

Coping with uncertainty for individual decision-making in nuclear emergency situations

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Research objectives

- To investigate what are people's concerns in case of an emergency
- To gain insights into expected behaviour with regards to recommended actions
- Data collected through surveys
 - Belgium, Spain, Norway
 - **People living close** to nuclear power plants (20 km radius Belgium, 30 km radius Spain)
 - **Other populations:** general public in Belgium and Norway, and living at 30-100km from nuclear installations in Spain



Why are we interested in expected behaviour?

- Emergency decisions generally based on:
 - Model calculations
 - Measurements
 - Operational considerations



However, they also rely on assumptions about peoples' behaviour

- Largely unaddressed and leading to important uncertainties regarding the effectiveness of emergency measures
- Affects societal vulnerability to disasters

Insights from theory

- Behavioral expectation is a good proxy for actual behaviour
(*compliance with recommended actions*) (cf. Theory of Planned Behaviour)

Potentially influencing factors

- Hazard related attributes
(*perceived effectiveness of action*) (cf. Protective Action Decision Model)
- Resource related attributes
(*perceived difficulty*) (cf. Protective Action Decision Model
& Theory of Planned Behaviour)
- Descriptive norms
(*expectation of specific reference groups
performing the action*) (cf. extensions of Theory of
Planned Behaviour)
- ... others (severity, susceptibility, distance, ...)

Findings

Imagine we have just heard the news that a nuclear accident has taken place at a nuclear installation or close to its borders and radioactivity has been released in the air. What would be your first concern?

Risk (for oneself,
family, general)
People



Spain: <30 km NPP's

People,
Take/find iodine
tablets



Belgium <20 km
Doel NPP

Risk (for oneself,
family, general)
People



Belgium <20 km
Tihange NPP

Findings

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Take/find iodine

Risk (for oneself,
family, general)

Main concerns /first reactions may differ
between local populations in different
countries, and between different areas in the
same country

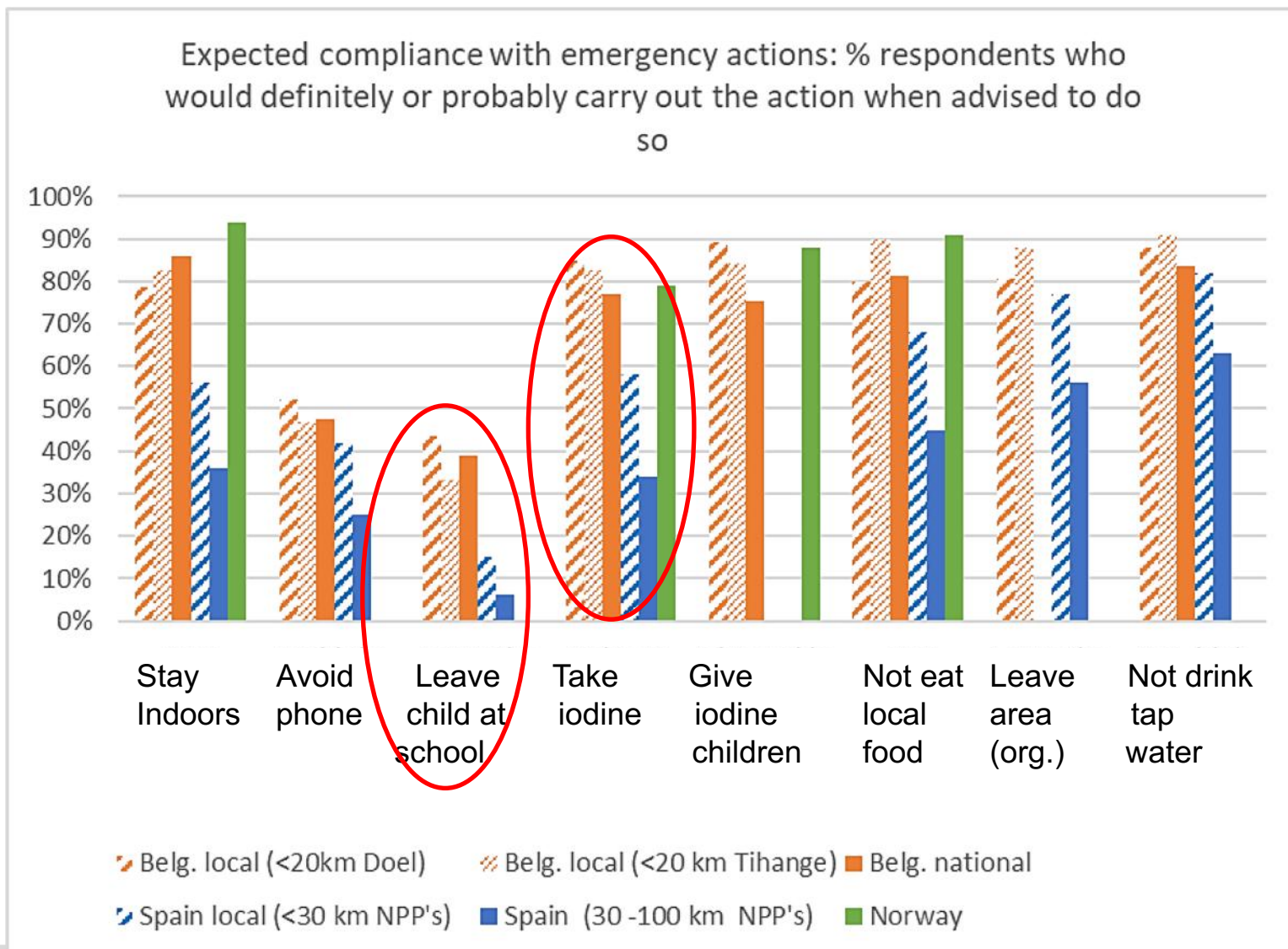
➔ Emergency response must be adapted to
national and local context



