



行政法人 國家災害防救科技中心
National Science and Technology Center
for Disaster Reduction

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

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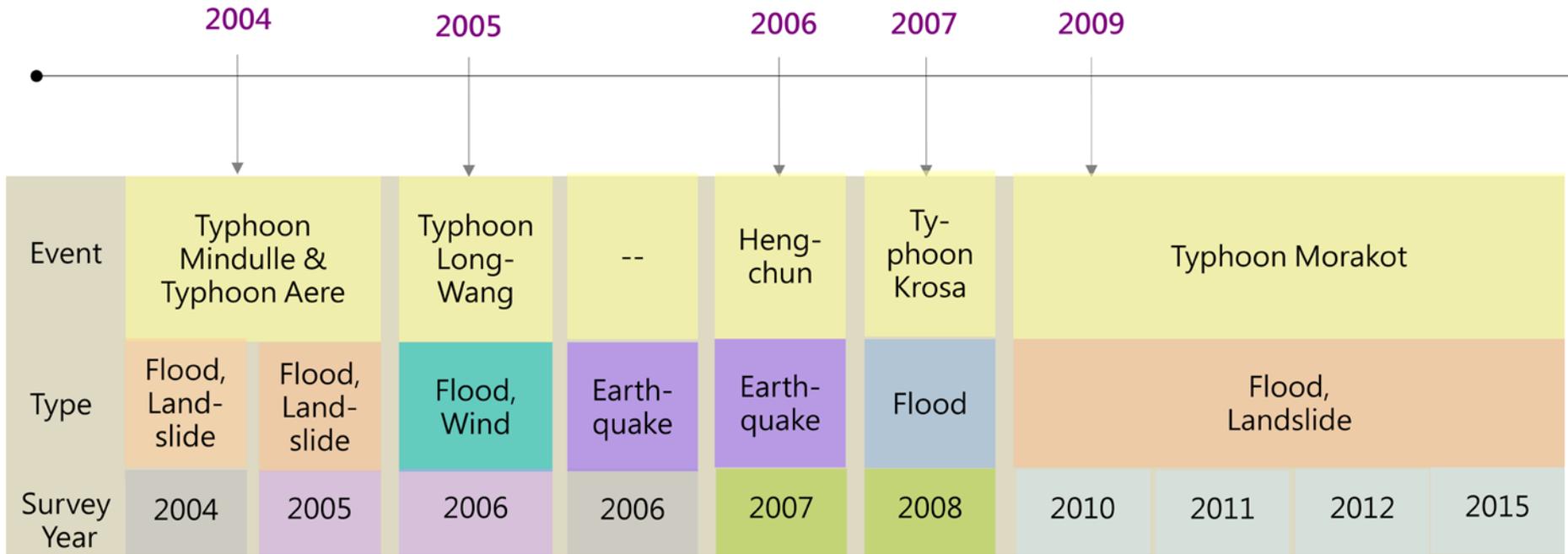
National Science and Technology Center for Disaster Reduction (NCDR), Taiwan

2017.07.18

Disaster Social Survey Done by NCDR



Year of Disaster Event



Upcoming data: 0206 Earthquake, Year 2016

Issues covered:

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

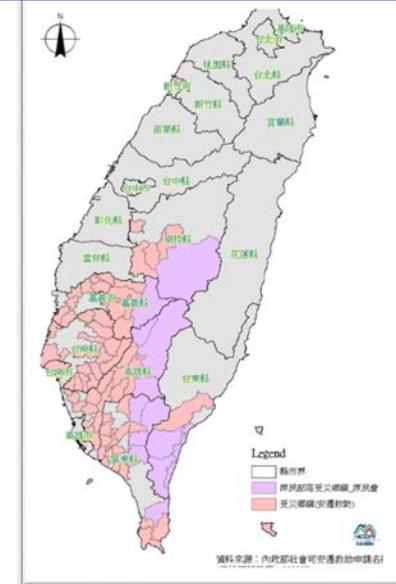
Data Application:

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

4-year panel data

	Population	Year 2010	Year 2011	Year 2012	Year 2015
Same households successfully interviewed	1,754	1,658	1,602	1,542	1,481 84%
Same person 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

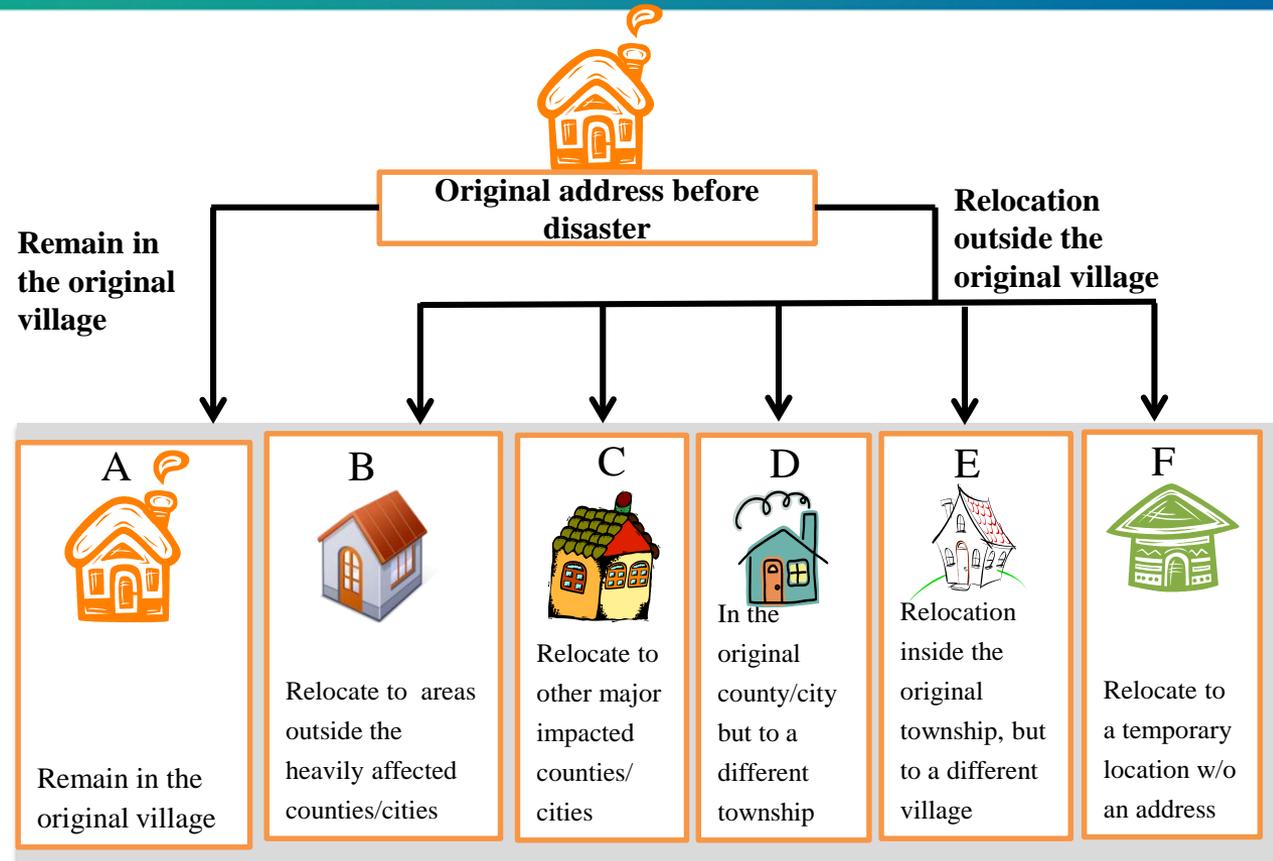
Major Challenge when Conducting the Survey



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

A	B	C	D	E	F
Each Interviewer has their own responsibility of survey area	NCDR is responsible for transportation fees	Negotiate b/w county /city gov's	The subjects are reassigned to the nearby interviewers		

