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## Capitalisation Note

How Randomised Control Trials  
can lead to powerful insights  
and enhance learning

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Luxembourg Development  
Cooperation Agency

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# LIST OF ACRONYMS

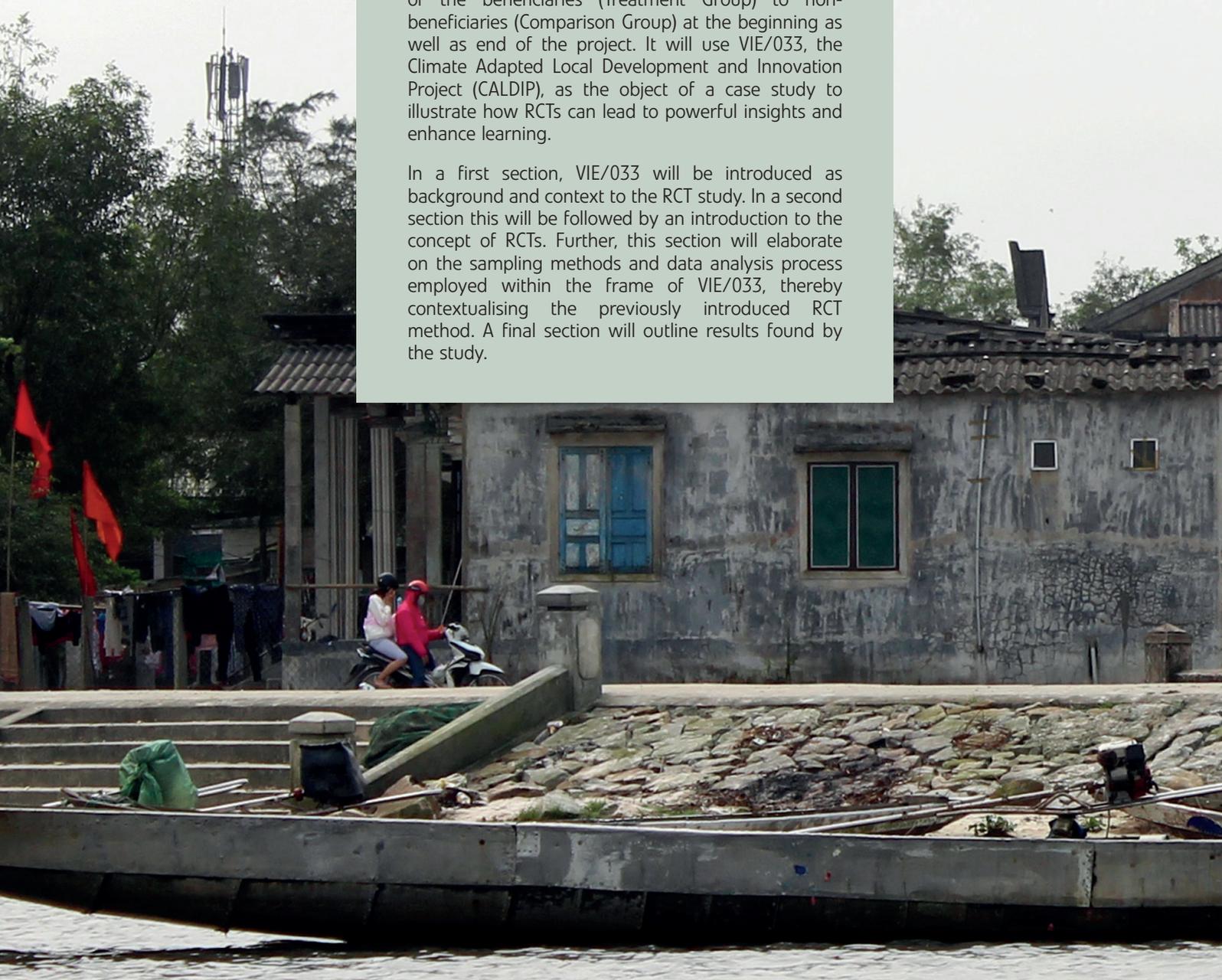
C Group	Comparison Group
CALDIP	VIE/033, Climate Adapted Local Development and Innovation Project
DD	Difference in Differences, or Double Difference
DOLISA	Department of Labour, Invalids and Social Affairs
DRR	Disaster Risk Reduction
EOP	End of Project
FE	Final Evaluation
HH(s)	Household(s)
M&E	Monitoring and Evaluation
NPL(s)	National Poverty Line(s)
NTP(s)	National Target Programme(s)
PCs	People's Committees
RCT	Randomised Control Trial
SD	Single Difference
SPSS	Statistical Package for the Social Sciences
T Group	Treatment Group
VND	Vietnam Dong

## Randomised Control Trials

### VIE/033 showcase

This document serves as a showcase for Randomised Control Trials (RCTs), a technical evaluation that allows estimating the impact achieved by an intervention. The validity of the estimate stems from a comparison of the beneficiaries (Treatment Group) to non-beneficiaries (Comparison Group) at the beginning as well as end of the project. It will use VIE/033, the Climate Adapted Local Development and Innovation Project (CALDIP), as the object of a case study to illustrate how RCTs can lead to powerful insights and enhance learning.

In a first section, VIE/033 will be introduced as background and context to the RCT study. In a second section this will be followed by an introduction to the concept of RCTs. Further, this section will elaborate on the sampling methods and data analysis process employed within the frame of VIE/033, thereby contextualising the previously introduced RCT method. A final section will outline results found by the study.