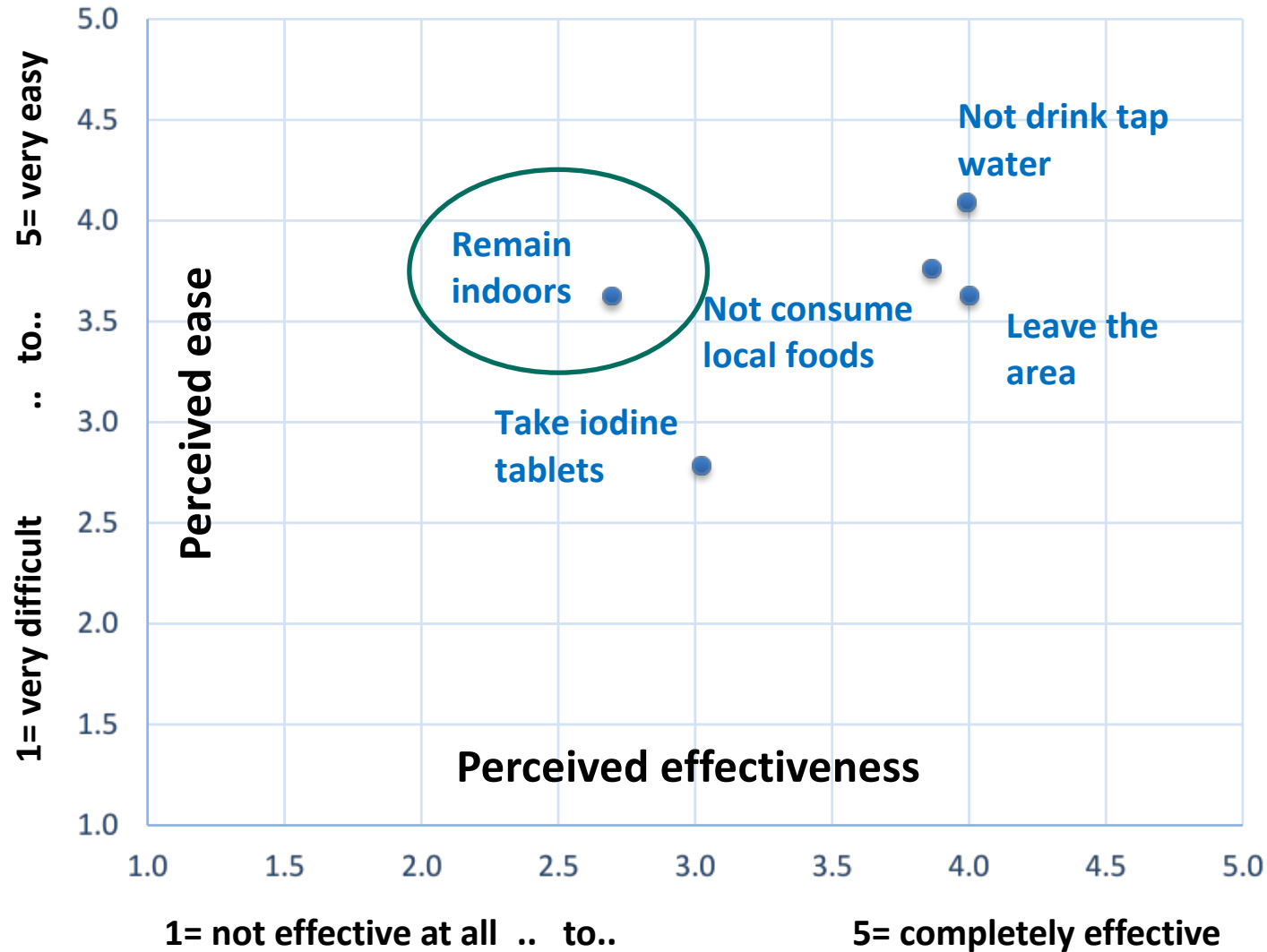
Spain: <30 km



Findings

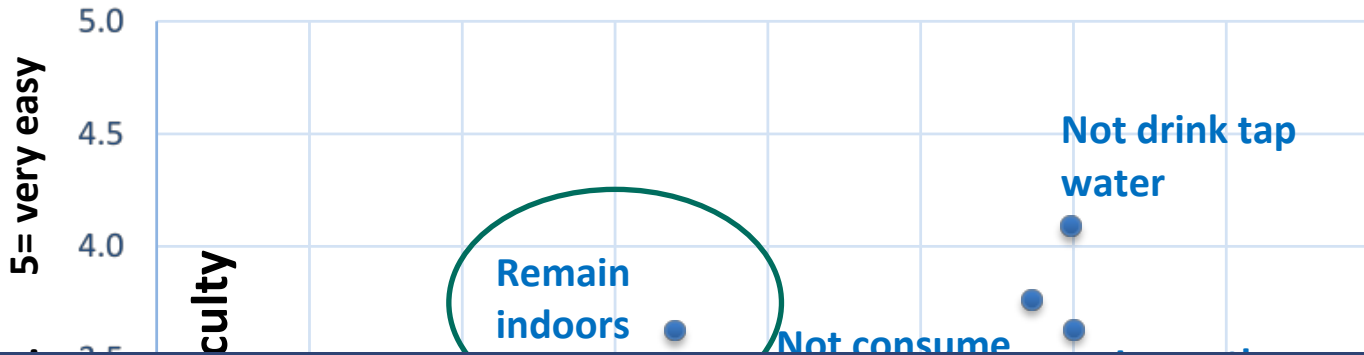


Findings



Spain
0-100 km
(N=808)

Findings



Across countries:

Avoiding local products or tap water, and leaving the area during few days are perceived as rather easy and effective.

Staying indoors is perceived as rather easy, but ineffective.

Findings

- *Research hypothesis 1: Perceived effectiveness is correlated with expected compliance.*
- *Research hypothesis 2: Perceived ease of protective actions is correlated with expected compliance.*



Spearman corr. coef.	Descr. norm	Ease of action	Effectiveness action	
Staying indoors	0.27**	0.18**	0.27**	Belg. national
	0.26**	0.22**	0.18*	Belg. local (<20km Doel)
	0.19*	0.21**	0.28**	Belg. local (<20 km Tihange)
	0.49**	0.51**	0.50**	Spain local (<30 km NPP's)
	0.40**	0.24**	0.36**	Spain (30 -100 km NPP's)

- *Research hypothesis 3: Perception of other residents' behaviour is correlated with expected compliance*



Findings

- *Research hypothesis 4: Perceived effectiveness is a stronger correlate of expected behaviour than perceived ease. **Partially verified***

Spearman corr. coef.	Descr. norm	Ease of action	Effectiveness action	
Staying indoors	0.27**	0.18**	0.27**	Belg. national
	0.26**	0.22**	0.18*	Belg. local (<20km Doel)
	0.19*	0.21**	0.28**	Belg. local (<20 km Tihange)
	0.49**	0.51**	0.50**	Spain local (<30 km NPP's)
	0.40**	0.24**	0.36**	Spain (30 -100 km NPP's)

Leave area few days	0.24**	0.26**	0.19*	Belg. local (<20km Doel)
	0.34**	0.36**	0.29*	Belg. local (<20 km Tihange)
	0.33**	0.34**	0.37**	Spain local (<30 km NPP's)
	0.45**	0.41**	0.34**	Spain (30 -100 km NPP's)

Conclusions

- Perceived effectiveness of protective actions positively correlated with compliance with protective actions
 - To be accounted for in communication about protective actions
- Perception of other residents' behaviour is significantly correlated with behavioural intentions
 - Stakeholder engagement in emergency preparedness at local level
- Main concerns and compliance with protective actions differs between local populations in different countries, and between different areas in the same country
 - More research is needed to explain why such differences occur