# Panel data captured important

# dynamics in the precautionary

## behavior of flood-affected residents.

## The dynamics of individual precautionary behavior and intentions in response to experiencing a flood event

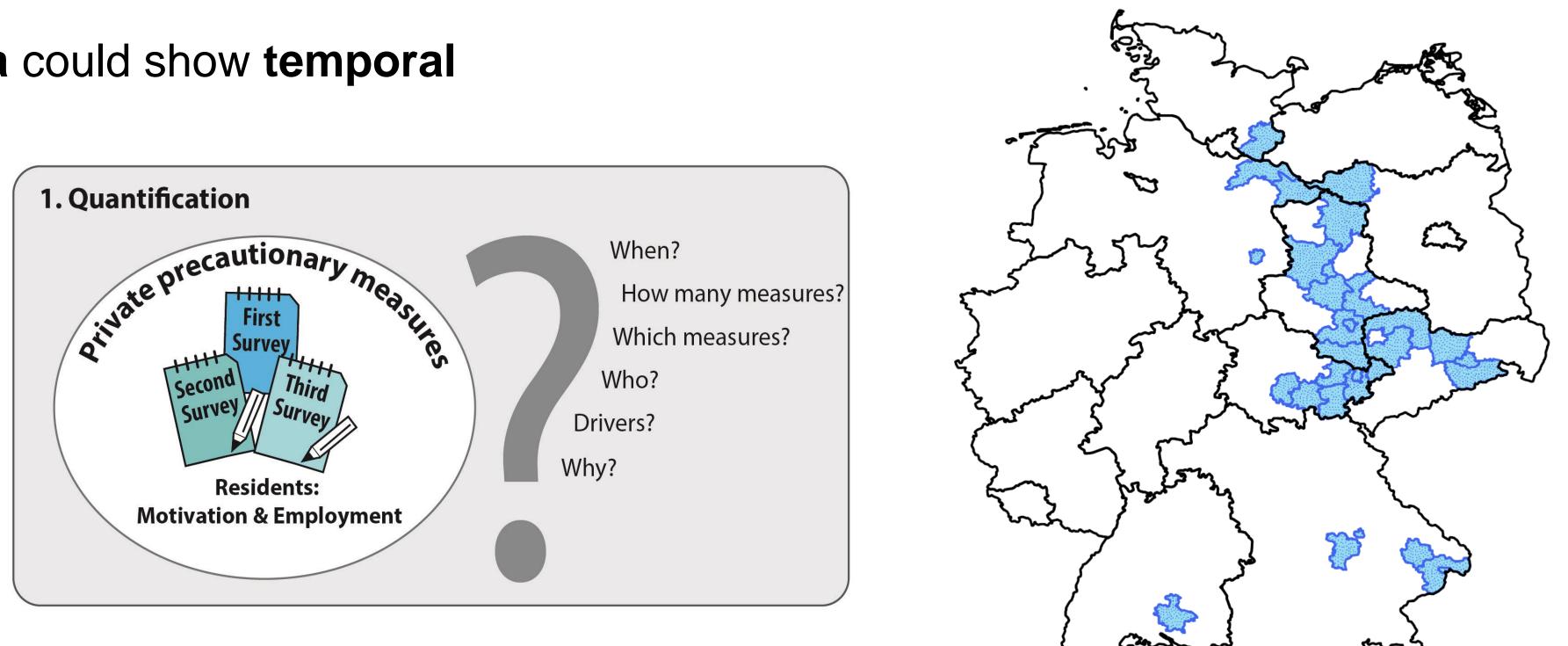
Lisa Berghäuser, Philip Bubeck, Paul Hudson, Annegret H. Thieken

### BACKGROUND

- Current predominance of the use of cross-sectional surveys in studies on precautionary behavior
- Cross-sectional surveys provide limited temporal snapshots of the variables of interest
- Panel data could show temporal dynamics

### PANEL DATA

Longitudinal survey after flood event May/June 2013 in Germany with 227 respondents for 4 years (3 survey waves: 9, 18, 45 months after flood).



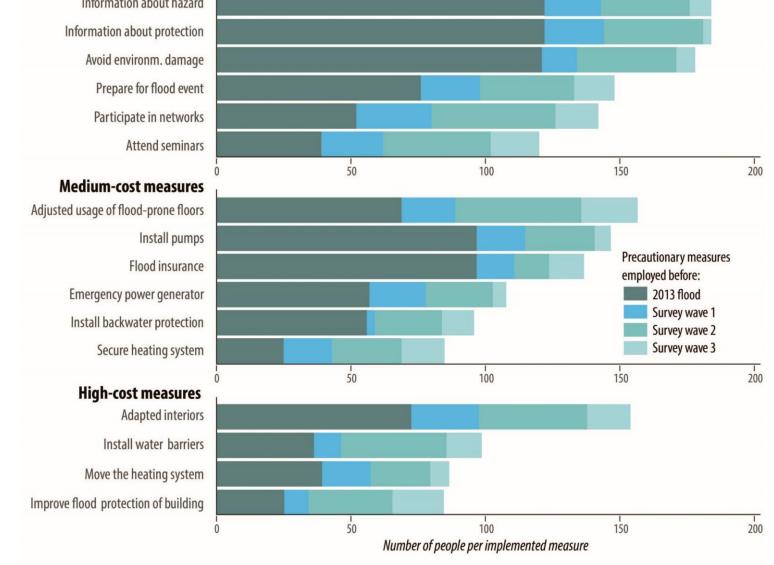


Fig. 1: Temporal development of the implementation of precautionary measures by cost category