# VIE/033 - CLIMATE ADAPTED LOCAL DEVELOPMENT AND INNOVATION PROJECT

In 2013, LuxDev launched the CALDIP (VIE/033), benefitting 29 poor and vulnerable communes in three districts of Thua Thien Hue province. The project, currently in its final phase, provided assistance in a wide array of activities to around 400,000 people, through highly participatory approaches. The project's primary aim was to protect people's livelihoods and strengthen their resilience within a context of increasing climate shocks and stresses, including more frequent typhoons, more severe floods in the rainy season, droughts in the dry season and a substantial loss of land to the ocean.

VIE/033 aimed to achieve its objectives through hundreds of different hardware and software interventions, with a focus on socio-economic development and livelihoods and with LuxDev's main crosscutting issues of local governance, gender equality and climate change at the heart of the project. These interventions were highly diverse, going from strengthening the organisation of civil society community groups, and the introduction of climate resilient crops and varieties, to capacity strengthening in community-based ecotourism and construction of a concrete dam to fight land erosion. The Final Evaluation (FE) found the project to be highly successful in that it achieved, and for the most part exceeded, its end-of-project targets. Moreover, the project's achievements are expected to be highly sustainable due to its focus on participatory approaches, capacity building and creating ownership.

The FE report found that by end 2017, the project had contributed to sustainable, equitable and efficient trends of poverty reduction and adaptation to climate

change: the average monthly income of beneficiary households (HHs) doubled; the number of HHs suffering from significant damage and loss caused by natural disasters reduced by more than 30%; 76.1% of women in target communes benefited from improved access to economic opportunities, and 88% of previously unemployed labourers had secured full time contracts and earned more than the government minimum wage... to only name a few of the successes.

These achievements were attributed to project interventions with relative certainty, because the outcomes were measured based on the pre and post data collected by the project Monitoring and Evaluation (M&E) system. The latter, led by a full time M&E specialist and assisted by trained government staff at local level, was assessed by the FE as outstanding, capable of collecting, processing and analysing data to assess project performance and outcomes regularly and reliably.

To further test and confirm its impact on target beneficiaries, the project also conducted the RCT study, to help establish whether the achieved outcomes were natural, or rather induced by the project's many interventions. Specifically, the RCT study examined the project's achievements under its Specific Objective – i.e. to reduce poverty rates among the poorest areas, and reduce damage in the most vulnerable areas. The wealth of information generated by the RCT enables LuxDev to draw more in-depth conclusions on what has worked and why.

# RCT INTRODUCTION

## What is a RCT?

A RCT is a quantitative experimental evaluation method which measures the impact of an intervention based on a “with versus without” analysis, also called a counterfactual analysis. The RCT design, thus, requires a comparison group (or control group), which should be randomly selected from areas isolated from the intervention, as well as any interventions which may affect the outcomes being measured. The counterfactual analysis makes for a comparison between what actually happened and what would have happened in the absence of the intervention. The differences in outcomes can then be attributed to the intervention(s).

The data analysis uses two methods of comparison:

Single Difference (SD), which measures the differences in outcome of beneficiaries versus non-beneficiaries, and before versus after the intervention; and Difference in Differences (or double difference, DD), which measures the difference in “post-pre” data of beneficiaries versus that of non-beneficiaries. Both methods require that data from beneficiaries as well as non-beneficiaries are collected at the start, and at the end of the intervention.

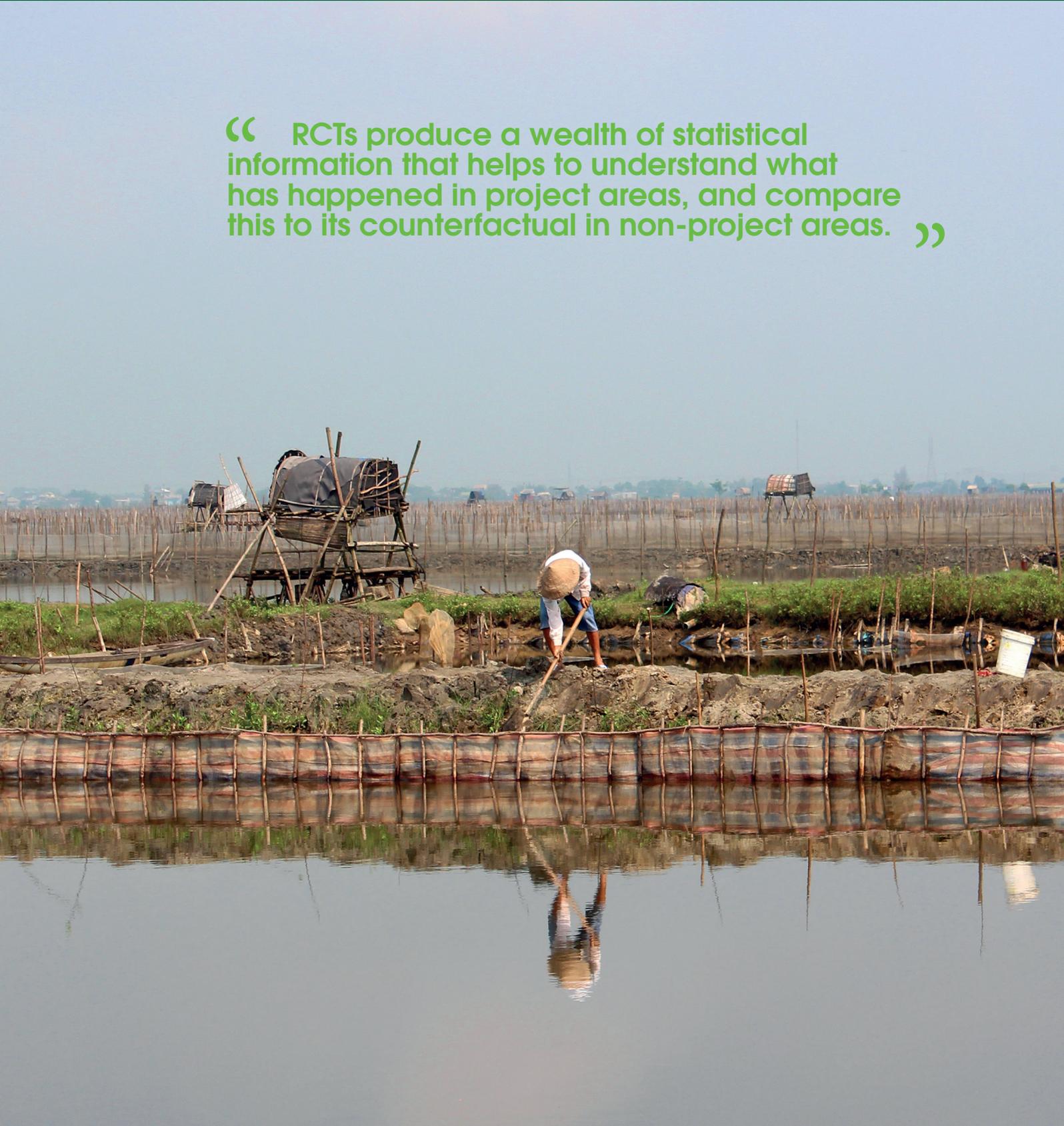
In RCTs, HHs that benefited from project interventions are referred to as the Treatment (T) Group, while those from outside of the project catchment area are referred to as the Comparison (C) Group. Both are randomly selected.

