

# Using NCDR Social Survey to Discuss Disaster Recovery, Vulnerability and Resilience

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# Disaster Social Survey Done by NCDR



Year of Disaster Event

	2004		2005		2006	2007	2009			
Event	Typhoon Mindulle & Typhoon Aere		Typhoon Long-Wang	--	Heng-chun	Typhoon Krosa	Typhoon Morakot			
Type	Flood, Land-slide	Flood, Land-slide	Flood, Wind	Earth-quake	Earth-quake	Flood	Flood, Landslide			
Survey Year	2004	2005	2006	2006	2007	2008	2010	2011	2012	2015

**Upcoming data:** 0206 Earthquake, Year 2016

Issues covered:

Economic lost, risk perception, mitigation, social impacts, psychological impacts, and recovery

Data Application:

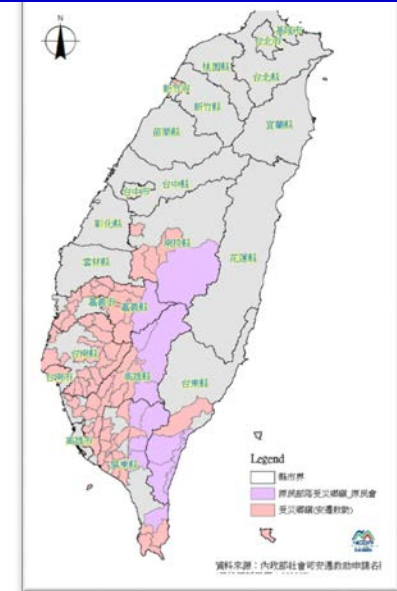
<http://easy2do.ncdr.nat.gov.tw/survey>

# Morakot Survey

## 4-year panel data

	Population	Year 2010	Year 2011	Year 2012	Year 2015
Same <b>households</b> successfully interviewed	1,754	1,658	1,602	1,542	1,481 84%
Same <b>person</b> successfully interviewed	1,754	1,658	1,357	1,194	988 56%

## Spatial distribution of the interviewed household



## Subject

- Families whose houses were seriously damaged during Typhoon Morakot and applied for government subsidies (using the **population**, not a sample)
- Survey Unit: **household**

## Source of Interviewers

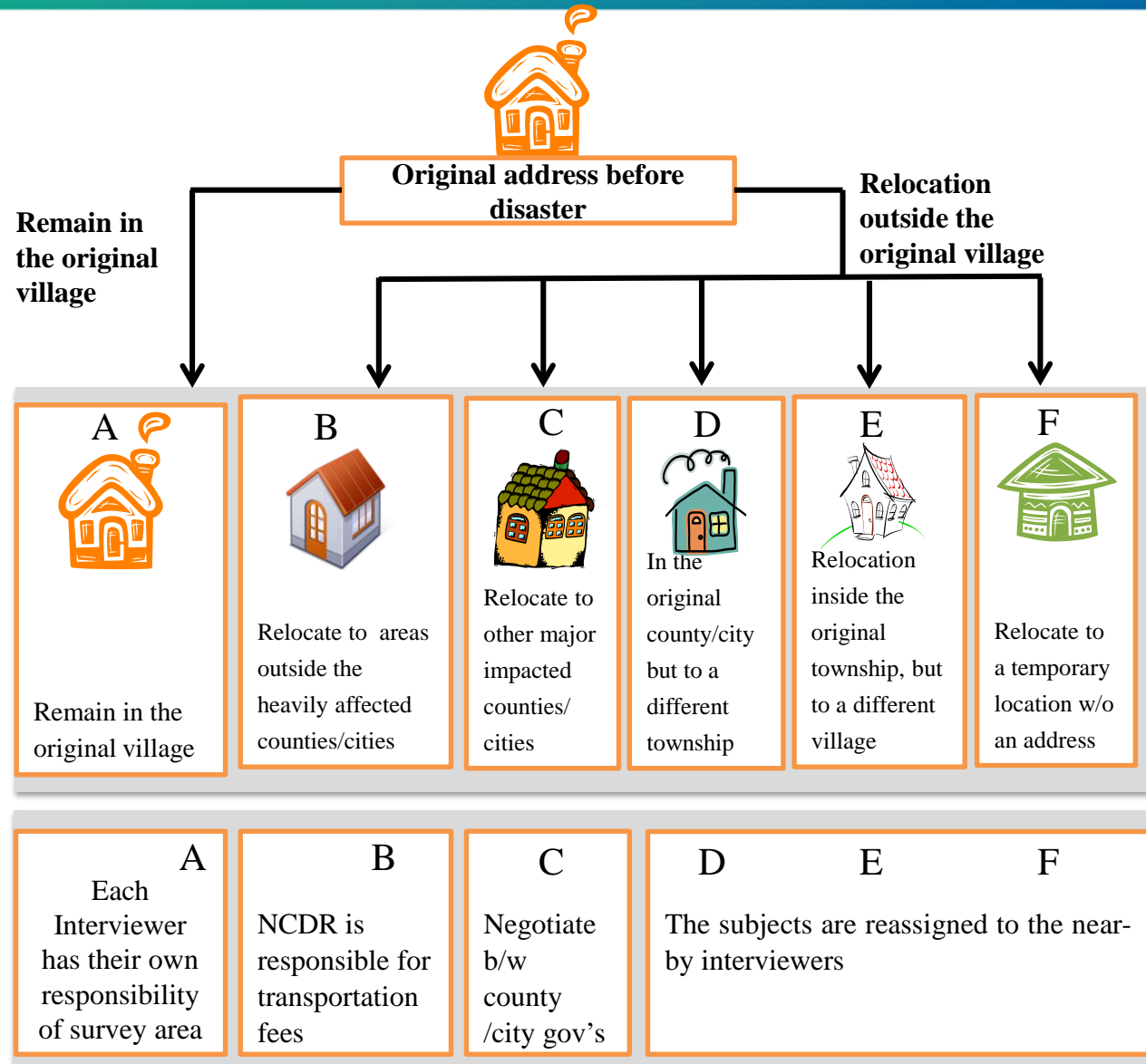
- 主計處 Directorate General of Budget, Accounting and Statistics (DGBAS) of Executive Yuan

# Major Challenge when Conducting the Survey

## Major challenge:

Loss of subjects over years

- In year 2010, **69%** of the subjects relocated
- The costs of tracking subjects increase because of relocation



3 level local administrative areas:  
village  
township  
cities/counties

# Topics of Survey Questions

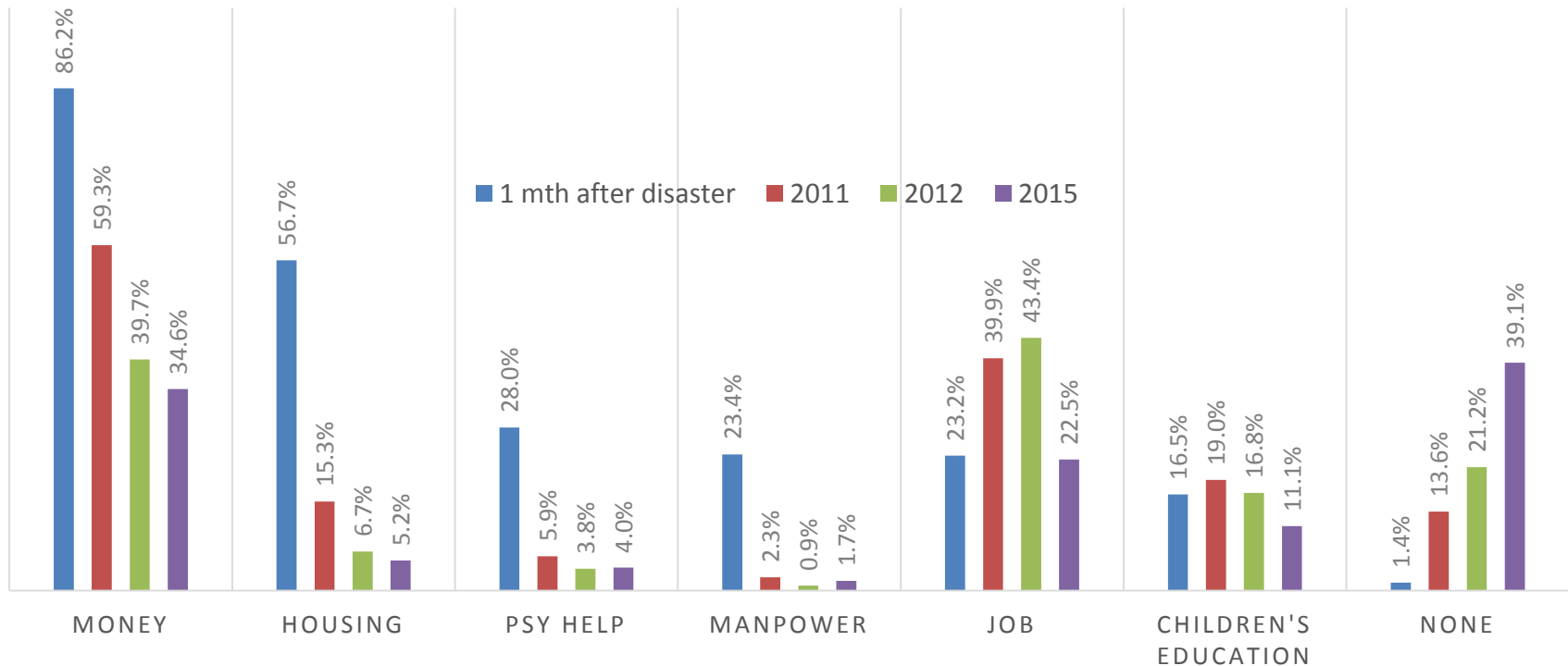
Survey year	Social							Psychological			Economic		Housing		
	Social network	Disabled	Mitigation	Trust	Evacuation/Shelter	Resources Demand/supply	General recovery	Risk perception	Coping	Health	Household loss	Unemployment	Communication about relocation	Permanent housing	Living quality
2010	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
2011	✓	✓		✓		✓	✓		✓	✓		✓		✓	✓
2012	✓	✓		✓		✓	✓		✓	✓		✓		✓	✓
2015	✓			✓		✓	✓		✓	✓		✓	✓	✓	✓