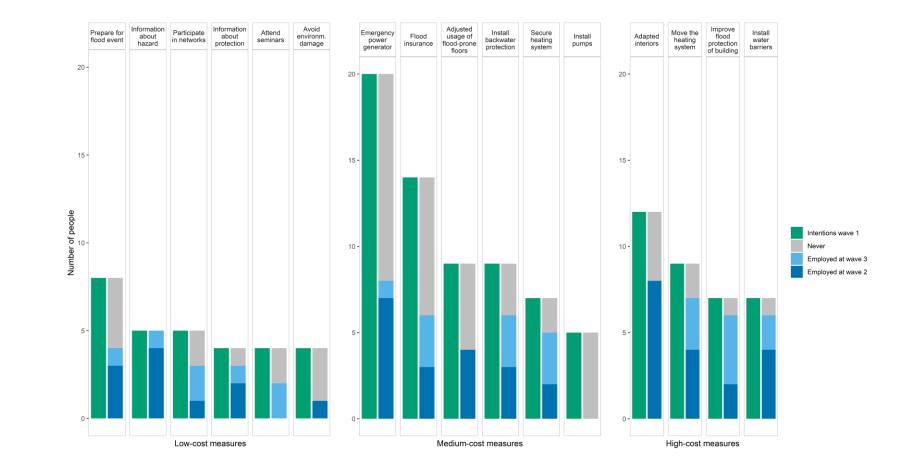


Fig. 2: Implementation ratios of each precautionary measure, sorted by it's cost category.

### RESULTS

- Precautionary measures are **differently implemented** regarding their **cost** categories:
  - Low-cost measures are the most commonly implemented measures
  - High-cost measures are the least commonly implemented measures
- Motivation does not necessarily lead to implementation of measures
- High-cost measures have the highest implementation ratio

Tab. 1: Precautionary measures in the questionaire and their associated cos
catagony

Low-cost precautionary measure	
Prepare for flood event	Answers to "I am preparing for a flood event (e.g., create supplies, create an emergency plan).": 0 = before the
	flood, $1 = $ currently employed, $2 = $ will employ in the next six months and $3 = $ never
Get information about hazard	Answers to "I inform myself about the flood hazard of my house or my apartment." : 0 = before the flood, 1 =
	currently employed, $2 =$ will employ in the next six months and $3 =$ never
Participate in networks	Answers to "I participate in networks, neighborhood help during floods and / or the flood emergency community." : 0 = before the flood, 1 = currently employed, 2 = will employ in the next six months and 3 = never
Get information about protection	Answers to "I get information about how I can protect my house or apartment against floods." : 0 = before the
Get mormation about protection	flood, $1 = $ currently employed, $2 = $ will employ in the next six months and $3 = $ never
Attend seminars	Answers to "I take part in seminars / information sessions on flood / flood prevention." : 0 = before the flood, 1 = currently employed, 2 = will employ in the next six months and 3 = never
Avoid environm. damage	Answers to "I avoid environmental damage (e.g. do not store paints or jerry cans in the cellar." : $0 =$ before the flood, $1 =$ currently employed, $2 =$ will employ in the next six months and $3 =$ never
Medium-cost precautionary mea	
Create emergency power	Answers to "I create an emergency generator or a power generator.": 0 = before the flood, 1 = currently
generator	employed, 2 = will employ in the next six months and 3 = never
Flood insurance	Answers to "I conclude insurance against flood damage.": 0 = before the flood, 1 = currently employed, 2 = will employ in the next six months and 3 = never
Use flood-prone floors	Answers to "I use the flood-prone floors of low value to keep possible flood damage small." : 0 = before the flood, 1 = currently employed, 2 = will employ in the next six months and 3 = never
Install backwater protection	Answers to "I install a backwater protection.": 0 = before the flood, 1 = currently employed, 2 = will employ in the next six months and 3 = never
Flood-prone heating system	Answers to "I change the heating system or provide the oil tank with flood protection." : $0 =$ before the flood, $1 =$ currently employed, $2 =$ will employ in the next six months and $3 =$ never
Install pumps	Answers to "I create one (or more) pump (pumps)." : 0 = before the flood, 1 = currently employed, 2 = will employ in the next six months and 3 = never
high-cost precautionary measure	es
Use flood-prone interiors	Answers to "I avoid valuable permanently installed interiors in flood-prone floors, but use water-resistant or easily renewable building and finishing materials.": 0 = before the flood, 1 = currently employed, 2 = will employ in the next six months and 3 = never
Move the heating system	Answers to "I move the heating system and / or the electrical utilities to higher floors.": $0 = before$ the flood, $1 = currently employed$ , $2 = will employ in the next six months and 3 = never$
Improving flood protection of building	Answers to "I am improving the flood protection of my building, i.e. improve the stability or seal the basement rooms." : $0 =$ before the flood, $1 =$ currently employed, $2 =$ will employ in the next six months and $3 =$ never
Install water barriers	Answers to "I create stationary or mobile water barriers that prevent water from entering the building / apartment (such as window and door bulkheads, sandbags, local small flood defenses)." : 0 = before the flood, 1 = currently employed, 2 = will employ in the next six months and 3 = never

#### REFERENCES

Bubeck, P., Berghäuser, L., Hudson, P. & Thieken, A.H. (2019): Using panel data to understand the dynamics of human behavior towards and in response to flooding (Risk Analysis, under review)





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LONTACT Lisa Berghäuser University of Potsdam, Institute of Environmental Science & Geography E-mail: <u>berghaeu@uni-potsdam.de</u> Phone: +49 331 977 5334