Topics of Survey Questions



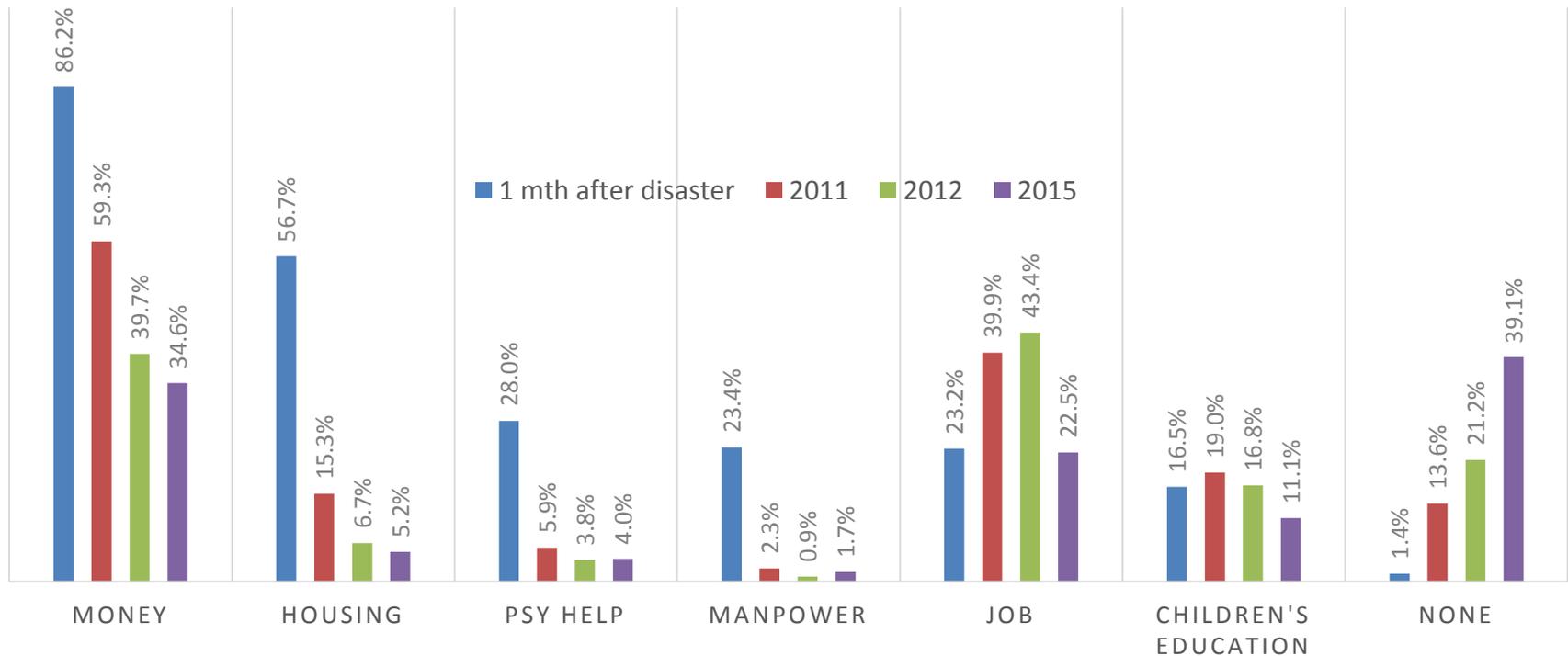
Survey year	Social							Psychological			Economic		Housing			
	Social network	Disabled	Mitigation	Trust	Evacuation/Shelter	Demand/supply	Resources	General recovery	Risk perception	Coping	Health	Household loss	Unemployment	Communication about relocation	Permanent housing	Living quality
2010	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓
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 2nd wave
- Needs of job and children' s education increased in the 2nd wave and **remained important** in the 4th wave

“the resources I needed within one year”

(Multi-response questions)

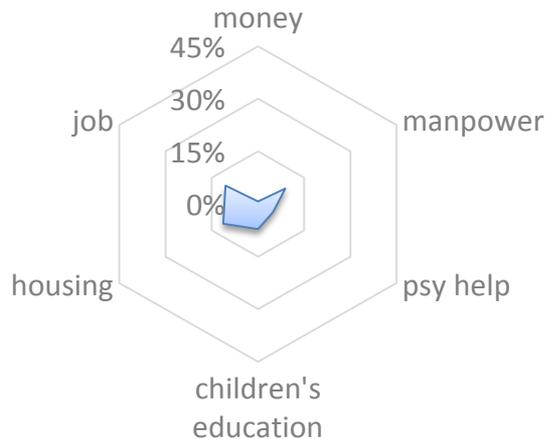


Gaps b/w Needs and Assistances Received

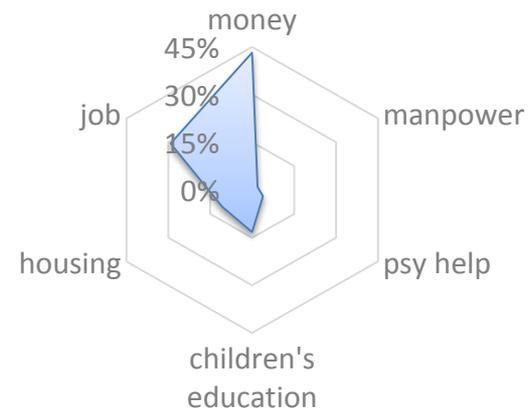


The needed resources which did NOT received

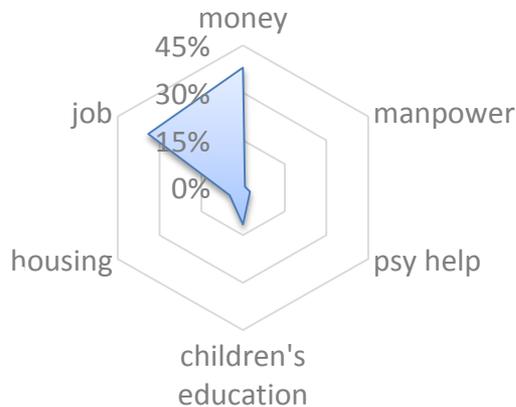
(1 mth after disaster)



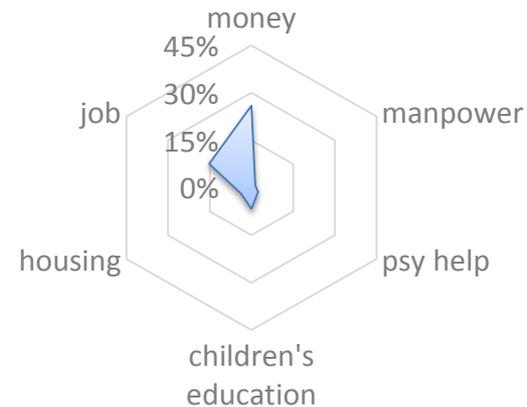
2011 (2 year after disaster)



2012(3 year after disaster)