## Why is a RCT useful?

RCTs produce a wealth of statistical information that helps to understand what has happened in project areas, and compare this to its counterfactual in non-project areas. Further, continuous monitoring with regular data collection provides a project with the necessary information and insights to manage and possibly adjust the project, and follow a results-based approach. The use of RCTs therefore enables

to engage in a deeper and evidence-based learning process. However, RCTs should be planned from the beginning of the project intervention and usually need a large sample size for sufficient “power”. They are best used for projects that seek to achieve clear, measurable outcomes and impacts that can be attributed to a distinct intervention or a set of interventions.

“ RCTs produce a wealth of statistical information that helps to understand what has happened in project areas, and compare this to its counterfactual in non-project areas. ”



## VIE/033 RCT Design

In 2014, the baseline HH survey interviewed a random sample of 904 HHs in 13 of the 29 project target communes, and 196 HHs in three communes outside of project target districts. In late 2017, the endline HH survey interviewed a sample of 1,104 HHs, including the same 904 interviewed during the baseline and an additional 200 beneficiary HHs randomly selected from project target communes. The results of “baseline versus endline” HH data, together with the periodically collected monitoring data, provided the data for the project’s M&E Report 2017, the Project Annual Report 2017, and the FE Report conducted by an externally hired company.

Following collection of endline data in the project target area, and to further measure impact, VIE/033 also conducted an RCT in early January 2018, through a survey in non-project communes with the same 196 randomly selected HHs (C Group) interviewed during the baseline. The survey used the same questions as those of the baseline and endline surveys and questionnaire interviews were administered by the same externally recruited enumerators that had conducted the endline HH interviews. Data collection was supervised by the project’s M&E Specialist, who later undertook data processing, analysis and reporting. Statistical Package for the Social Sciences (SPSS) raw data files were shared with the external FE team, which have confirmed the validity of the data, analysis and findings of this report.

The RCT specifically measured the impact of project interventions on beneficiaries’ lives versus a comparison group under the project’s Specific Objective - i.e: To reduce poverty rates among the poorest areas, and reduce damage in the most vulnerable areas - based on three project final outcome indicators (ref. project M&E Matrix). These indicators are related to HH income, reduced poverty and vulnerability, as follows:

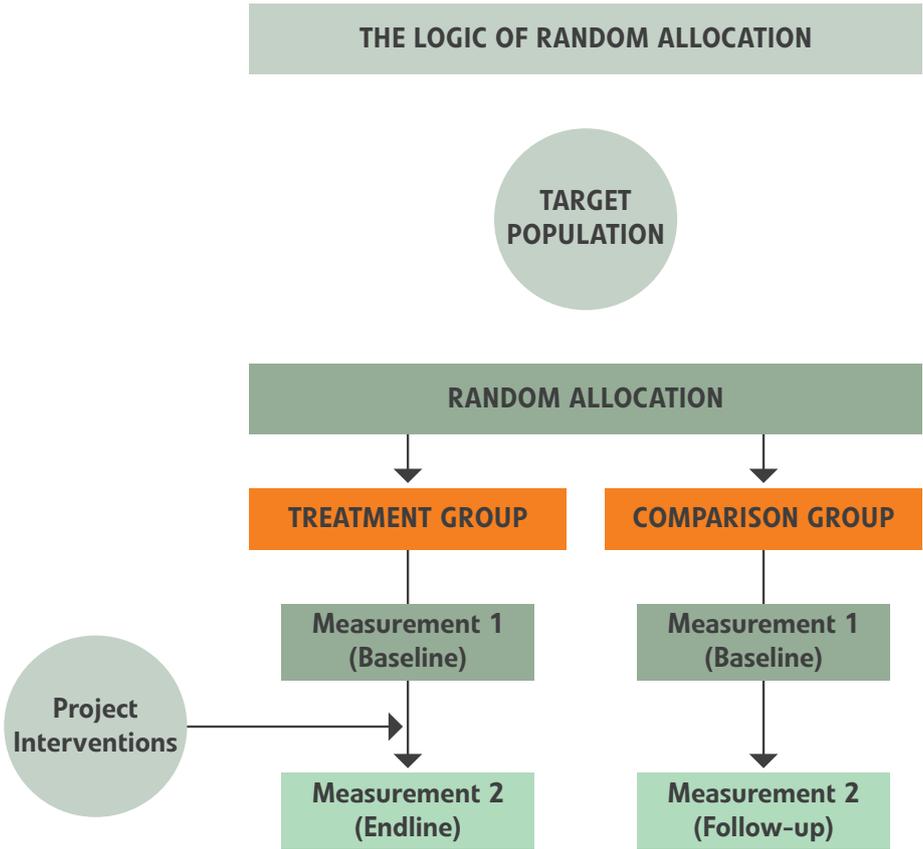
- Indicator 1: Total number of poor HHs in target communes to be reduced by 25% (1,387) by End of Project (EOP);
- Indicator 2: Number of resettled HHs in target communes with average monthly HH income  $\leq$  2 Mn Vietnam Dong (VND) to be reduced from 37.9% (baseline) to 20% by EOP;
- Indicator 3: Number of poor and near poor HHs in target communes suffering significant damage/loss caused by disasters (estimated in monetary values) to be reduced by 30% on average by EOP.