# The Most Demanded Resources

- Money is the **most** demanded resource for each wave
- Needs of housing, psy help, manpower **dramatically reduced** in the 2<sup>nd</sup> wave
- Needs of job and children' s education increased in the 2<sup>nd</sup> wave and **remained important** in the 4<sup>th</sup> wave

“the resources I needed within one year”

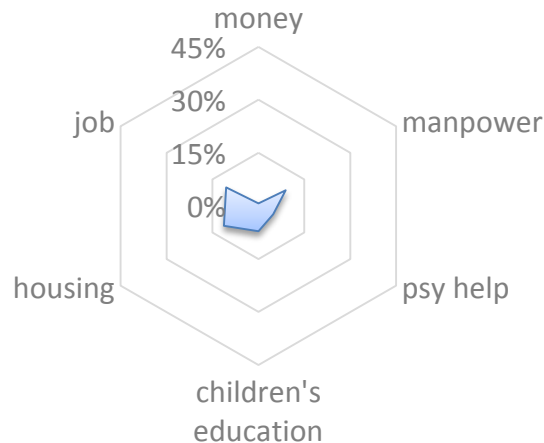
(Multi-response questions)



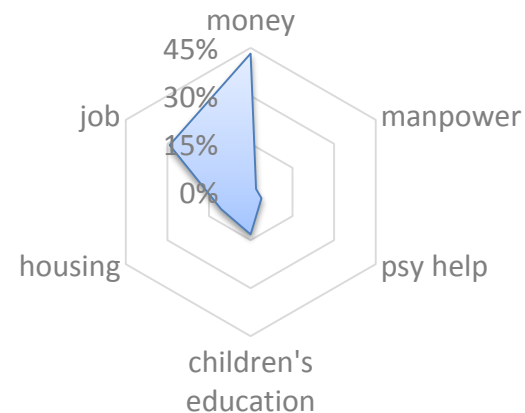
# Gaps b/w Needs and Assistances Received

## The needed resources which did NOT received

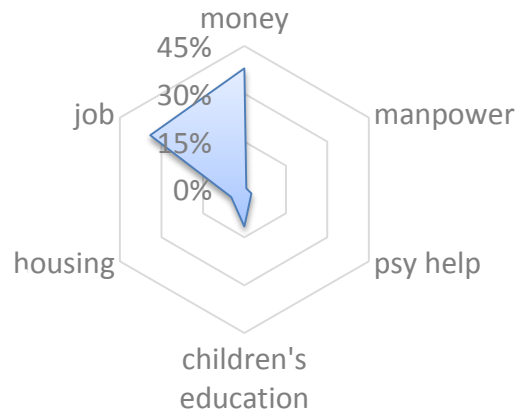
(1 mth after disaster)



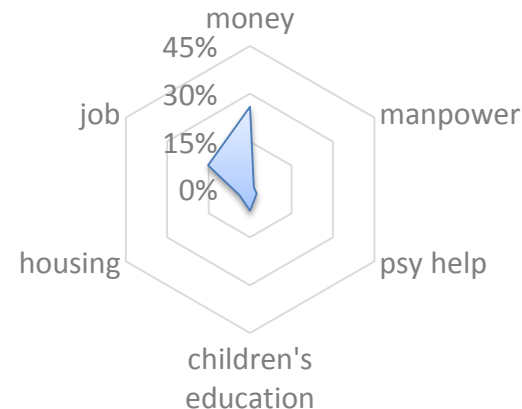
2011 (2 year after disaster)



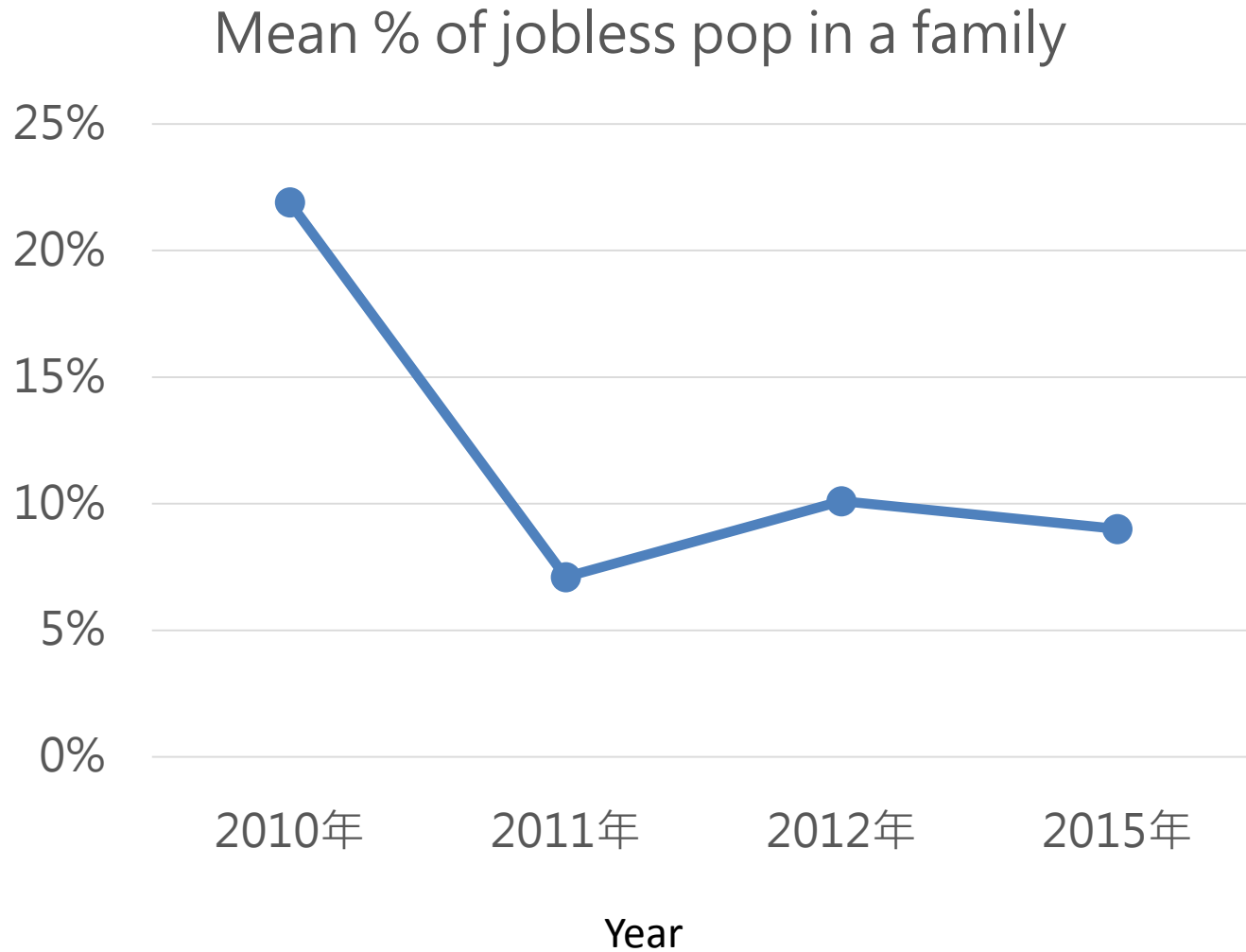
2012(3 year after disaster)



