

# FP3: The effects of managed retreat (red zoning) on the relocated households in New Zealand

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## 1. ISSUES & RESEARCH QUESTIONS

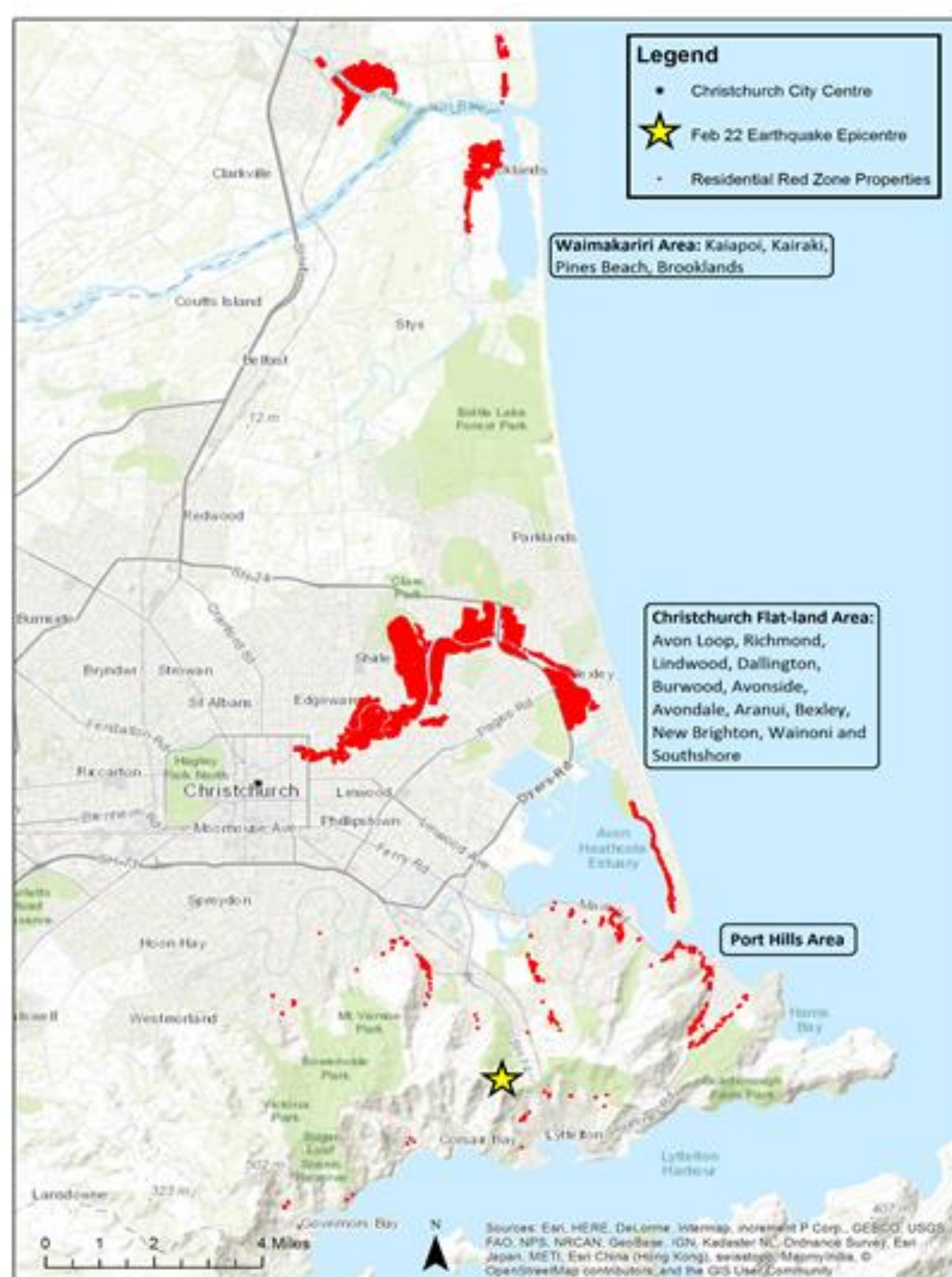
### Main issues

- After the 2011 earthquake in Christchurch, the government designated some of the worst affected areas as Residential Red Zones. Around 20,000 people were forced to move out of these Residential Red Zone areas and were compensated for that.
- The government offered homeowners two options: (1) The Crown Option: the government buys both the building and land at their 2007 assessed values, and in return it owns any outstanding insurance claim for damage from the earthquake(s). (2) The Insurance Option: the Crown will only purchase the land at its 2007 assessed value, and the homeowner will retain the remaining claim against their insurer for any damage.
- The final date for accepting these offers was 10th December 2015. By that deadline, 7,724 of 8,060 property owners in the residential red zone had accepted one of the government offers