The results of this counterfactual study and report provide further evidence of project impact.

## Sample size

The Slovin sampling formula:  $n = N / [N * (e)^2 + 1]$  with  $n$ =sample size,  $N$ =number of total survey population,  $e$  = desired margin of error ( $e=1$ -degree of confidence) to estimate a sample size ( $n$ ), which is 1,100 HHs for the baseline survey (904 HHs in the T Group

and 196 in the C Group). This sample size has a confidence level of 97% and margin of sampling error of 0.03 which allows for the generalisation of the survey findings.



## Sampling methods

The project used a multiple-stage sampling method, i.e. Cluster-Stratified-Random sampling, to select the cluster and HH samples. Cluster-Stratified sampling was used to sample the communes and villages in the target districts, whereas Stratified-Random sampling was employed to establish the HH samples.

To avoid selection bias and increase the representativeness, the project sampled the communes (or clusters) based on four Strata:

- high rate of poor HHs;
- vulnerable areas; (coastal, lagoon, low land);
- having resettlement areas and
- geographic position.

The selection of village clusters was done based on the same four Strata as well as on recommendations of the targeted commune People's Committee (PCs).

To ensure equal chances for HHs to be selected as well as the representativeness of different economic

Strata, the project stratified the prospective HHs into three categories, using a systematic random sampling method:

- poor HHs;
- near poor HHs; and
- better-off HHs.

HHs selected in resettlement areas were required to account for at least 20% of total sample size. The selection of respondents in each sample HH took into account sex balance to avoid gender bias in the provided information. Selected respondents were required to be official members of the HH, >18 years of age, had to understand the family livelihoods or business and broader social issues, and to have adequate ability to answer the questions.

Figure 1 (next page) illustrates the four steps of selecting HH samples which combines Cluster-Stratification-Random sampling methods.

## Data processing and analysis

The RCT study used four datasets in SPSS including 02 datasets for the T Group (baseline & endline surveys) and 02 for the C Group (baseline & follow-up surveys). The data processing analysis mainly ran the descriptive statistics to produce the findings from the data of each group. The data analysis used two methods of comparison to evaluate project impact: (1) SD and

(2) DD. SD measured the differences in outcome of T Group vs. C Group, and before vs. after the intervention. DD used panel or longitudinal data to measure the differences between T Group and C Group of the changes in outcome variables that occurred over time. The difference in "post-pre" data of the T Group was compared with that of the C Group.

## Issues of selection bias and contamination

There is no issue of selection bias nor contamination in this RCT study because in 2014 the C Group HHs were randomly selected from a different population than

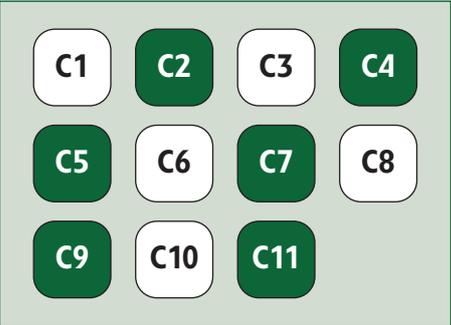
the T Group, and the three comparison communes were not geographically part of the project catchment area. In addition, the sample size was statistically ran-

domised and the selection of both C and T Group HHs was carried out through a number of sampling procedures and based on selection criteria correlated to the observed outcomes regarding poverty and vulnerability. Further, in-depth interviews with leaders of the three comparison communes confirmed that they did not receive any support from VIE/033 or any similar

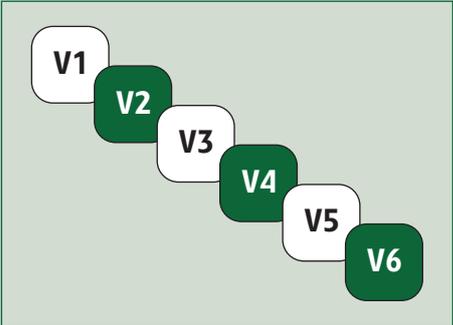
intervention since 2014. Whereas they did receive very limited support from various government National Target Programmes (NTPs), this was not considered a contamination factor as similarly poor and vulnerable communities in the project catchment area received similar government support through these NTPs.