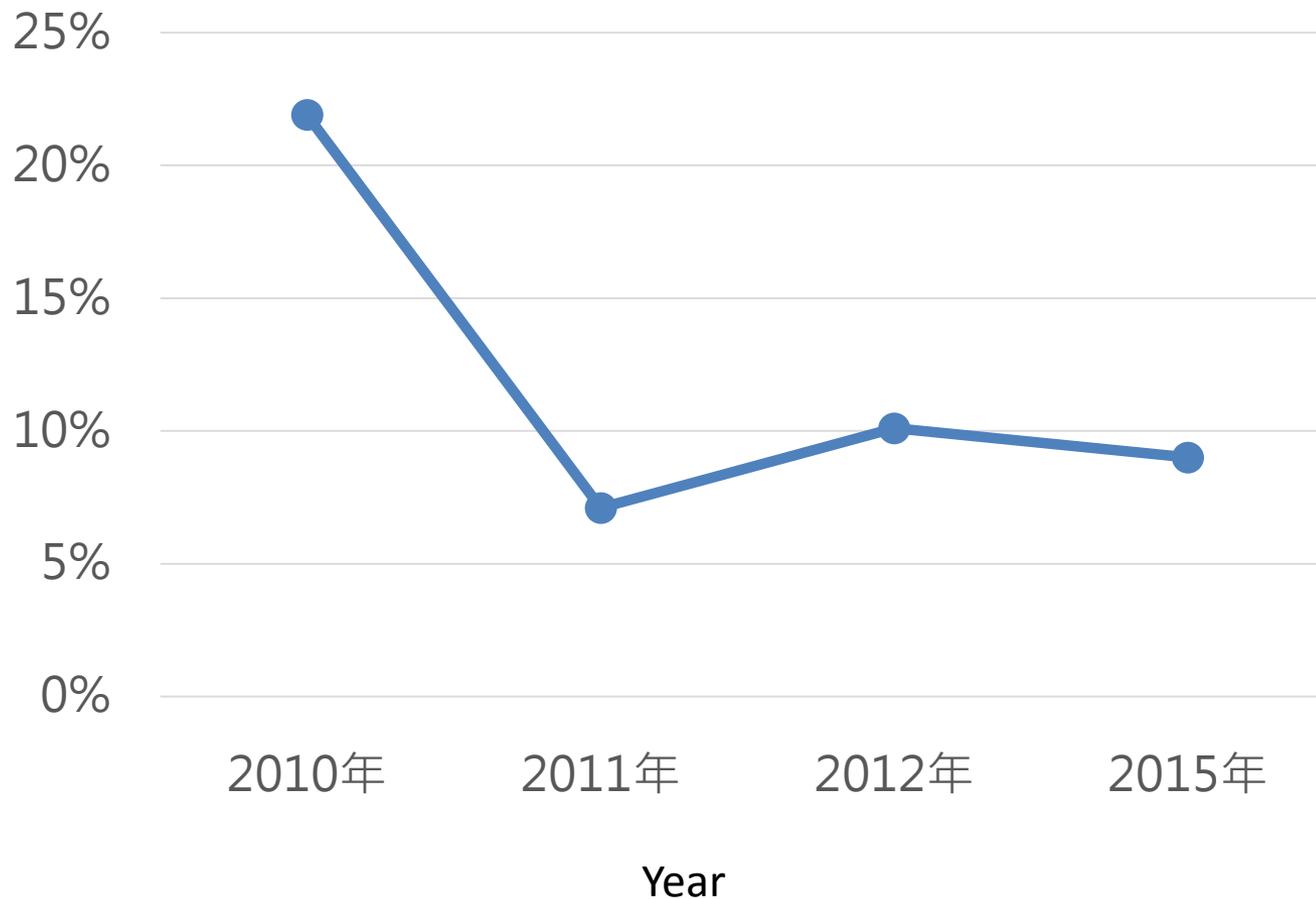
2015(6 year after disaster)