2015(6 year after disaster)



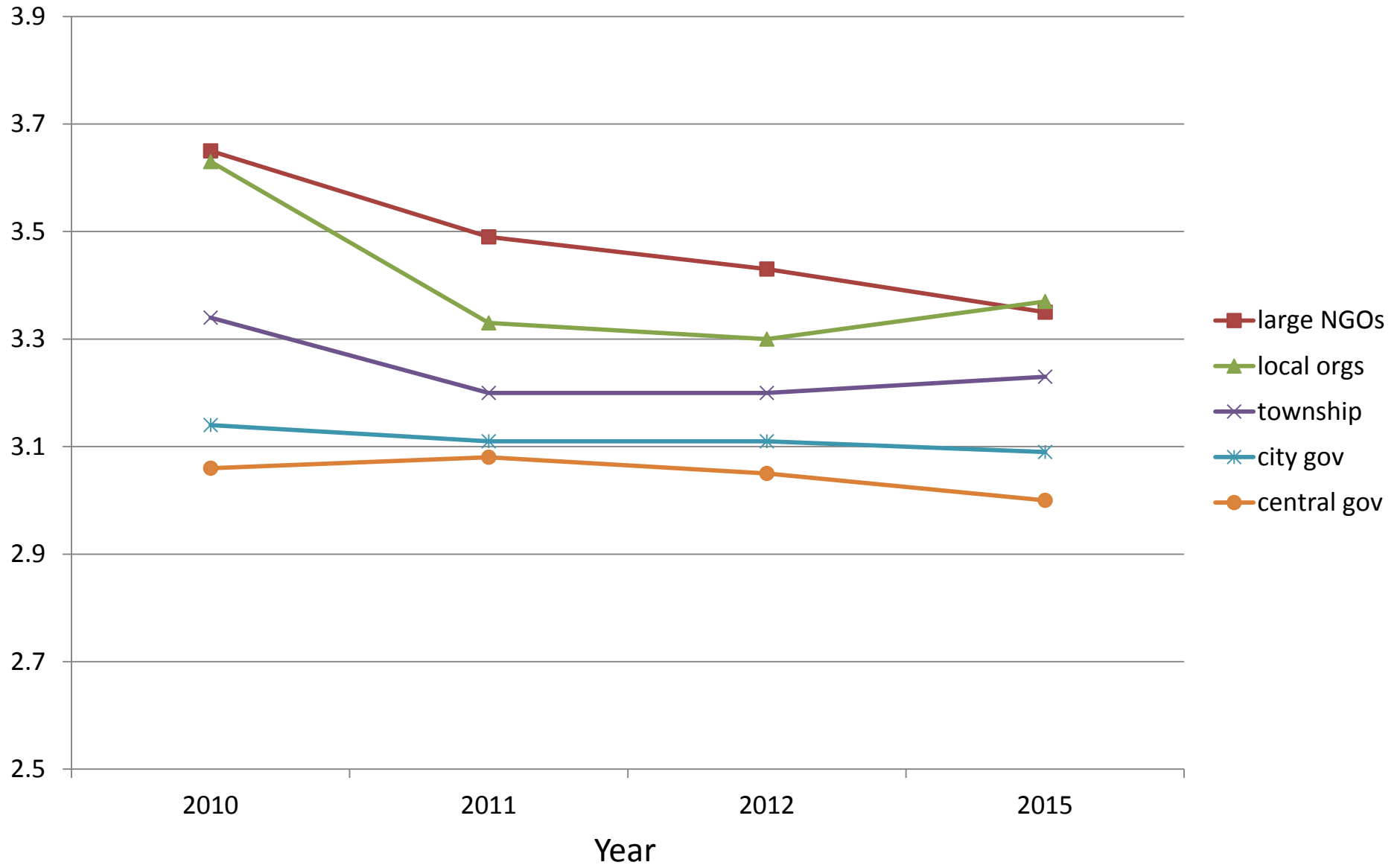
# Job Status



unemployment rate in Taiwan: 3.78 (2016/11)