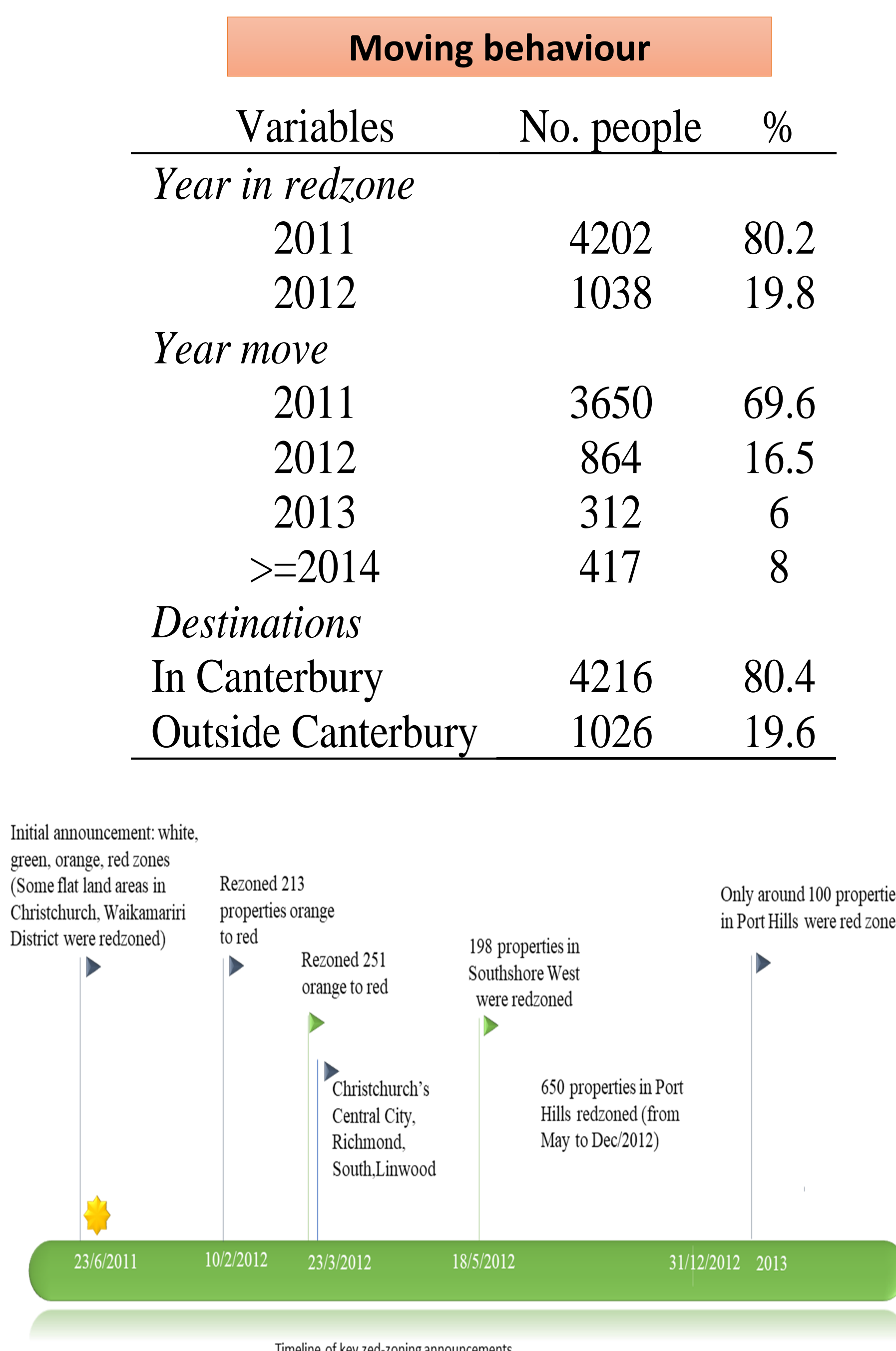
### Research questions

- What is the impact of relocation on income, employment status, and mental-health service use?
- Does the impact vary by the timing of red zoning, the destination, demographic factors ?

## 2. STUDY AREA



Residential Red Zone Properties



### Moving behaviour

Variables	No. people	%
<i>Year in redzone</i>		
2011	4202	80.2
2012	1038	19.8
<i>Year move</i>		
2011	3650	69.6
2012	864	16.5
2013	312	6
>=2014	417	8
<i>Destinations</i>		
In Canterbury	4216	80.4
Outside Canterbury	1026	19.6