Job Status

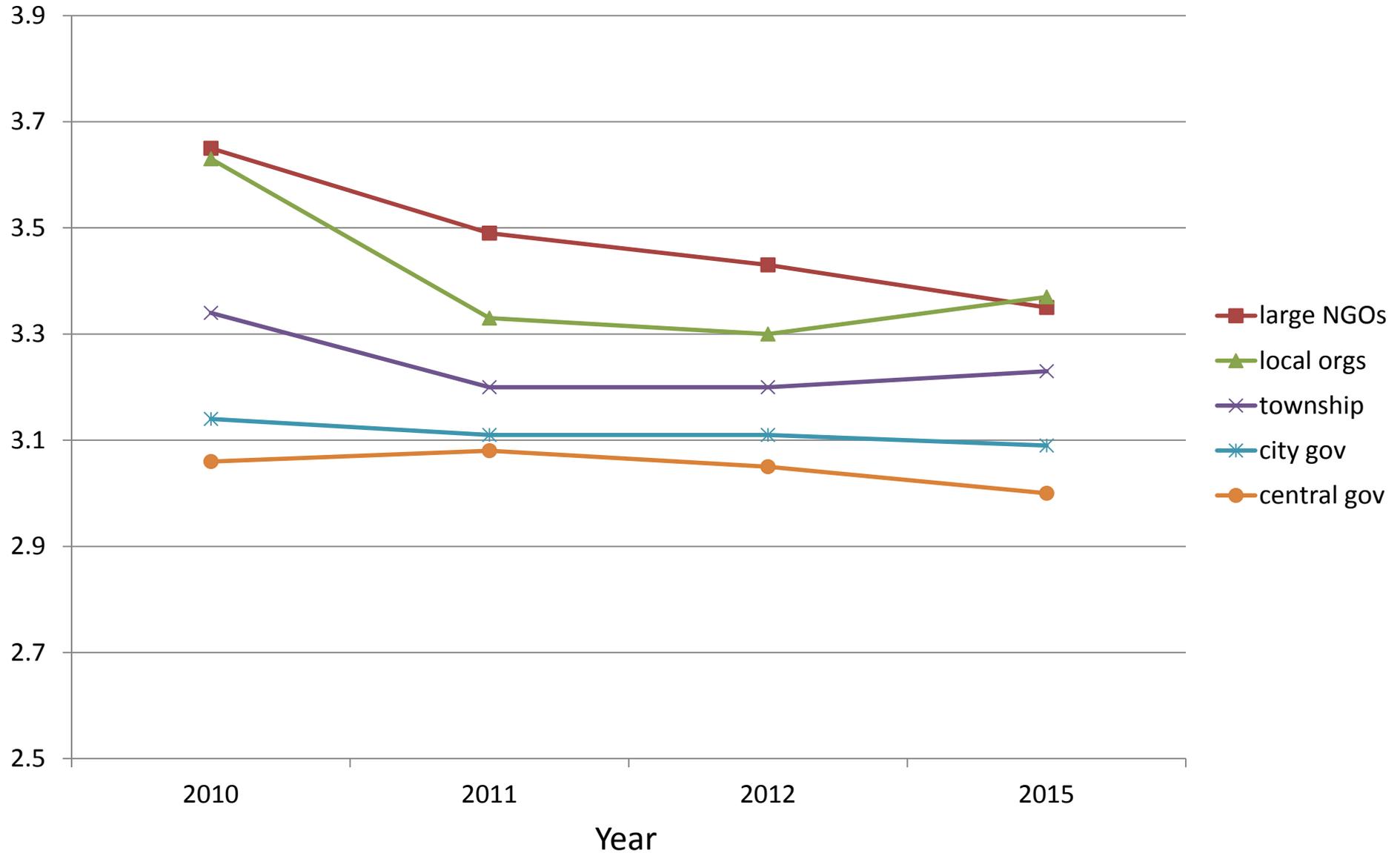


Mean % of jobless pop in a family



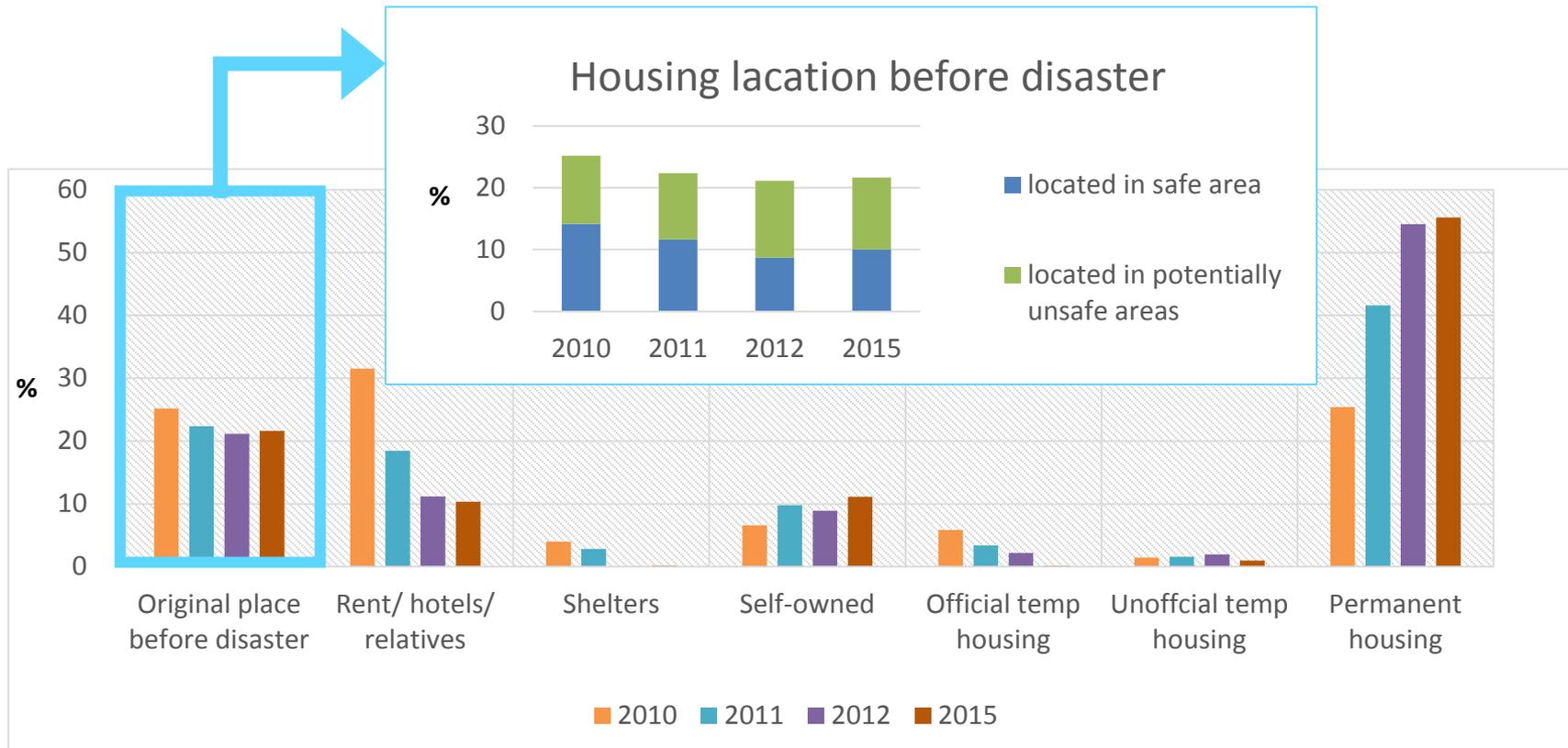
unemployment rate in Taiwan: 3.78 (2016/11)

Social Trust



Housing Type

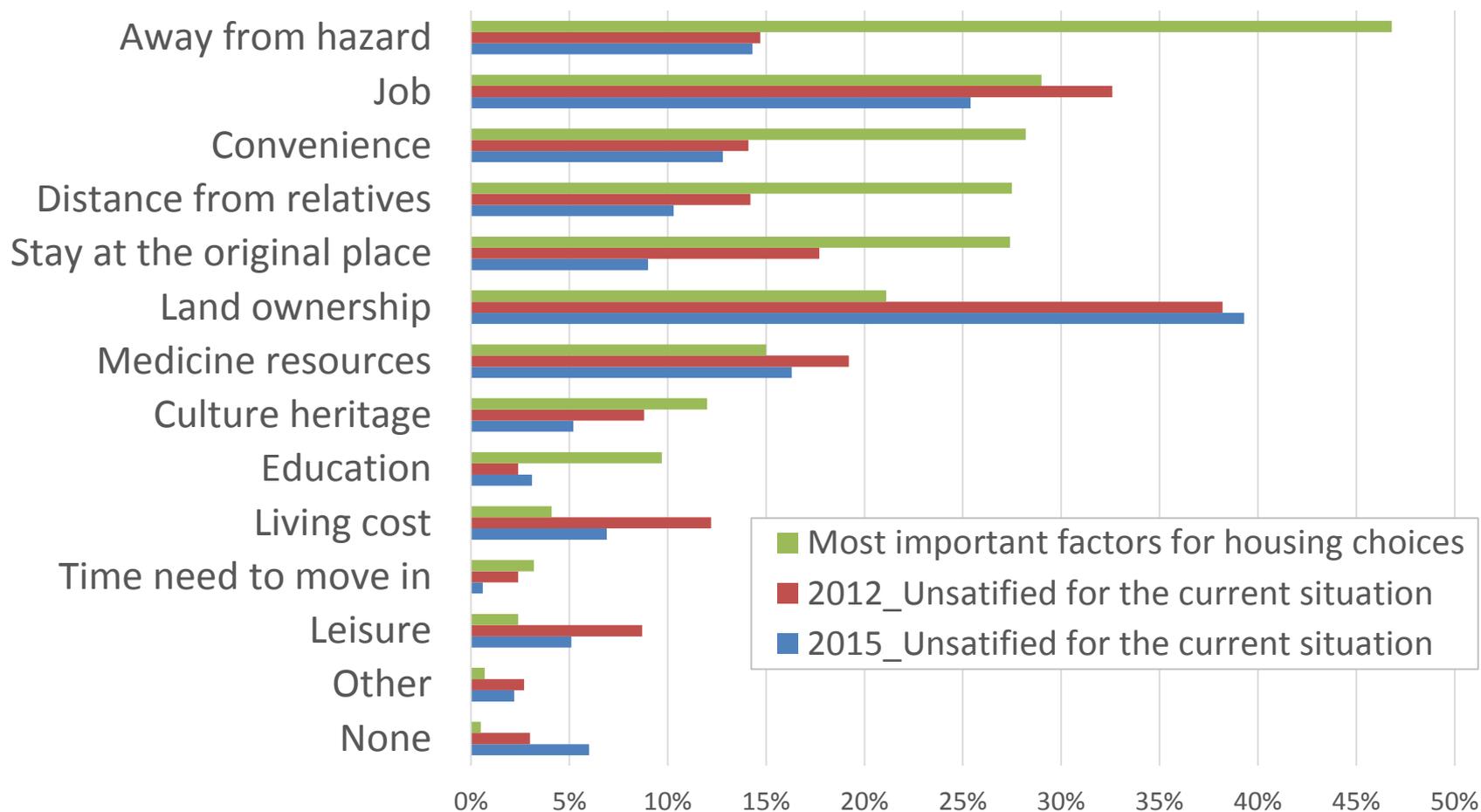
- Over 88% of the interviewee's households **settled down** in 6 years. (the combined percentage of housing types “original place before disaster”, “self-owned” and “permanent housing” each year is 57.2%, 73.7%, 84.6%, and 88.3%)
- In the 6th year, 11.6% of the interviewed households still lived in their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