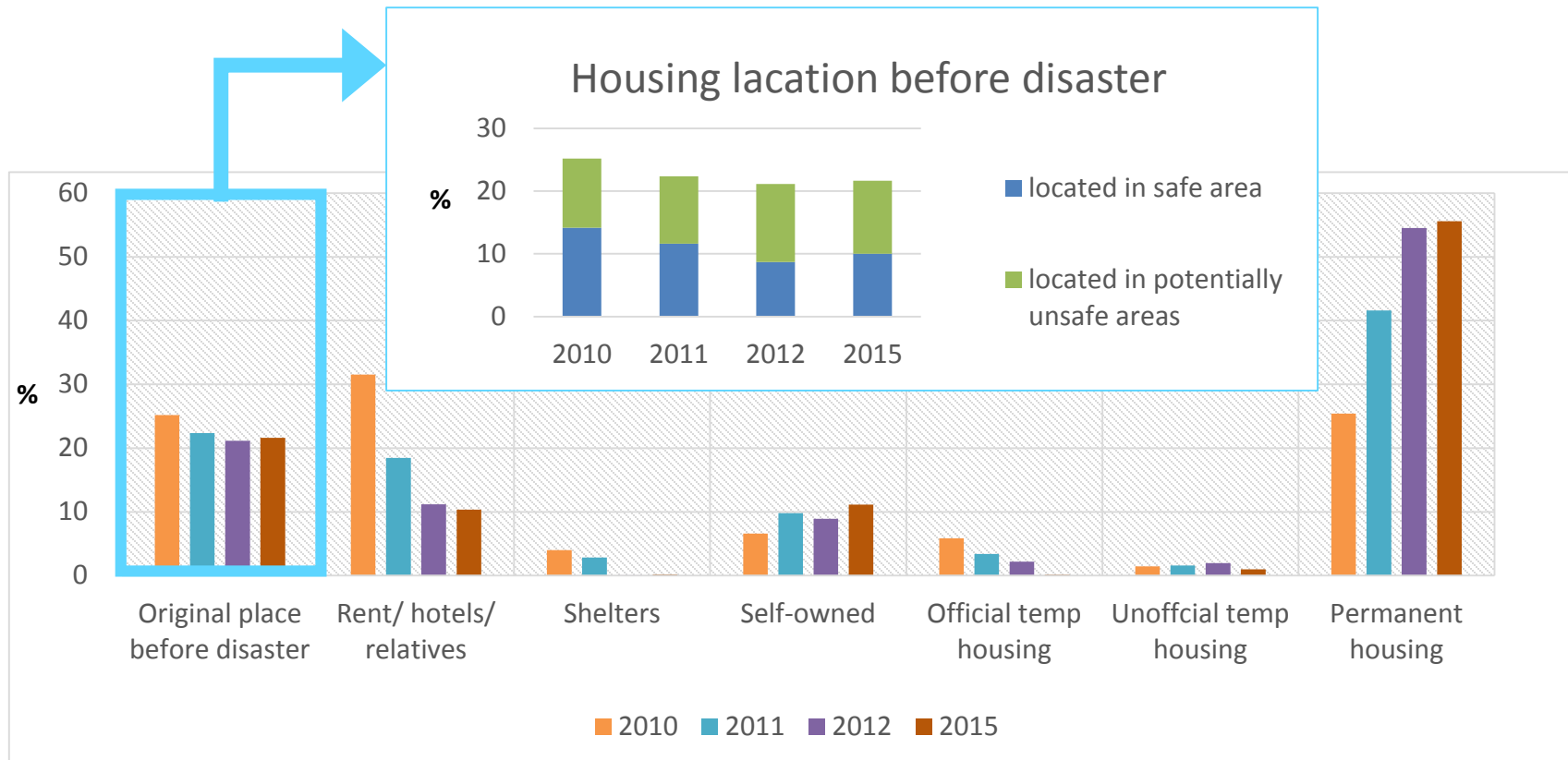


# Social Trust



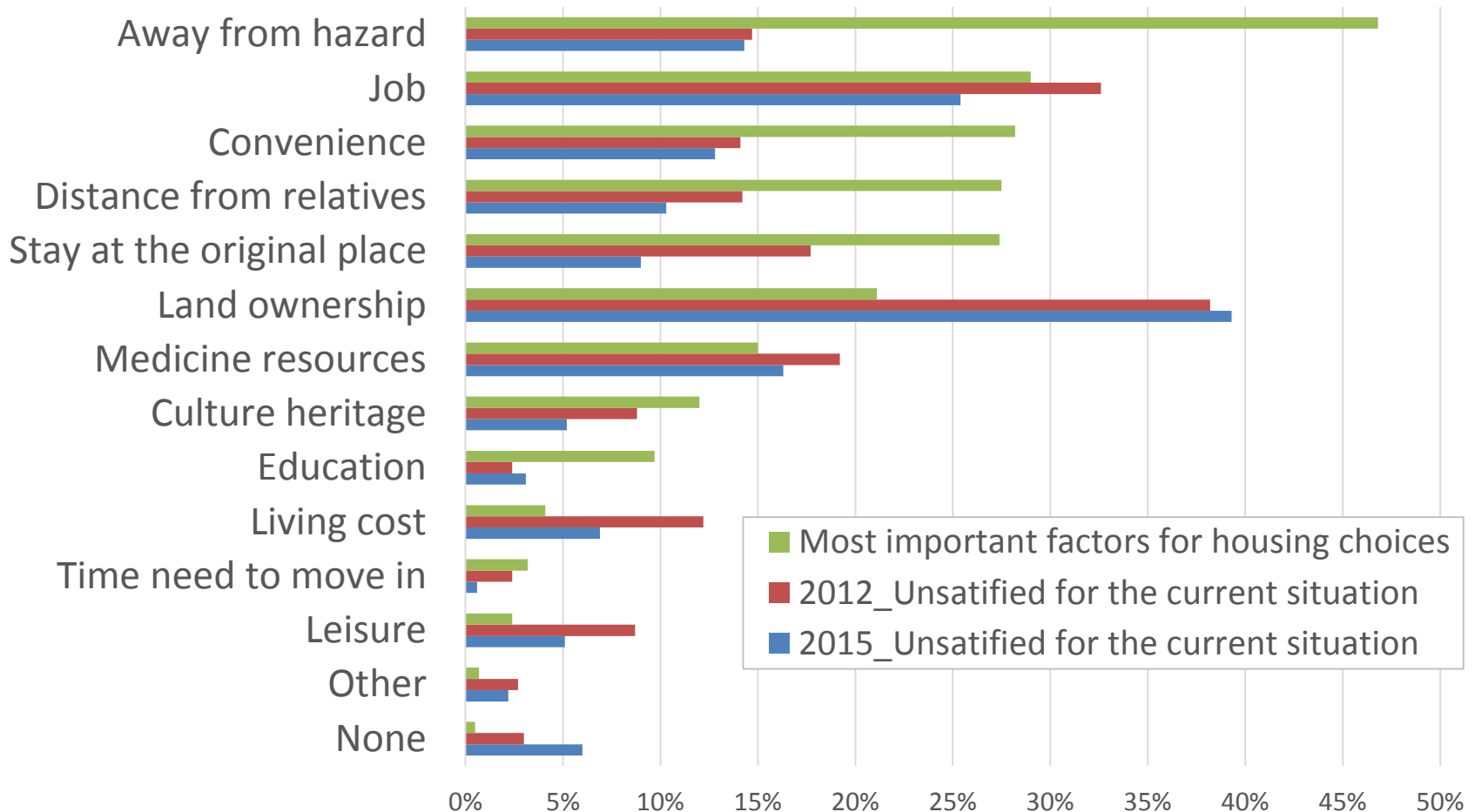
# Housing Type

- Over 88% of the interviewee's households **settled down** in 6 years. (the combined percentage of housing types “original place before disaster”, “self-owned” and “permanent housing” each year is 57.2%, 73.7%, 84.6%, and 88.3%)
- In the 6<sup>th</sup> year, 11.6% of the interviewed households still lived in their original places that were marked **as unsafe**.



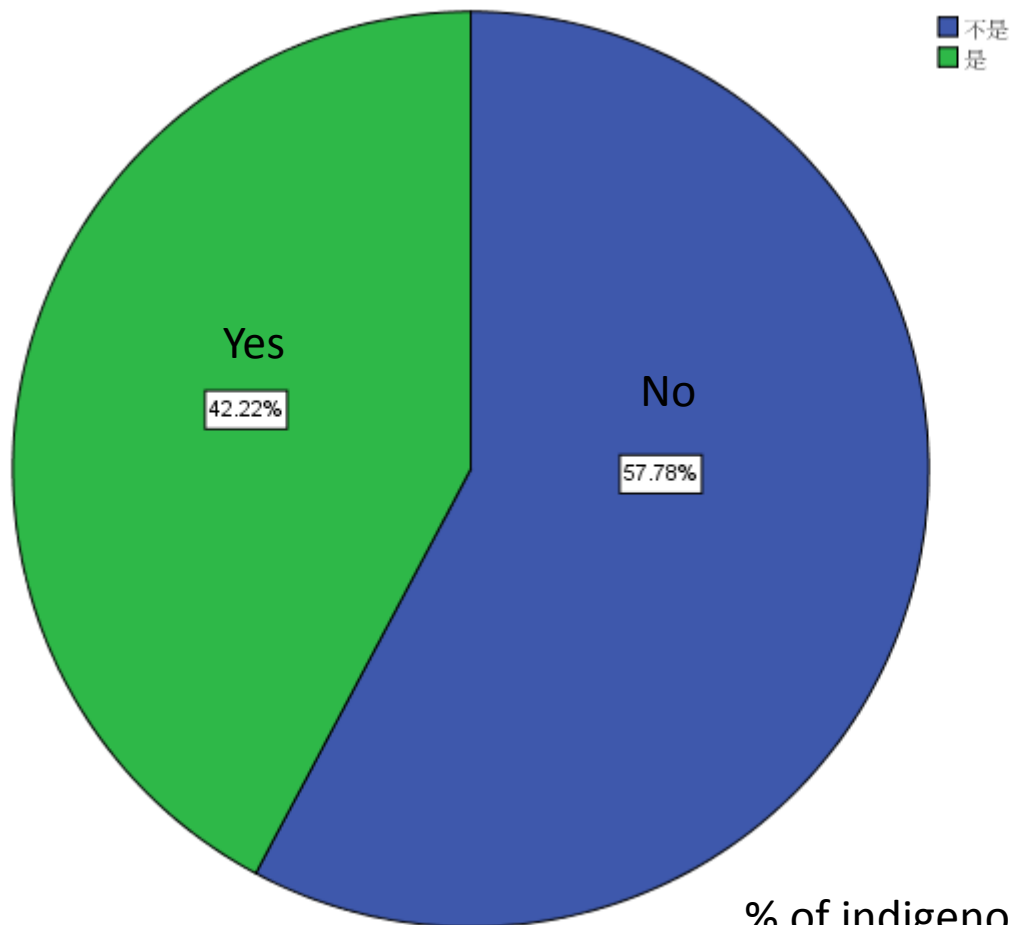
# Factors Affecting Housing Choices

- “away from hazards” and “job opportunities” are the most important factors for housing choices
- “land ownership” and “Job opportunities” are the most unsatisfied issues