**Figure 1:**  
**Four steps of sampling the survey HHs using the combined probability sampling methods:**  
**Cluster-Stratification-Random sampling**

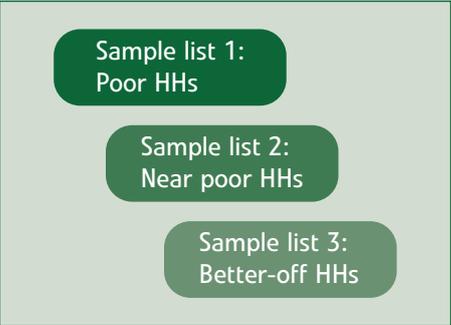
**Step 1:**  
 Communes (C) sampled from a target district based on four selection criteria (Strata)



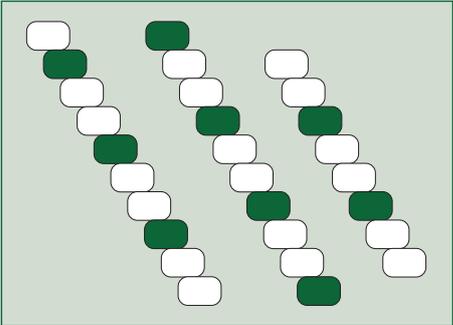
**Step 2:**  
 Villages (V) sampled from a selected commune (C) based on four selection criteria (Strata)



**Step 3:**  
 HHs in a sampled village (V) are listed into three economic status Strata: poor HHs, near poor HHs, and better-off HHs



**Step 4:**  
 HHs in a sample list (frame) are systematically selected according to a random starting point and a fixed periodic interval



# STUDY RESULTS

## Raised average HH income per month

Table 1 below shows the statistically significant differences in average monthly HH income between C and T Group over time.

At the time of the baseline, there was a minimal statistically significant difference in the average monthly HH income of C and T Group: 2,542,409 VND and 2,418,465 VND per month respectively. At the time of

the endline survey, both C and T Group had achieved a remarkable increase in average monthly HH income. However, the figure for the T Group more than doubled, whereas for the C Group it increased by just 26%, to 3,199,366 VND/month. The increase gained by the T Group is 1,927,196 VND/month higher compared to the counterfactual, and this difference can thus be attributed to the intervention.

**TABLE 1: AVERAGE MONTHLY HH INCOME (UNIT: VND)**

RANDOMISED GROUPS	BASELINE (PRE)	ENDLINE/FOLLOW-UP (POST)	POST-PRE DIFFERENCE
COMPARISON GROUP (C)	2,542,409	3,199,366	656,957
TREATMENT GROUP (T)	2,418,465	5,126,562	2,708,097
C-T DIFFERENCE	(123,944)	1,927,196	2,051,140

The “before versus after” income data show the statistically significant difference in the average monthly HH income between C and T Group over time. It is noticeable that in the absence of the intervention, the average monthly HH income of the C Group increased by 656,957 VND/month (counterfactual value) but the T Group saw its average increase by 2,708,097 VND/month or 112%. When comparing the “before versus after” income differences of both groups, it is interesting to see that the average HH income of the Treatment Group has a higher income difference of 2,051,140 VND/month and makes up 4.1 times the

post-pre figure of the C Group. This implies that without the intervention, the average HH income would have increased by just 656,957 VND/month over time, but with the intervention it increased by 2,708,097 VND/month, hence 2,051,140 VND above the counterfactual is attributed as the result of project interventions.

Income data of poor and near poor HHs in Table 2 below show equally significant increases in average HH income per month for these two groups.

**TABLE 2: AVERAGE MONTHLY HH INCOME OF POOR AND NEAR POOR HHs (UNIT: VND)**

RANDOMISED GROUPS	BASELINE (PRE)		ENDLINE/FOLLOW-UP (POST)		POST-PRE DIFFERENCE	
	Poor	Near poor	Poor	Near poor	Poor	Near poor
COMPARISON GROUP (C)	1,585,803	2,783,931	2,531,887	2,564,111	946,084	(219,820)
TREATMENT GROUP (T)	1,694,894	1,772,199	3,963,163	4,075,776	2,268,269	2,303,577
C-T Difference	109,091	(1,734,304)	1,431,276	1,511,665	1,322,185	2,523,397

At the time of the baseline, the average HH income per month of poor HHs showed no significant difference between C and T Group, while the difference was much bigger for near poor HHs. At the time of the endline survey, the average HH income per month for both T and C Group showed statistically significant differences. The average income for the T Group increased around 2.3 times for both poor and near poor HHs. The average income for the C Group increased by around 1.6 times for poor HHs and actually decreased by 7.9% for near poor HHs.

Poor HHs in the C Group saw their average income per month increase by 59.7%, from 1,585,803 VND at the baseline to 2,531,887 VND at the endline. This increase is far below the average increase in income gained by poor HHs in the T Group: 134%, from 1,694,894 (baseline) to 3,963,163 VND at the endline. The average HH income of poor HHs in the T Group is 1,431,276 VND higher than that of similar HHs in the C Group, which suggests the attribution of project interventions to poor HHs incomes.

While the average HH income of near poor HHs in the C Group marginally decreased over time, near poor HHs in the T Group considerably raised their average income: over 1.5 million VND higher for T Group HHs as compared to C Group HHs.