Factors Affecting Housing Choices

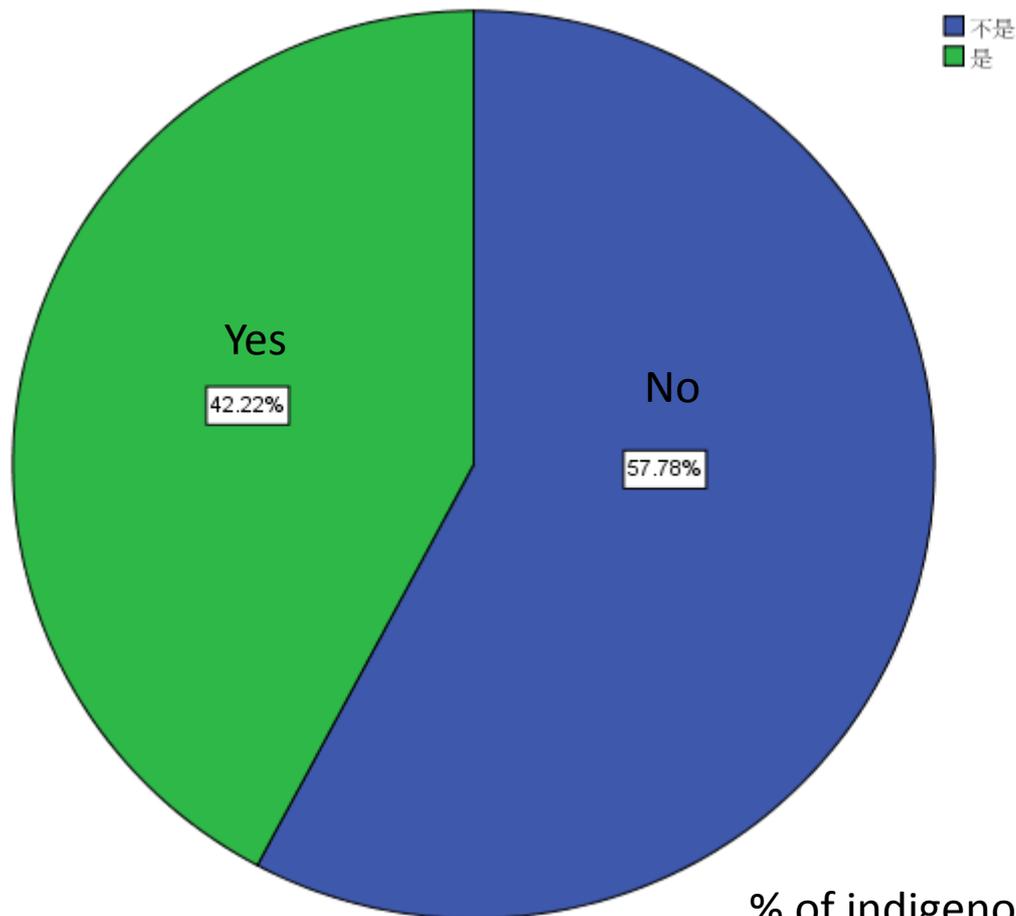


- “away from hazards” and “job opportunities” are the most important factors for housing choices
- “land ownership” and “Job opportunities” are the most unsatisfied issues



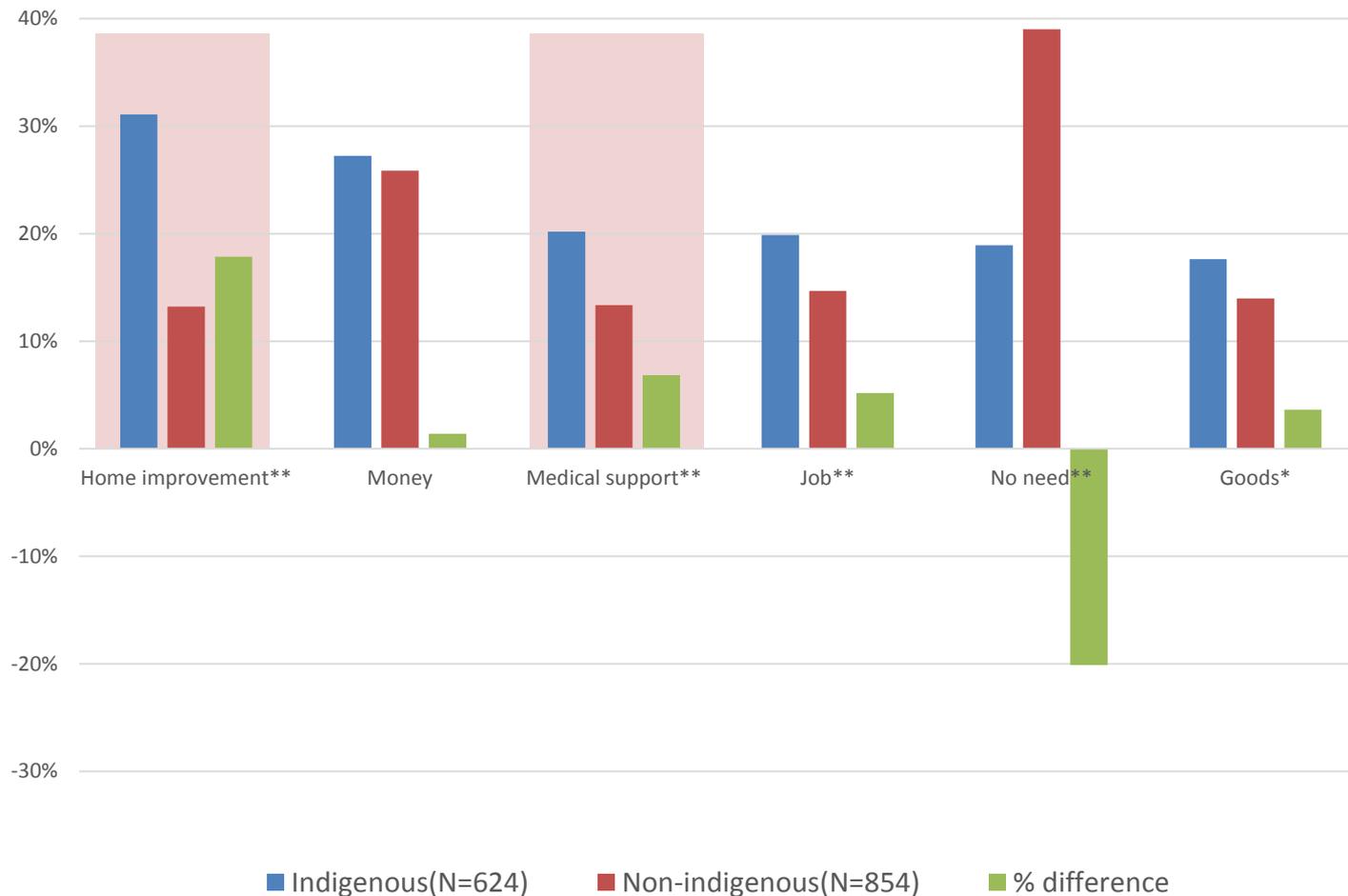
% of Indigenous Family: the 4th wave

Do you consider your family as an indigenous family?