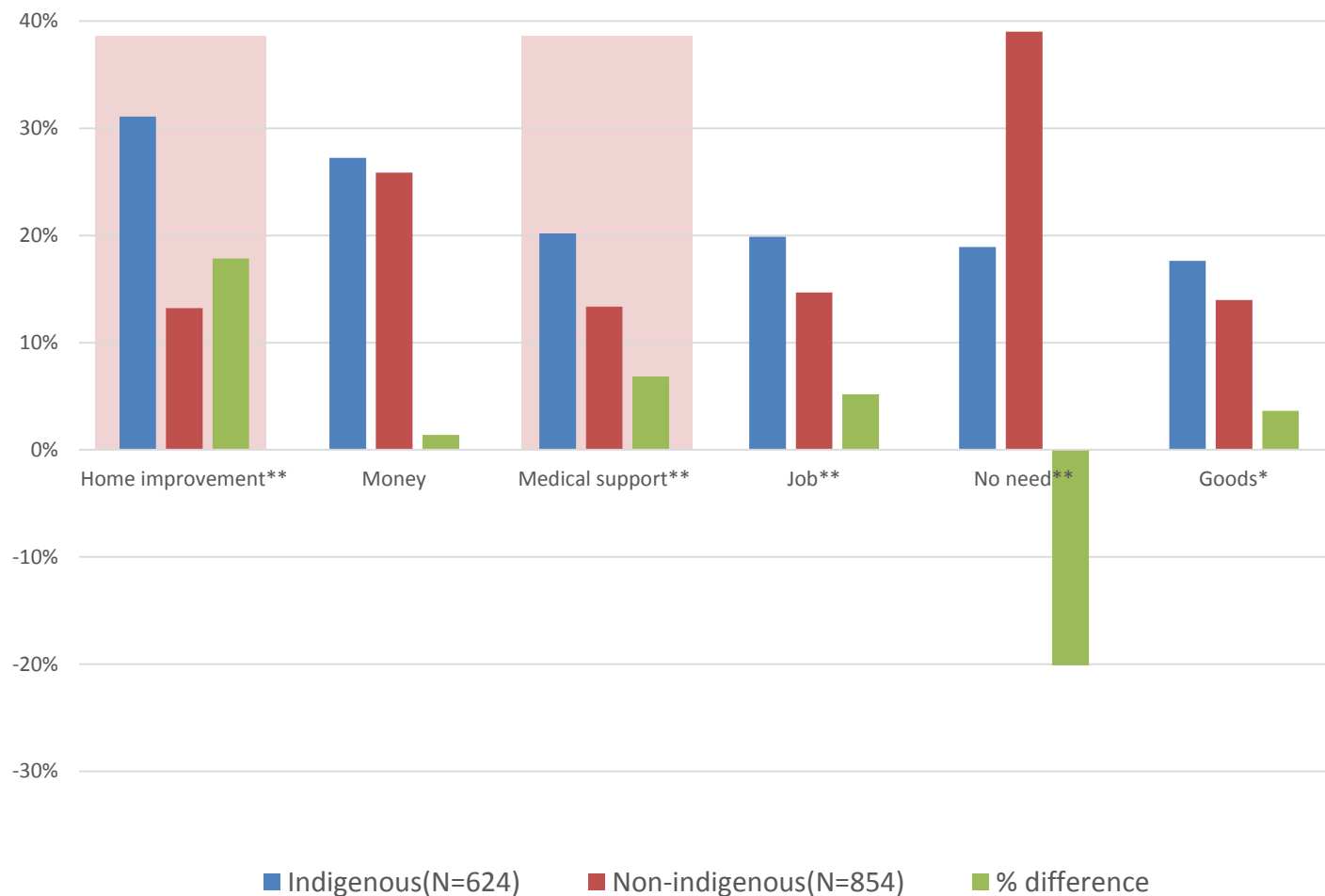
# % of Indigenous Family: the 4th wave

Do you consider your family as an indigenous family?

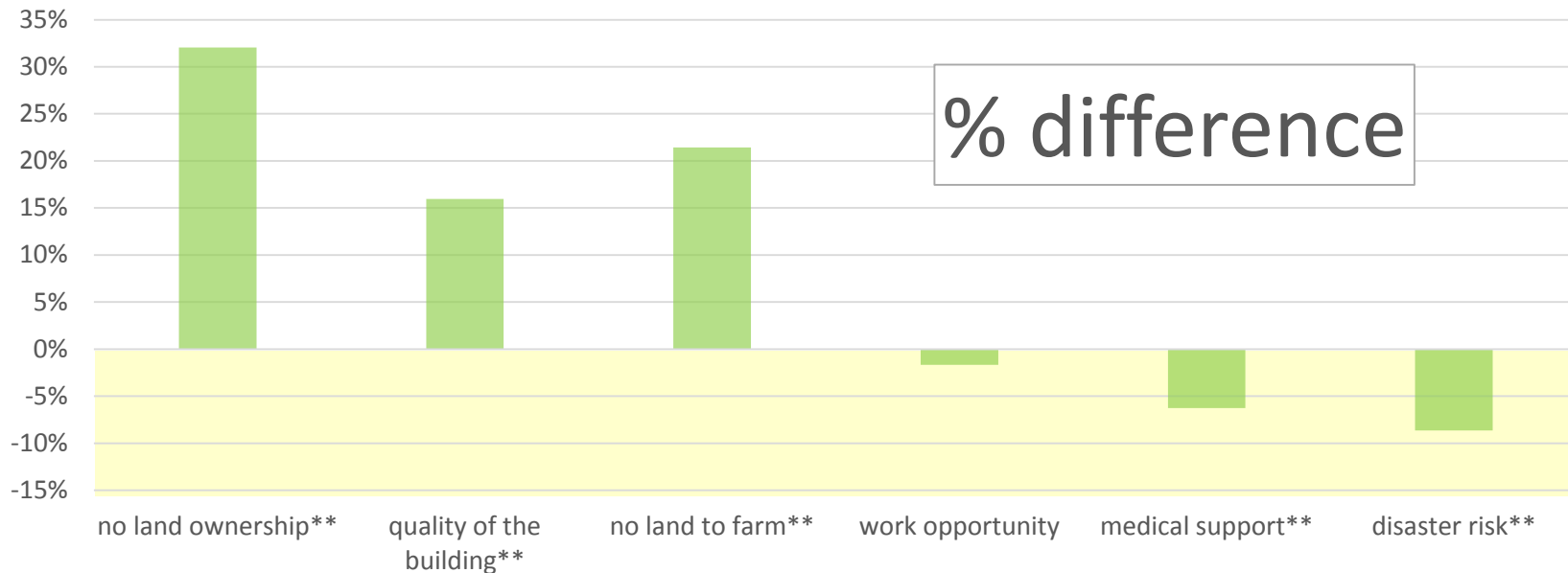
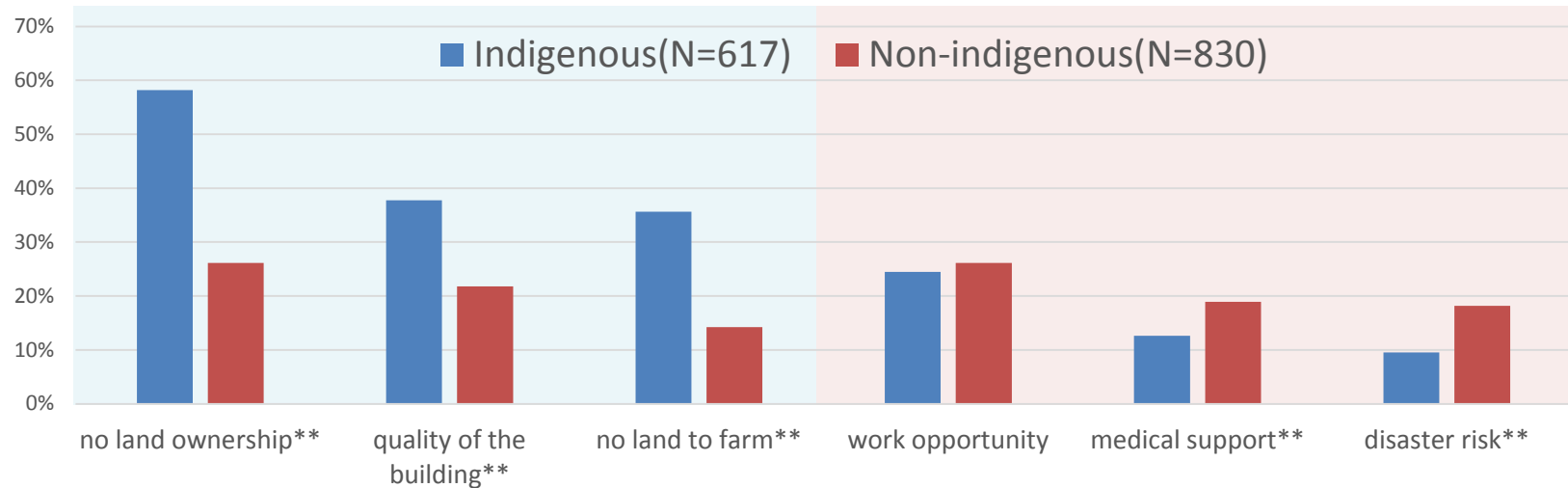


