
		σ		(0.11)	(0.11)	(0.12)		(0.11)	(0.11)	(0.12)
	A2*T	β		0.08	0.08	0.11		0.11	0.10	0.13
		σ		(0.12)	(0.12)	(0.13)		(0.12)	(0.12)	(0.14)
Received medical attention in women	A0*T	β	99.94***	0.66**	0.66**	-0.02	99.75***	0.44	0.43	-0.09
		σ	(0.02)	(0.29)	(0.29)	(0.05)	(0.19)	(0.35)	(0.35)	(0.11)
	A1*T	β		0.00	0.00	-0.07		-0.07	-0.06	-0.14
		σ		(0.07)	(0.07)	(0.08)		(0.08)	(0.08)	(0.10)
	A2*T	β		0.02	0.01	0.06		0.07	0.06	0.10
		σ		(0.05)	(0.05)	(0.07)		(0.05)	(0.05)	(0.07)
Received medical attention (>65 years)	A0*T	β	99.91***	0.43**	0.42**	-0.02	99.96***	0.44**	0.44**	-0.05
		σ	(0.02)	(0.18)	(0.18)	(0.03)	(0.04)	(0.19)	(0.19)	(0.07)
	A1*T	β		-0.01	-0.01	-0.06		-0.07	-0.07	-0.08
		σ		(0.04)	(0.04)	(0.05)		(0.06)	(0.06)	(0.07)
	A2*T	β		0.00	-0.01	0.03		0.02	0.02	0.04
		σ		(0.04)	(0.04)	(0.05)		(0.04)	(0.04)	(0.05)

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

			Peru without Lima				1K			
			Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)
Atended the health center (<13 years)	A0*T	β	21.43***	-4.03	-3.90	-4.76	16.90***	-3.84	-3.68	-5.12
		σ	(0.42)	(2.73)	(2.75)	(2.90)	(2.00)	(3.59)	(3.61)	(3.72)
	A1*T	β		4.59**	4.54**	3.63**		2.87	2.62	1.20
		σ		(1.93)	(1.93)	(2.00)		(2.64)	(2.63)	(2.70)
	A2*T	β		2.58	2.62	3.26**		1.29	1.66	2.28
		σ		(1.90)	(1.87)	(1.94)		(2.54)	(2.50)	(2.58)
Treatment in children under 13 years	A0*T	β	43.78***	-7.85	-8.13	-10.19**	32.38***	-11.50	-11.95	-15.51**
		σ	(0.95)	(5.30)	(5.29)	(5.68)	(4.74)	(7.55)	(7.54)	(7.82)
	A1*T	β		6.50**	6.19**	3.73		11.35**	11.87**	9.57**
		σ		(3.44)	(3.43)	(3.57)		(5.12)	(5.05)	(5.23)
	A2*T	β		3.18	2.85	5.57**		-5.15	-5.60	-3.62
		σ		(3.19)	(3.13)	(3.23)		(4.75)	(4.66)	(4.83)

Note 1: Coefficients are presented in rows with "β", standard deviation of the estimates are presented in rows with "σ", it values are presented between parentheses and coefficients that are statistical significant include "*", "**" or "***" depending on the level of significance.

Note 2: * is for coefficients with 0.10 or less p-value, ** is for coefficients with 0.05 or less p-values, *** is for coefficients with 0.01 or less p-values.

Note 3: Treated sample are the individuals or households that live in localities that are below 35 km of distance from the epicenter of the main quake of August 15th or any of the 90 following aftershocks.

Note 4: Sample "Peru without Lima" includes all sample in the country excluding only the province of Lima, the capital metropolis; Sample "1K" includes only population within 35km around the earthquake

Note 5: Column (1) presents the coefficients estimated for Difference in Difference (DiD) estimates with no additional control variables included. Column (2) presents the coefficients estimated for Difference in Difference estimates including fixed effects at the province level (195, for the whole country). Column (3) presents the coefficients estimated for Difference in Difference estimates including fixed effects at the province level (195, for the whole

Table A3. Results for ENAHO Analysis for 2007-2008 (short-term or destruction effect) and two recovering periods of 2009-2010 and 2011-2014 (two levels of medium-term or recovery) for Peru without Lima and below 70 km from epicenter samples

	Peru without Lima				1K			
	Control Mean	(1)	(2)	(3)	Control Mean	(1)	(2)	(3)

country) and socio-demographic characteristics that are highly time-invariant. Column “Control Mean” presents the coefficient estimated for the constant in the regression presented in column (1).