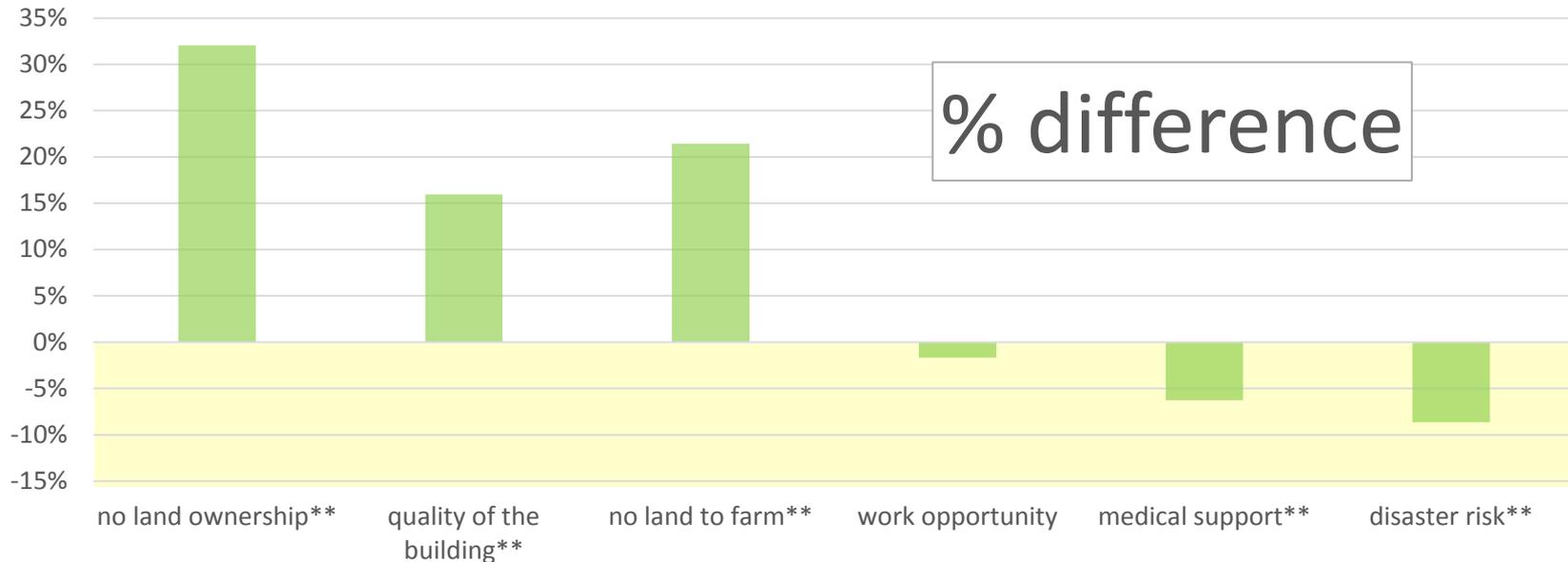
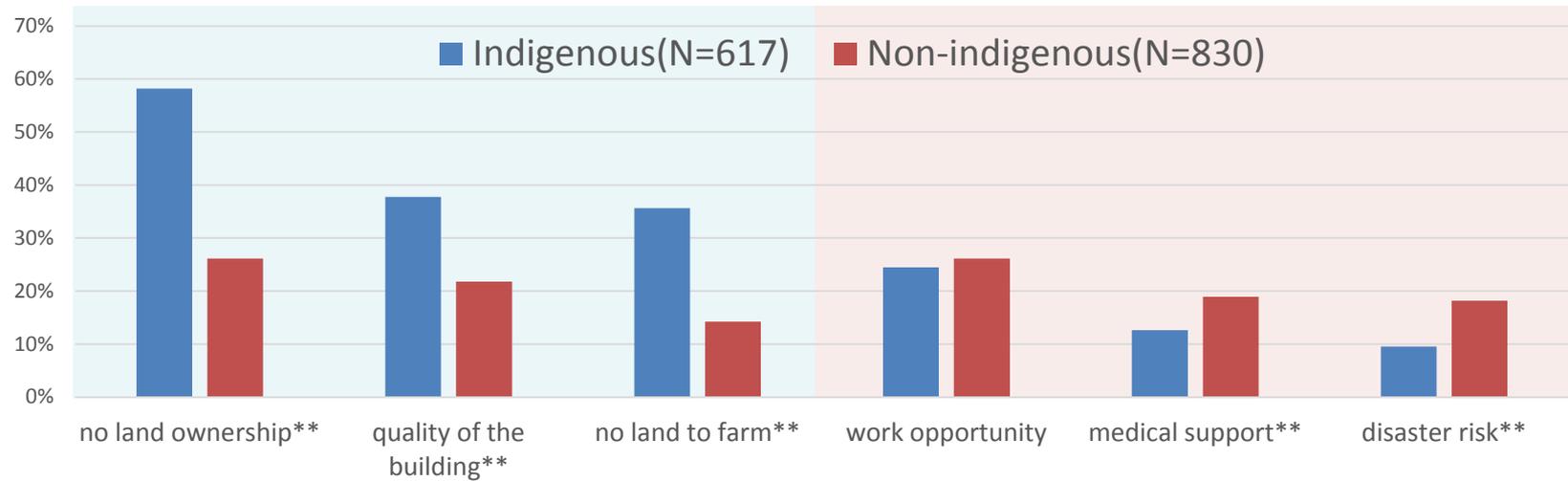