% of indigenous people in Taiwan~2.28%

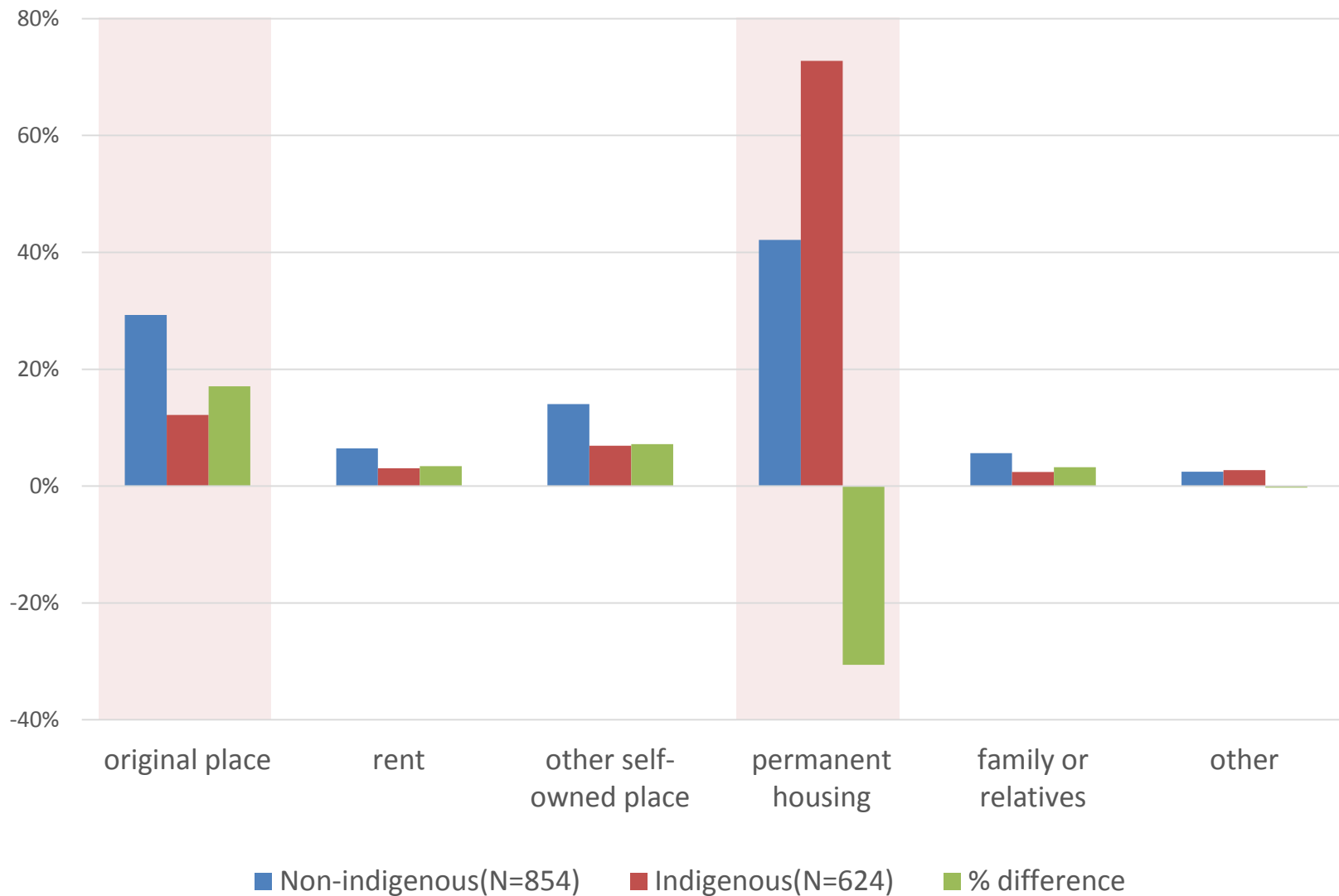
# Most Needed Resources: the 4th wave



# Unsatisfied w/ Current Situation: the 4th wave

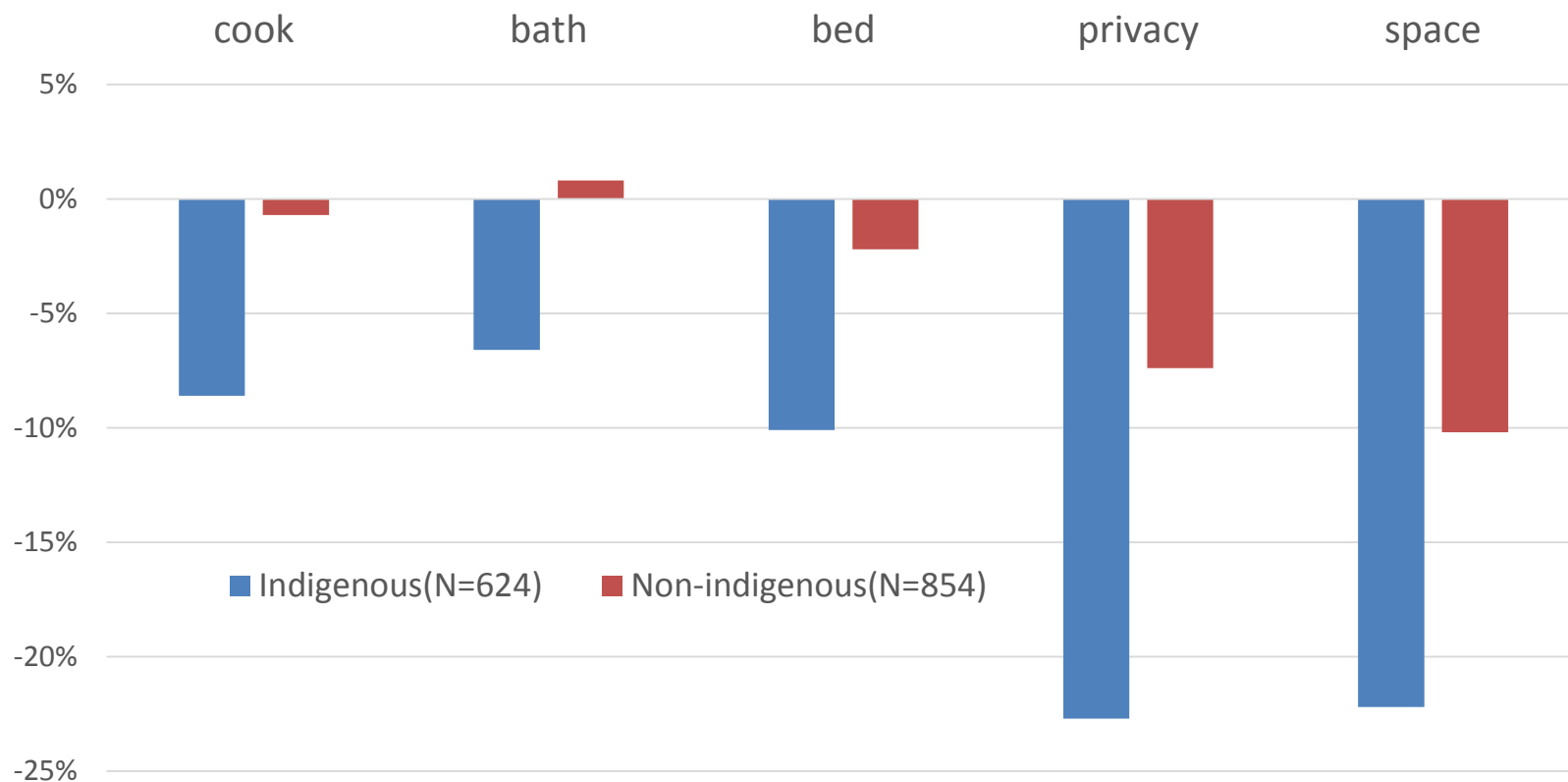


# Current Housing Type: the 4th wave



# Satisfied w/ Current Life Quality: the 4th wave

% of difference    **■**    now (% of satisfied)    **■**    before disaster (% of satisfied)





# Public Participation



			Participate in choosing the place to relocate					
			participate and influence	participate; no influence	be informed; no participation	not informed		
Indigenous family?	No	N	77	209	153	298	737	
		%	10.4%	28.4%	20.8%	40.4%	100.0%	
	Yes	N	92	283	130	90	595	
		%	15.5%	47.6%	21.8%	15.1%	100.0%	
Total			N	169	492	283	388	1332
			%	12.7%	36.9%	21.2%	29.1%	100.0%

			Participate in designing the public facilities after the disaster				
			participate and influence	participate; no influence	be informed; no participation	not informed	
Indigenous family?	No	N	51	189	171	351	762
		%	6.7%	24.8%	22.4%	46.1%	100.0%
	Yes	N	59	271	155	113	598
		%	9.9%	45.3%	25.9%	18.9%	100.0%
Total		N	110	460	326	464	1360
		%	8.1%	33.8%	24.0%	34.1%	100.0%

# Stable Income: the 4th wave

			Do you have stable income?		
			No	Yes	
Indigenous family?	No	N	89	406	495
		%	18.0%	82.0%	100.0%
	Yes	N	40	318	358
		%	11.2%	88.8%	100.0%
Total		N	129	724	853
		%	15.1%	84.9%	100.0%

# How does resilience matter? An empirical verification of the relationships between resilience and vulnerability



- This article is published in **Natural Hazards journal (2017)**  
doi:10.1007/s11069-017-2916-1.