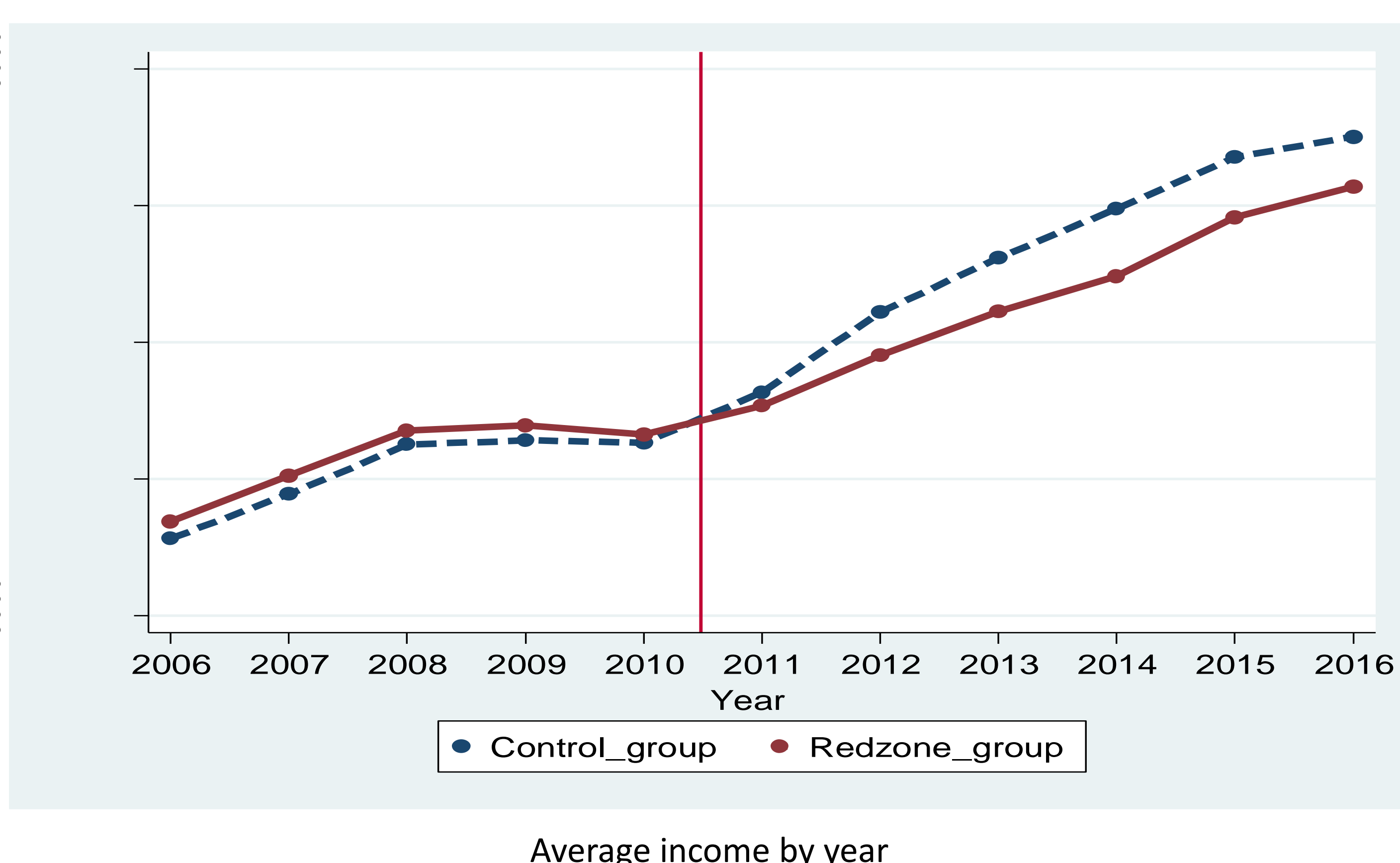
### Sample characteristics

Variables	Treatment	Control
Total number of people	5241	137967
<i>Gender (%)</i>		
Male	47.3%	49.3%
<i>Age group (%)</i>		
<25	32.7	32.9
25-29	7.8	9.9
30-39	16.6	16.3
40-49	14	14
50-59	12.1	11.1
60-69	9	7.7
>69	8	8
<i>Ethnicity (%)</i>		
Maori	11.5	11
Non-Maori	88.5	87.2
Missing	0	1.8
Average annual mental health activities	0.4	0.5
Average annual income (NZ\$)	31524	31317

## 3. EMPIRICAL MODLE

$$Y_{it}^* = \beta_0 + \beta_1 \text{Post}_i + \beta_2 \text{Redzone}_i + \beta_3 \text{Post}_i * \text{Redzone}_i + \beta_c D_i^c + \varepsilon_i \quad (1)$$

$Y_{it}^*$  denotes income, employment status, or mental health services use; Post, RedZone are binary; RedZone=1 if that person is a Red-Zone resident;  $D_i^c$ : a vector of demographic characteristics;  $\varepsilon_i$  is the error term.



Average income by year

## 4. RESULTS

The income for those who were red-zoned in 2011, their income was reduced by 7%, and 4.4% for those who were red-zoned in 2012.

The income of people who left the Canterbury region is lower than that of people who still stayed within the region.

LHS variable- log income- affected period (2011-2016)

Variables	Red zoned in 2011	Red zoned in 2012
<i>Post</i>	0.473*** (0.005)	0.472*** (0.005)
<i>Being Red zone residents</i>	0.101*** (0.008)	0.072*** (0.016)
<i>Post*Redzone</i>	-0.070*** (0.01)	-0.044*** (0.02)
Age	0.005*** (0.00005)	0.005*** (0.00005)
Male (base: female)	0.306*** (0.002)	0.306*** (0.002)
Maori (base: Non-Maori)	-0.122*** (0.002)	-0.121*** (0.002)
Destination (base: outside Canterbury region)	0.102*** (0.014)	0.086*** (0.021)
Year fixed effect	Yes	Yes