% of indigenous people in Taiwan ~ 2.28%

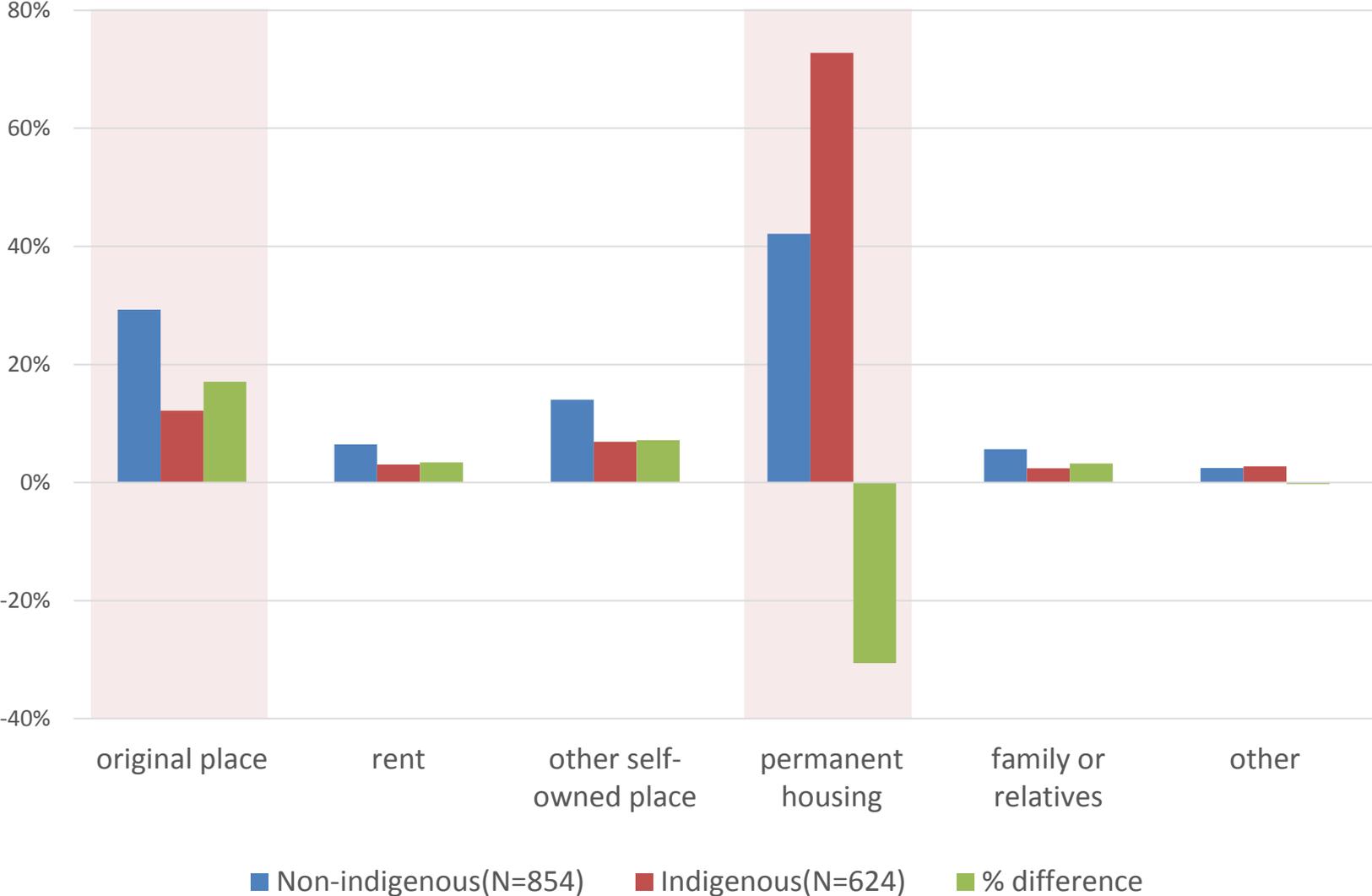
Most Needed Resources: the 4th wave



Unsatisfied w/ Current Situation: the 4th wave



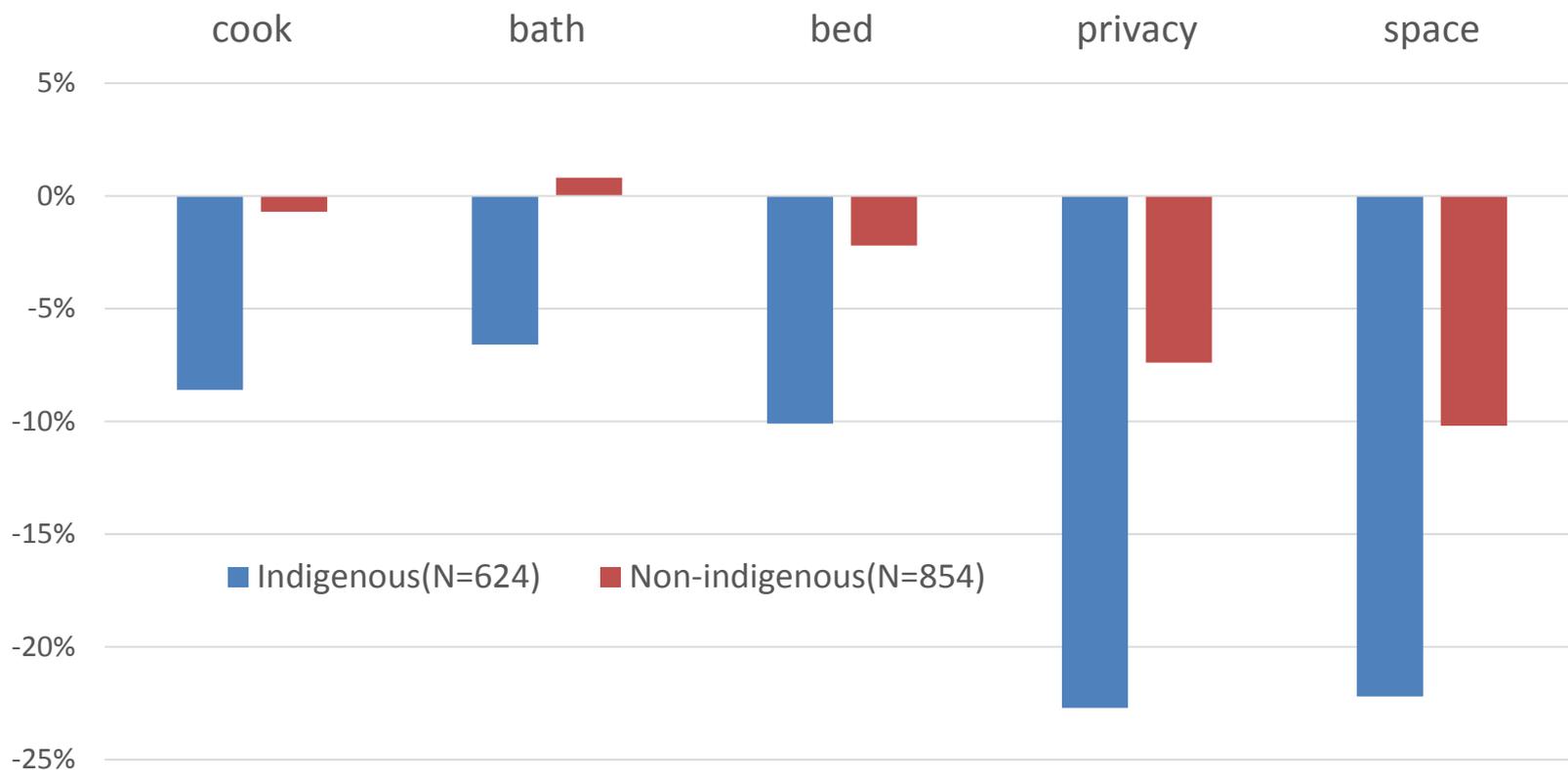
Current Housing Type: the 4th wave



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				Total
			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				Total
			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?		Total
			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)
Natural hazards				
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 ²)	8.3995*** (2.4534)	0.0625*** (0.0097)	0.0344** (0.0115)	0.1182*** (0.0100)
Exposure				
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)
Contextual vulnerability				
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) OLS (5)	During 2009–2012 Fixed-effect model (6)
Exposure		
Family size	0.0476** (0.0177)	0.4510*** (0.0828)
Contextual Vulnerability		
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) OLS (5)	During 2009–2012 Fixed-effect model (6)
Resilience		
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

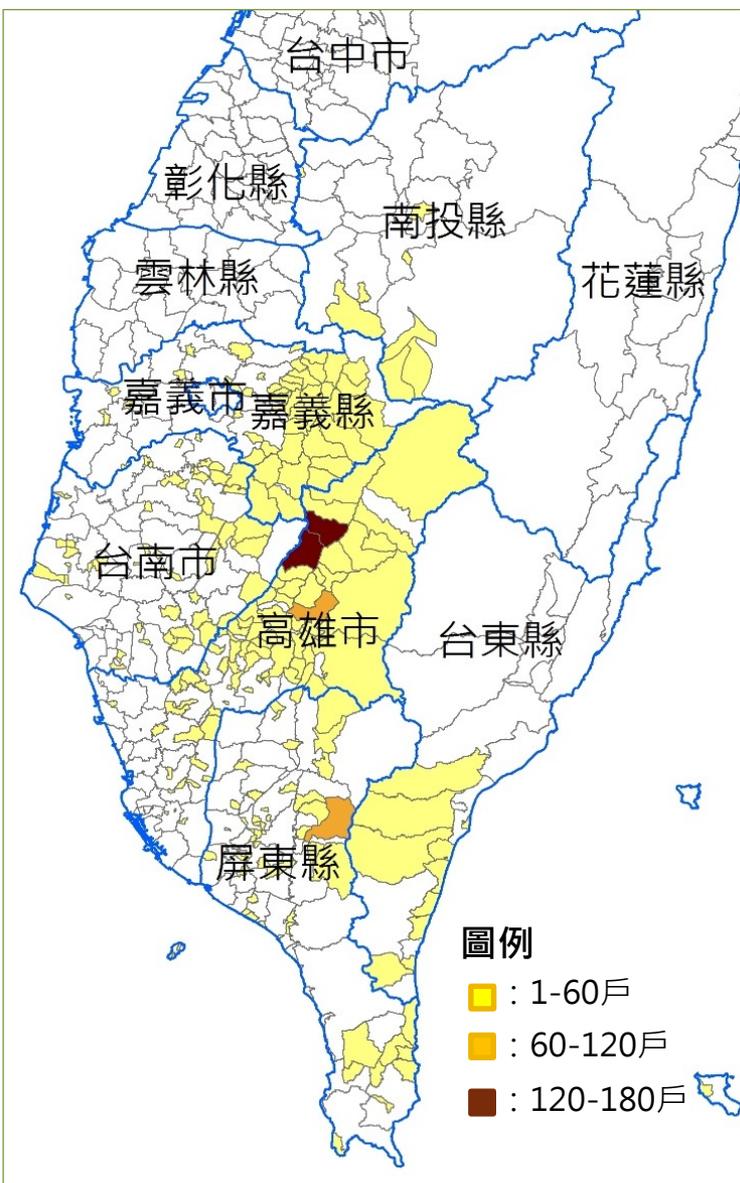
Conclusions

- **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

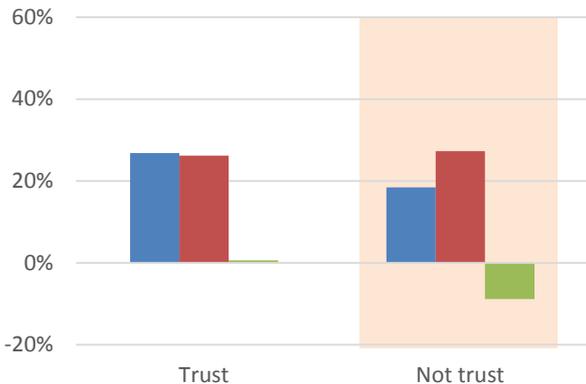


縣市	安遷救助金申請數	2010年完訪數	2011年完訪數	2012年完訪數	2015年完訪數
臺東縣	141	140	138	135	134
臺南市	87	86	118	99	88
南投縣	40	39	39	37	36
屏東縣	367	364	341	337	322
高雄市	902	817	758	726	702
嘉義縣	217	212	208	208	204
總戶數	1,754	1,658	1,602	1,542	1,481
相同受訪者數	--	1,658	1,357	1,194	988