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- **Contextual (starting-point) vulnerability**
  - represented by class inequality, lower education, ethnicity and family status
- **Outcome (end-point) vulnerability**
  - household's income recovery as a measurement
- **Resilience**
  - measured by social capital

Disaster Risk=fn(Hazard, Exposure, Contextual Vulnerability)

Outcome Vulnerability (recovery)=fn(Exposure, Contextual Vulnerability, 1/resilience)

- 4 hazard datasets
  - rainfall, flood, debris flow, and landslide data
- 2 social datasets
  - 臺灣社會變遷調查the Taiwan Social Change Survey (TSCS; representing nonvictims)
  - 3 waves of NCDR's Social Impact and Recovery Survey of Typhoon Morakot (SIRS; representing victims) from 2010 to 2012

**Table 3 Natural Hazards, Exposure, Contextual Vulnerability, and Disaster Risk**

	Homeless (=1) Logit (1)	Mortality rate OLS (%) (2)	Injury rate OLS (%) (3)	Log (economic loss) OLS (4)
<b>Natural hazards</b>				
Streams with debris	0.0031 (0.0573)	0.0275*** (0.0043)	0.0044 (0.0030)	0.0122*** (0.0026)
Precipitation (mm)	0.0022*** (0.0005)	0.0000* (0.0000)	0.0001* (0.0000)	0.0001*** (0.0000)
Depth of flood (m)	1.0719*** (0.2837)	-0.1908*** (0.0322)	-0.0155 (0.0317)	-0.0618** (0.0215)
Landslide area (km <sup>2</sup> )	8.3995*** (2.4534)	0.0625*** (0.0097)	0.0344** (0.0115)	0.1182*** (0.0100)
<b>Exposure</b>				
Family size before Morakot	0.1128* (0.0543)	0.0038** (0.0013)	-0.0010 (0.0007)	0.0021* (0.0009)

**Table 3 Natural Hazards, Exposure, Contextual Vulnerability, and Disaster Risk**

	Homeless (=1) Logit (1)	Mortality rate OLS ( % ) (2)	Injury rate OLS ( % ) (3)	Log (economic loss) OLS (4)
<b>Contextual vulnerability</b>				
Control class	1.1323* (0.4791)	0.0065 (0.0062)	0.0061* (0.0028)	0.0056 (0.0045)
Clerk	0.6613 (0.4522)	-0.0041 (0.0056)	0.0039 (0.0026)	-0.0010 (0.0040)
Manual worker	1.0658** (0.3939)	0.0061 (0.0055)	0.0045* (0.0023)	0.0040 (0.0039)
Farmer	2.1246*** (0.4948)	-0.0346** (0.0106)	0.0051 (0.0067)	0.0172 (0.0125)
Unemployed	2.4464*** (0.4114)	-0.0036 (0.0088)	0.0156** (0.0059)	0.0085 (0.0069)
Year of schooling	-0.1674*** (0.0315)	-0.0012* (0.0005)	-0.0005 (0.0003)	-0.0011** (0.0004)
Aboriginal	4.3872*** (1.0962)	-0.1535 (0.1397)	0.5047 (0.4583)	0.3682 (0.3550)
Married	-1.1711*** (0.2630)	-0.0207*** (0.0055)	-0.0063* (0.0026)	-0.0139*** (0.0038)
Constant	-3.1098*** (0.6679)	-0.0008 (0.0176)	-0.0366 (0.0234)	-0.0653*** (0.0195)
R-square		0.0197	0.0133	0.1597
adj. R-square		0.0123	0.0057	0.1533
pseudo R-square	0.7615			
Log likelihood	-253.2575			

Note: N = 1,719; \*p < .05; \*\*p < .01; \*\*\*p < .001

**Table 4 Household Income Pre- and Post-disaster (Outcome Vulnerability), 2009–2012**

	Logged annual household income	
	Before Morakot (2009)	During 2009–2012
	OLS (5)	Fixed-effect model (6)
<b>Exposure</b>		
Family size	0.0476** (0.0177)	0.4510*** (0.0828)
<b>Contextual Vulnerability</b>		
Control class	0.7641** (0.2586)	0.3347 (0.1789)
Clerk	0.7376** (0.2328)	0.5947** (0.1878)
Manual worker	0.6869*** (0.1981)	0.3508* (0.1529)
Farmer	0.4988* (0.1961)	0.3475* (0.1613)
Unemployed	-0.7353*** (0.2163)	-1.0250*** (0.1408)
Year of schooling	0.0875*** (0.0169)	0.0147 (0.0199)
Aboriginal	-0.2830* (0.1293)	-0.1067 (0.3255)
Married	0.2620* (0.1306)	0.0646 (0.1696)



**Table 4 Household Income Pre- and Post-disaster (Outcome Vulnerability), 2009–2012**

	Logged annual household income	
	Before Morakot (2009)	During 2009–2012
	OLS (5)	Fixed-effect model (6)
<b>Resilience</b>		
Meeting with neighbors, weekly	0.2680** (0.0970)	0.1043 (0.0541)
Logged aid from kinfolk/friends		0.0015 (0.0135)
Logged aid from institutions		-0.0115 (0.0101)
Year dummy 2010		0.0663 (0.1448)
Year dummy 2011		0.2084* (0.0987)
Year dummy 2012		0.5533*** (0.0988)
Constant	9.9731*** (0.3488)	9.0122*** (0.5712)
N	1,157	4,585
R-square	0.1325	
adj. R-square	0.1249	
R-square within		0.0617
R-square between		0.1149
R-square overall		0.0668

Note: \*p < .05; \*\*p < .01; \*\*\*p < .001

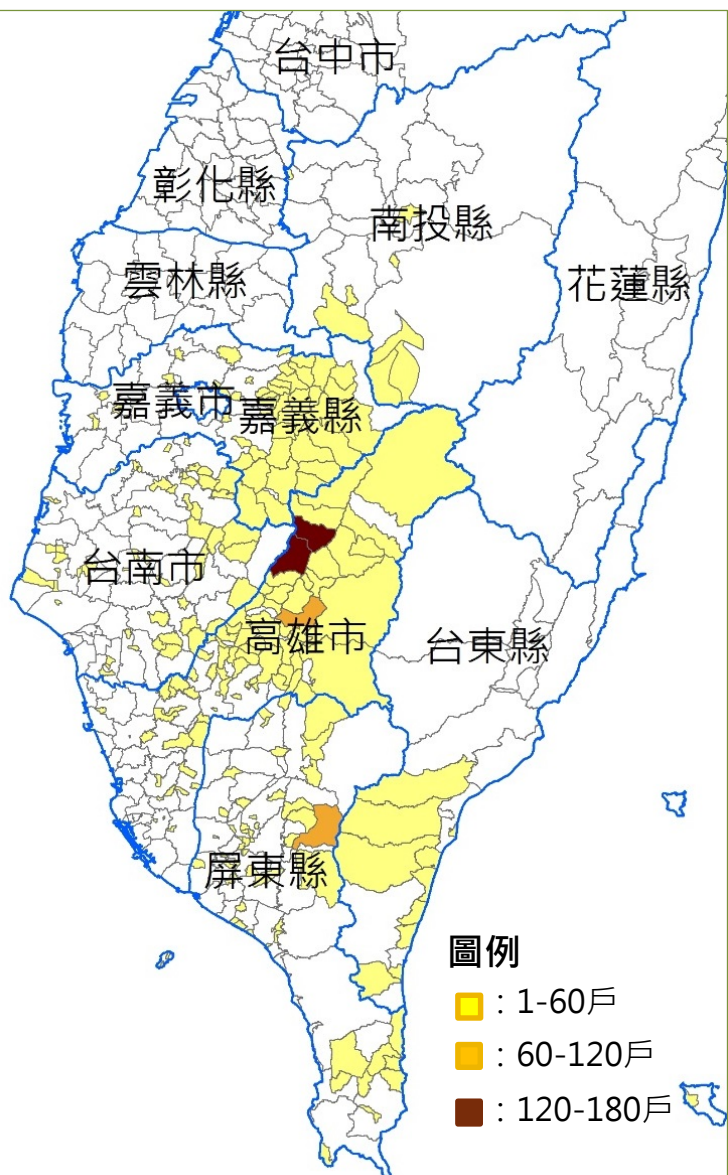
- **Contextual vulnerability** was shaped by lower social class, lower education, indigenous population, and single or unmarried family and had impacts on disaster risk.
- **Social capital** as a key factor of **resilience** was found **significant** to enhance household income **before** the occurrence of a disaster.
- But the effect of social capital to accelerate income recovery as a form to evaluate **outcome vulnerability** in the **post** disaster phase was found very **restricted**.