The “before versus after” income data in Table 2 show statistically significant differences in the average monthly HH income of poor and near poor HHs between T and C Groups over time. In the absence of the intervention, the post-pre difference in average HH income per month for poor HHs in the C Group is 946,084 VND, considered as the counterfactual, while, with the intervention, poor HHs of the T Group saw a “before versus after” difference of 2,268,269 VND. The difference of 1,322,185 VND implies a project impact on incomes for poor HHs in target communes. Similarly, the result of post-pre data analysis shows that the average HH income of near poor HHs in the T Group is 2,523,397 VND, above the counterfactual value, which indicates a project impact on near poor HH income over time.

### Reduced proportion of HHs with average income ≤ 2,000,000 VND per month

The percentage of HHs assessed to be poor based on the criteria of the NPL 2011-2015 gives another interesting picture of poverty and poverty tendency between T and C Group over time. That single dimension poverty line 2011-2015 was based on an average income of ≤2,000,000 VND/month for a rural HH of five. Table 3 below shows that the number of such HHs in the baseline accounted for 49.7% for the T Group and 52.7% for the C Group. From that time and over the following four years, the number of HHs having such low monthly income substantially decreased to 21.5% for

the T Group as compared to a more modest decrease to 38.3% for the C Group. The C-T difference in the endline survey shows that the decrease of HHs with average income ≤ 2,000,000 VND per month is almost 17 percentage points larger for the T Group than for the C Group. The “with versus without” data indicate a decrease of poor HHs as per the previous 2011-2015 poverty line that is twice as large for the T Group than for the C Group (28.2 vs. 14.4). This difference is attributable to project interventions.

**TABLE 3: NUMBER OF HHs WITH AVERAGE INCOME ≤ 2,000,000 VND/MONTH (UNIT: %)**

RANDOMISED GROUPS	BASELINE (PRE)	ENDLINE/FOLLOW-UP (POST)	POST-PRE DIFFERENCE
COMPARISON GROUP (C)	52.7	38.3	(14.4)
TREATMENT GROUP (T)	49.7	21.5	(28.2)
C-T DIFFERENCE	(3.0)	(16.8)	(13.8)

## Reduced proportion of resettled HHs with average income $\leq$ 2,000,000 VND per month

The resettlement areas are some of the poorest areas in project communes and, thus, were a particular target of project interventions. Resettled HHs are among the most vulnerable HHs, who used to live on their boats but were relocated on land for safety reasons and due to the loss/damage they suffered from every calamity. Given their large population (3,050 HHs), poverty sta-

tus and persistent vulnerabilities, it is crucial to evaluate the project impact on poverty reduction for this vulnerable group. The counterfactual analysis shows the substantial difference in the reduction rate of resettled HHs with average HH income  $\leq$  2,000,000 VND/month between T and C Group.

**TABLE 4: RESETTLED AVERAGE MONTHLY HHs INCOME (UNIT: VND)**

RANDOMISED GROUPS	BASELINE (PRE)	ENDLINE/FOLLOW-UP (POST)	POST-PRE DIFFERENCE
COMPARISON GROUP (C)	2,743,730	3,524,943	781,213
TREATMENT GROUP (T)	2,208,820	5,377,649	3,168,829
C-T DIFFERENCE	(534,910)	1,852,706	2,387,616

Table 4 shows a substantially higher average income per month for resettled HHs in the C Group than for those in the T Group at the time of the baseline, with an average difference of 535,000 VND or around 24%. By the time of the endline four years later, however, the average monthly income of resettled HHs in the C Group increased by only 28% whereas the average income of resettled HHs in the project target area more than doubled from around 2.2 million to almost 5.4 million VND, i.e. a 143% increase. Counterfactual analysis shows that the average real monthly increase for the T Group HHs was 1,852,706 VND higher than that of the C Group.

This additional increase in monthly income for those most vulnerable HHs can be attributed to project interventions.

The C-T difference, i.e. 2,387,616 VND, shows that whereas at the baseline the average monthly resettled HH income of T Group was 24% below that of the C Group, by the time of the endline survey, T Group HH income was on average 52% above that of the C Group. Considering also the major impact of the Formosa pollution incident on fishing folks in project target communes, this is a surprising finding and evidence of HH and community resilience and ability to recover from environmental disasters.

**TABLE 5: NUMBER OF RESETTLED HHs WITH AVERAGE INCOME  $\leq$  2,000,000 VND/MONTH (UNIT %)**

RANDOMISED GROUPS	BASELINE (PRE)	ENDLINE/FOLLOW-UP (POST)	POST-PRE DIFFERENCE
COMPARISON GROUP (C)	42.9	24.1	(18.8)
TREATMENT GROUP (T)	37.9	14.5	(23.4)
C-T DIFFERENCE	(5.0)	(9.6)	(4.6)

Table 5 shows that at the time of the baseline both C and T Group had a minimal (5%) difference in the proportion of resettled HHs with average HH income  $\leq$  2,000,000 VND/month (poor as per the 2011-15 NPL): 42.9% vs. 37.9% of HHs respectively. By the time of the endline that 5% difference had further widened to 9.6% (almost doubled), clearly indicating a faster reduction in poverty rates in project resettlement areas as compared to settlements in the control area.

The post-pre difference data of two groups implies that in the absence of project interventions, the rate of resettled HHs with income levels  $\leq$  2 million VND would have dropped by only 18.8% vs. the actual current 23.4%.

## Reduced loss/damage caused by natural disasters in most vulnerable areas

To reduce people's damage to, or loss of assets from natural calamities in the most vulnerable areas was one of the key expected outcomes of the project. In this RCT survey, the loss/damage of the T and C Group was measured in monetary values by five variables:

- loss of income;
- loss of assets;
- loss of production (crop, livestock, aquaculture);
- health care and medical treatment costs; and
- funeral costs for a deceased family member.