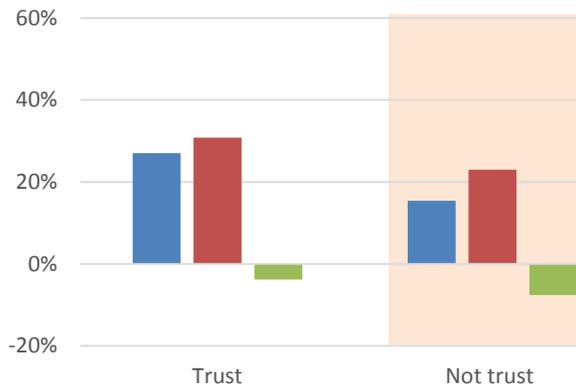
Social Trust: the 4th wave



Central Gov.



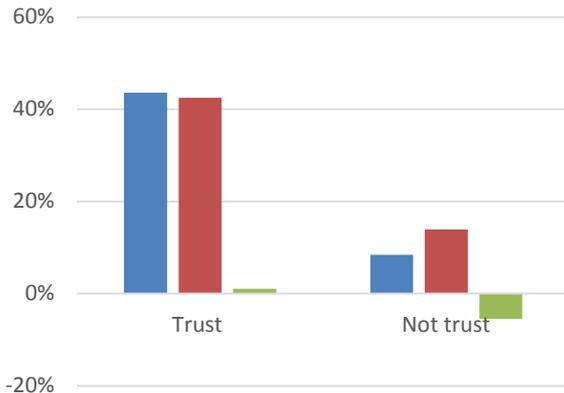
City Gov.



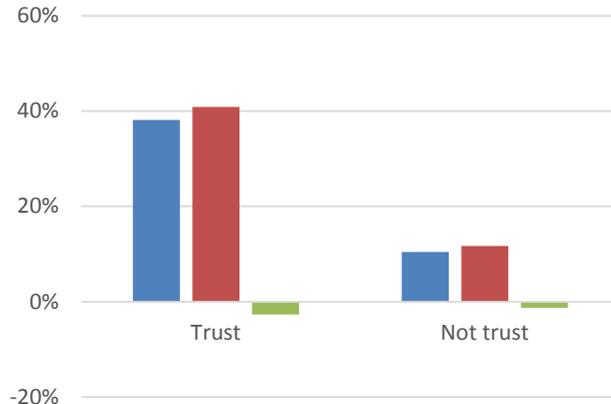
County Gov.



Large NGO

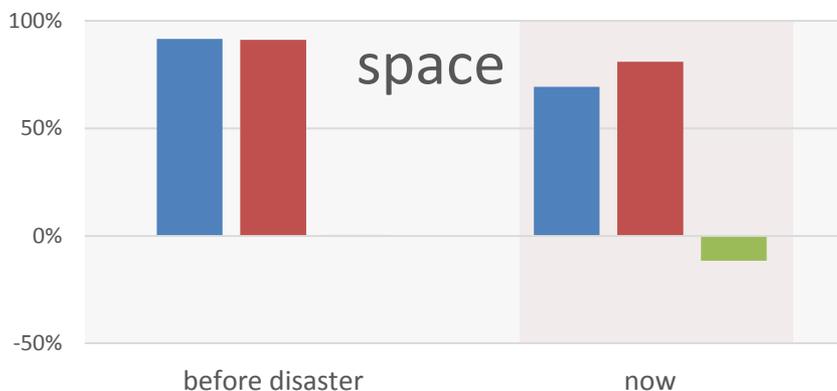
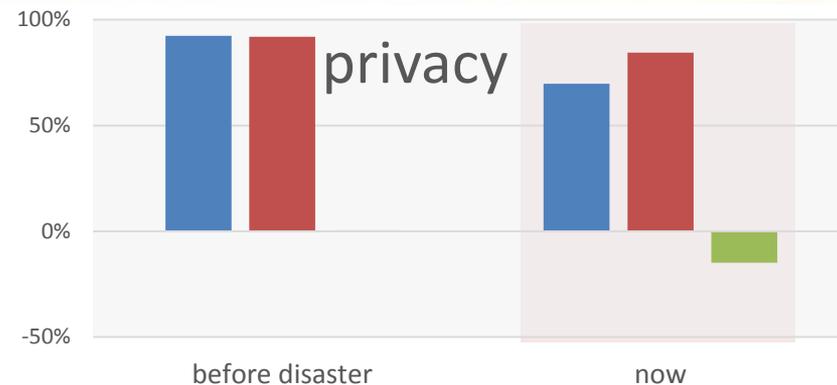
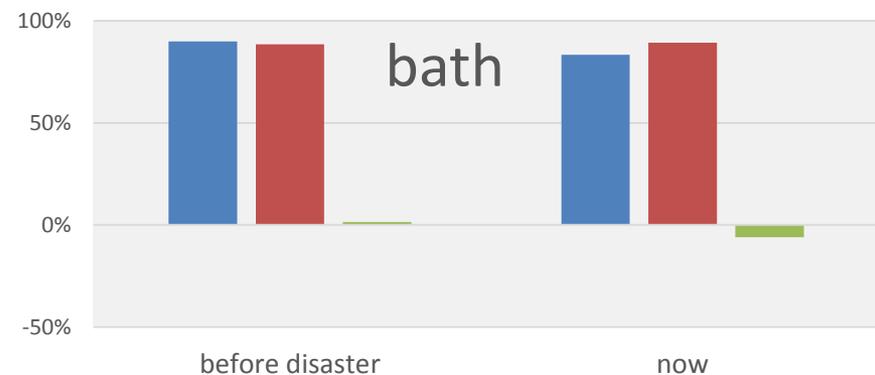
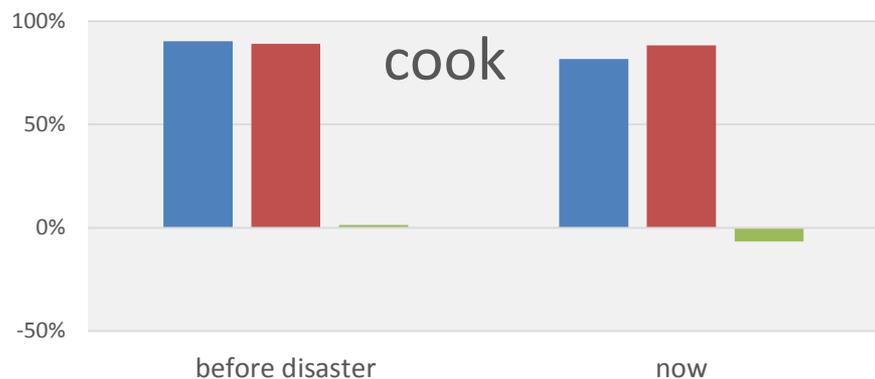


Village Leader/Local Org.



- Non-indigenous(N=844)
- Indigenous(N=615)
- % Difference

Satisfied w/ Current Life Quality: the 4th wave



- Non-indigenous(N=844)
- Indigenous(N=615)
- % Difference