**Thanks for Your Attention**



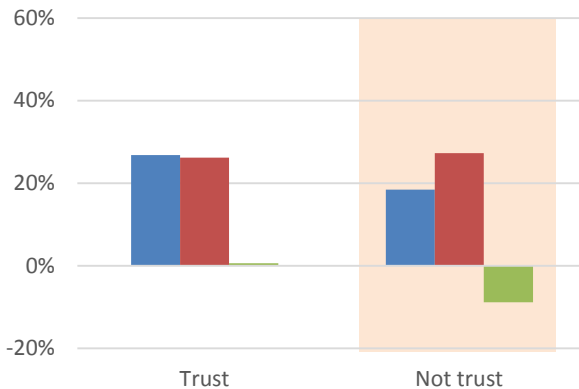
# 調查戶數



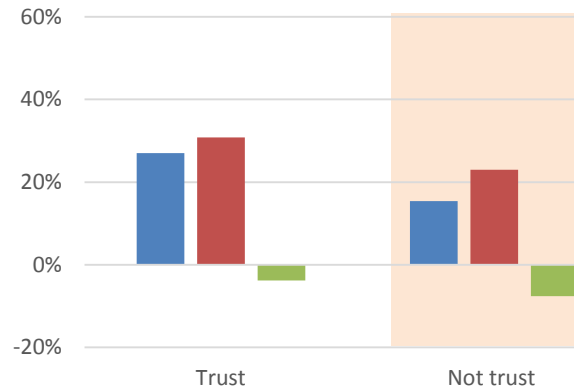
縣市	安遷救助 金申請數	2010年 完訪數	2011年 完訪數	2012年 完訪數	2015年 完訪數
臺東縣	141	140	138	135	134
臺南市	87	86	118	99	88
南投縣	40	39	39	37	36
屏東縣	367	364	341	337	322
高雄市	902	817	758	726	702
嘉義縣	217	212	208	208	204
總戶數	1,754	1,658	1,602	1,542	1,481
相同 受訪者數	--	1,658	1,357	1,194	988

# Social Trust: the 4th wave

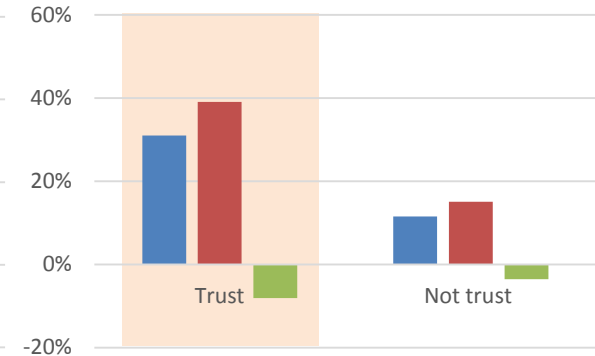
## Central Gov.



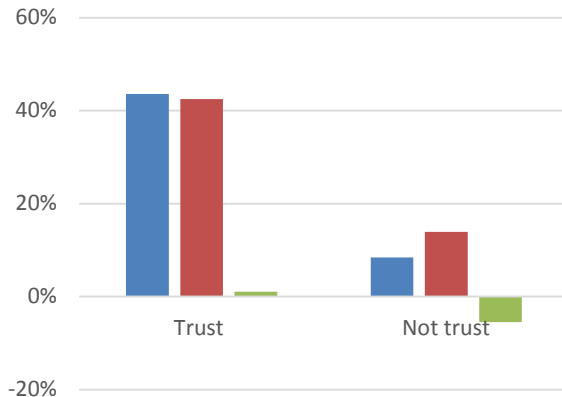
## City Gov.



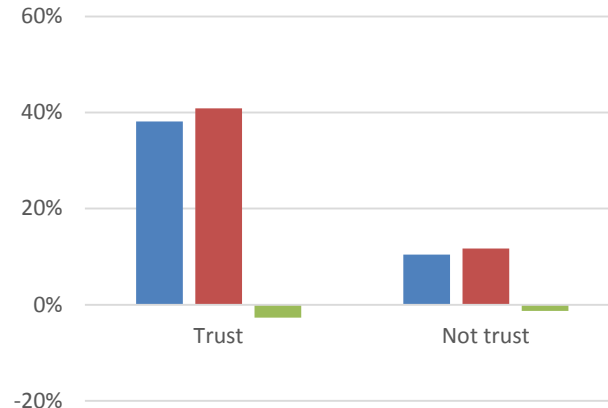
## County Gov.



## Large NGO



## Village Leader/Local Org.

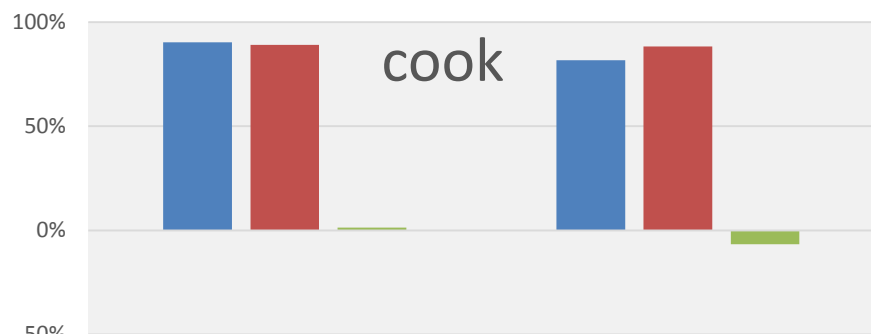


■ Non-indigenous(N=844)

■ Indigenous(N=615)

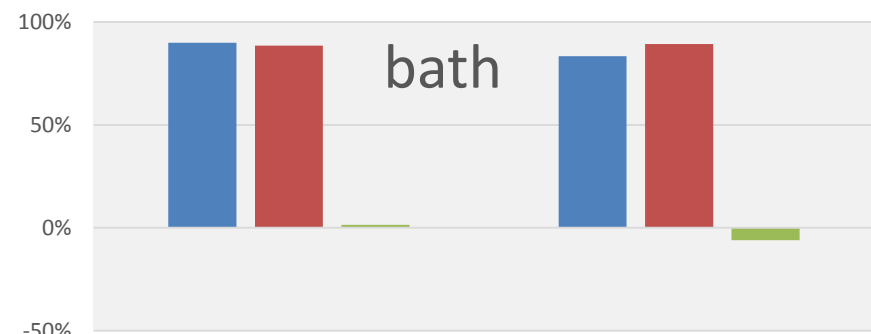
■ % Difference

# Satisfied w/ Current Life Quality: the 4th wave



before disaster

now



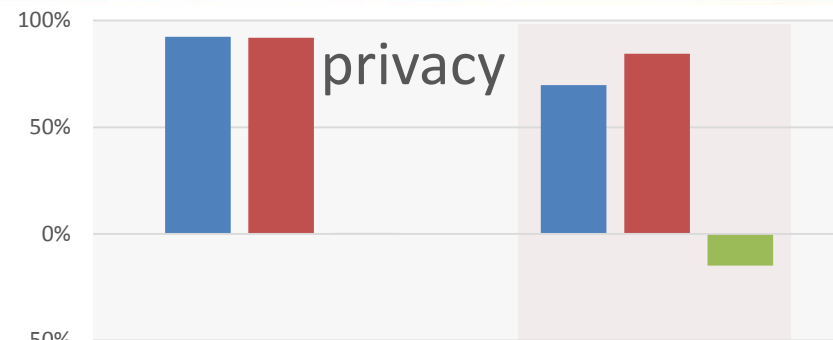
before disaster

now



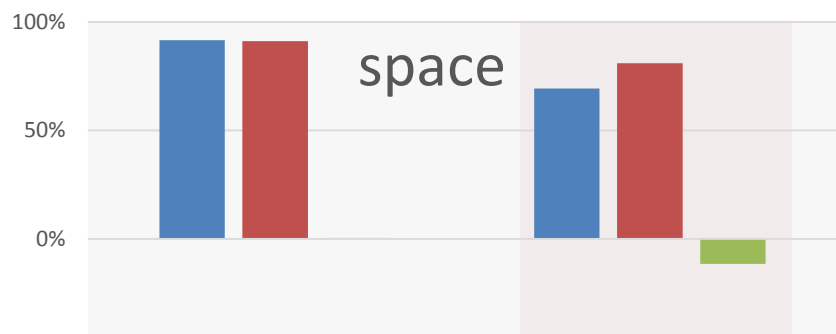
before disaster

now



before disaster

now



before disaster

now

Non-indigenous(N=844)

Indigenous(N=615)

% Difference