Aggregated data show that at the time of the baseline more than 1/3rd of all HHs in the T Group (36.3%) as well as the C Group (36.7%) suffered certain damage due to natural disasters over the last three years. By the end of the project four years later, this proportion in fact had further increased, by 7.7% for the C Group and 18.5% for the T Group, bringing the percentage of HHs that suffered certain damage in the control area to 44.4% and in the target area to 53.8%, or more than half of all target HHs. This tendency can be explained by the overall increase in the nature and number of such natural disasters, primarily heavier and more fre-

quent storms and floods. And the difference in increase with a higher rate for the T Group confirms the higher level of vulnerability to climate change for this group as compared to the C Group. This was the reason for the project to focus on these most vulnerable districts and communes in the first place.

Interestingly, however, whereas the number of HHs that were affected by weather events in the last four years increased in project as well as control area, the actual monetary value of the damage people suffered has declined. Table 6 below shows the average annual damage for both C and T Group over time, and indicates a statistically significant difference between the two groups for the period from baseline to endline. At the time of the baseline, the average annual damage of the T Group was with 4,114,824 VND about 1.5 times bigger than that of the C Group (2,715,785 VND). By the time of the endline survey, however, the average annual damage of the T Group had dramatically decreased, by 33.4% to 2,738,944 VND, while that of the C Group reduced also but by much less, to 2,043,333 VND or 24.8%.

**TABLE 6: AVERAGE ANNUAL DAMAGE/LOSS CAUSED BY NATURAL DISASTERS (UNIT: VND)**

RANDOMISED GROUPS	BASELINE (PRE)	ENDLINE/FOLLOW-UP (POST)	POST-PRE DIFFERENCE
COMPARISON GROUP (C)	2,715,785	2,043,333	(672,452)
TREATMENT GROUP (T)	4,114,824	2,738,944	(1,375,880)
C-T DIFFERENCE	1,399,039	695,611	(703,428)

At the time of the baseline the annual damage in project target areas was on average 1,399,039 VND higher than in the non-project area, but by the time of the endline was only 695,611 VND higher in the T versus the C Group (C-T differences). Or from a different perspective: The post-pre data indicate that in the absence of the intervention, HHs' annual damage due to natural disasters in project target areas would have on average decreased by only 672,452 VND, as compared to an actual reduction following project interventions of more than twice that amount (1,375,880 VND). The greater reduction can be attributed to a list of project interventions, including various Disaster Risk Reduction (DRR) activities as well as

78 infrastructure sub-projects many of which were implemented for greater protection.

Disaggregated data in Table 7 below unveil some further interesting observations. These are restricted to the first four variables as the last one (funeral cost for a deceased family member) was not mentioned as a cost factor by any HH. The proportion of HHs that suffered 'loss of income' as well as 'loss of production' (crop, livestock, aquaculture...) substantially increased for both T and C Group, whereas the proportion of HHs that reported a 'loss of assets' (house, land, transportation or production means...) sharply declined for both groups between baseline and endline surveys.

**TABLE 7: PROPORTION OF HHs THAT SUFFERED SIGNIFICANT DAMAGE, AND AVERAGE AMOUNT (VND) OF LOSS BY VARIABLE**

VARIABLE	RANDOMIZED GROUPS	BASELINE (PRE)		ENDLINE/FOLLOW-UP (POST)		POST-PRE DIFFERENCE	
		% HHs	AMOUNT	% HHs	AMOUNT	% HHs	AMOUNT
LOSS OF INCOME	COMPARISON GROUP (C)	10.7	2,766,667	34.6	1,739,074	23.9	(1,027,593)
	TREATMENT GROUP (T)	17.0	6,399,638	43.0	1,268,617	26.0	(5,131,021)
	C-T DIFFERENCE	6.3	3,632,971	8.4	(470,457)	2.1	(4,103,428)
LOSS OF ASSETS (HOUSE, LAND, MEANS OF TRANSPORT/ PRODN...)	COMPARISON GROUP (C)	66.1	1,237,254	35.8	727,273	(30.3)	(509,981)
	TREATMENT GROUP (T)	67.0	2,007,959	18.2	697,709	(48.8)	(1,310,250)
	C-T DIFFERENCE	0.9	770,705	17.6	(29,564)	(18.5)	(800,269)
LOSS OF PRODUCTION (CROP, LIVESTOCK, AQUACULTURE...)	COMPARISON GROUP (C)	42.9	3,866,667	61.7	1,191,176	18.8	(2,675,491)
	TREATMENT GROUP (T)	35.9	4,696,370	65.2	2,946,683	29.3	(1,749,687)
	C-T DIFFERENCE	(7.00)	829,703	3.5	1,755,507	10.5	925,804
HEALTH CARE AND MEDICAL TREATMENT COSTS	COMPARISON GROUP (C)	0.0	0.0	6.2	770,690	6.2	770,690
	TREATMENT GROUP (T)	1.1	2,222,222	0.2	234,375	(0.9)	(1,987,847)
	C-T DIFFERENCE	1.1	2,222,222	(6.0)	(536,315)	(7.1)	(2,758,537)

**Loss of income:** Whereas in 2014 just 17.0% of HHs in the target area and 10.7% in the control area reported a loss of income from natural disasters, by end 2017 these percentages shot up to 43.0% and 34.6% respectively, indicating more severe weather impacts. Thus, between baseline and endline surveys about a quarter more of all HHs reported a 'loss of income'. Interestingly, however, the monetary value of that loss drastically declined within that period: for the C Group from 2,766,667 to 1,739,074 VND on average (minus 37%), and for the T Group from an average 6,399,638 to 1,268,617 VND or an impressive minus 80%. Whereas at the time of the baseline the average damage to HHs in the target area was 3.6 million VND (i.e. 2.3 times) higher than in the control area, by the time of the endline survey the average damage per HH in the target area had become less than the damage in the control area. Further, post-pre data show that in the absence of project interventions, the current average damage to HHs in the target area could have been expected to be more than four times higher than the current 1,268,617 VND.

**Loss of production:** Similar to income, the number of HHs that reported a loss of production drastically increased between baseline and endline survey, for both T Group (35.9 to 65.2%) as well as C Group (42.9 to 61.7%). For this variable, however, the bigger increase for the T Group was, somewhat surprisingly, also reflected in actual monetary values: the average damage to people's productive activities reduced by 37% in the target area versus a 69% reduction in the control area. Whereas the average damage to production at the time of the baseline was 829,000 VND higher in the target area, by the endline survey it was 1,755,000 VND higher than in the control area.

**Loss of assets:** Both T and C Groups experienced a striking decrease in the proportion of HHs that suffered

a loss of assets in the period from baseline to endline survey. Whereas the percentage of HHs that suffered from such losses was more or less the same at the time of the baseline, by the endline, the proportion of HHs with such damage in the control area had gone from roughly two in three to one in three of all HHs (66.1 to 35.8%), but in the target area that proportion went from two in three to less than one in five of all HHs. This tendency was also reflected in monetary value: at the time of the baseline the average damage per HH in the target area was 62% higher than in the control area (2,007,959 vs. 1,237,254 VND). By the time of the endline, the average damage to people's assets in the target area had become slightly less than in the control area (697,709 vs. 727,273 VND). Post-pre data indicate that in the absence of project interventions the damage to people's assets in the target area could have expected to be more than double of what was reported.

**Loss from medical costs:** Although observations for this variable are based on a limited number of cases, data indicate that project interventions did have a significant positive impact on HHs in the target area. Whereas at the baseline 1.1% of HHs in the target area reported medical costs from natural disasters, in the control area no single HH reported such costs. However, four years later 6.2% of HHs in the control area reported medical expenses, whereas hardly any HHs (0.2%) in the target area reported such costs. And the average cost per HH in the control area was reported to be 770,690 VND against an average cost in the target area of 234,375 VND, i.e. about 1/10th the average cost it was at the time of the baseline. These differences can be explained by the many DRR interventions in project target areas that made people a lot more aware of the dangers of climate events and strengthened authorities' understanding and skills to respond to such events and their impact.



## Reduced proportion of poor and near poor HHs with significant loss/damage

As for the populace in general, to reduce the vulnerability to climate change for the most vulnerable groups specifically was another target of VIE/033. Hence the aim for “the number of poor and near poor HHs in target areas with significant damage/loss due to natural disasters to be reduced by 30% by end of the project” (M&E Matrix, Indicator 3). The project M&E Manual defines significant damage/loss as a ‘monetary loss’ equivalent to 15% of the average annual HH income for poor HHs (3,051,000 VND/year) and 20% for near poor HHs (4,253,000 VND/year).

Table 8 below shows the proportion of poor and near poor HHs that suffered significant damage from climate

impacts at the time of the baseline and endline, for both T and C Group. At the baseline, 26.7% of poor HHs in target areas reported to have suffered significant damage, against a somewhat lower but still high figure of 22.2% of poor in the control area, i.e. a C-T difference of 4.5 percentage point. As for near poor HHs, the difference at the time of the baseline was much bigger: 31.6% of near poor HHs in project target areas at the time reported to have suffered significant damage against only 10.0% in the control area, i.e. a C-T difference of 21.6 percentage point.

**TABLE 8: PROPORTION OF POOR AND NEAR POOR HHs WHO SUFFERED “SIGNIFICANT LOSS OR DAMAGE” (UNIT: %)**

RANDOMISED GROUPS	BASELINE (PRE)		ENDLINE/FOLLOW-UP (POST)		POST-PRE DIFFERENCE	
	Poor	Near poor	Poor	Near poor	Poor	Near poor
COMPARISON GROUP (C)	22.2	10.0	12.5	8.0	(9.7)	(2.0)
TREATMENT GROUP (T)	26.7	31.6	16.0	16.7	(10.7)	(14.9)
C-T DIFFERENCE	4.5	21.6	3.5	8.7	(1.0)	(12.9)

At the time of the endline survey, poor HHs in both the project target area and the control area showed a substantial decrease in the number of HHs suffering significant damage or loss (3,051,000 VND/year): from 26.7% to 16.0% in the project target area, and from 22.2% to 12.5% in the control area, i.e. for both areas a decrease of roughly 10 percentage points and not much change in C-T difference over time (3.5 vs. 4.5). However, data show a much bigger change for near poor HHs: in the project target area the proportion of near poor that suffered significant damage or loss (4,253,000 VND/year) decreased from 31.6% to 16.7%, i.e. a 14.9% drop.

In the non-project control area, on the other hand, that proportion decreased from 10 % to 8%, just a 2% drop. As a result, the C-T difference between T and C Group (of near poor) dramatically declined, from 21.6% at the baseline to 8.7% at the endline.

What these counterfactual data indicate is that without project interventions, the number of poor and near poor HHs in target areas that would have suffered significant damage from natural calamities would have been a lot higher than what it was in the last year: viz. 10.7% higher for poor HHs and 14.9% higher for near poor HHs.





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