



“Sickenin’ in the rain” - Increased risk of gastrointestinal and respiratory infections after urban pluvial flooding, a cross-sectional survey in the Netherlands

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Background

- Climate change is expected to increase the chance of extreme rainfall events and herewith, an increased chance of urban pluvial flooding. This leads to contaminated floodwater with several gastrointestinal and/or respiratory pathogens. This poses a health risk to those exposed to urban floodwater.

Aim

- We studied the association between exposure to pluvial floodwater and acute gastroenteritis (AGE) and acute respiratory infection (ARI).



Methods

Study design

- Retrospective, cross-sectional survey
- Summer of 2015
- 60 locations in the Netherlands with reported flooding

Data

- Two weeks after the flooding, questionnaires were sent to households reporting flooding
- Data was collected on self-reported AGE and ARI and information on floodwater exposure in the previous two weeks.

Statistical analyses

- Multivariable generalized estimating equations (GEE) regression models, accounting for the clustered data structure

Results

- In total, 699 households with 1,656 participants (response rate 21%) returned the questionnaire.
- 608 participants had contact with floodwater (were exposed).
- Contact with floodwater was significantly associated with AGE and ARI (**Figure 1**).

Figure 1. The association between contact with floodwater and AGE/ARI

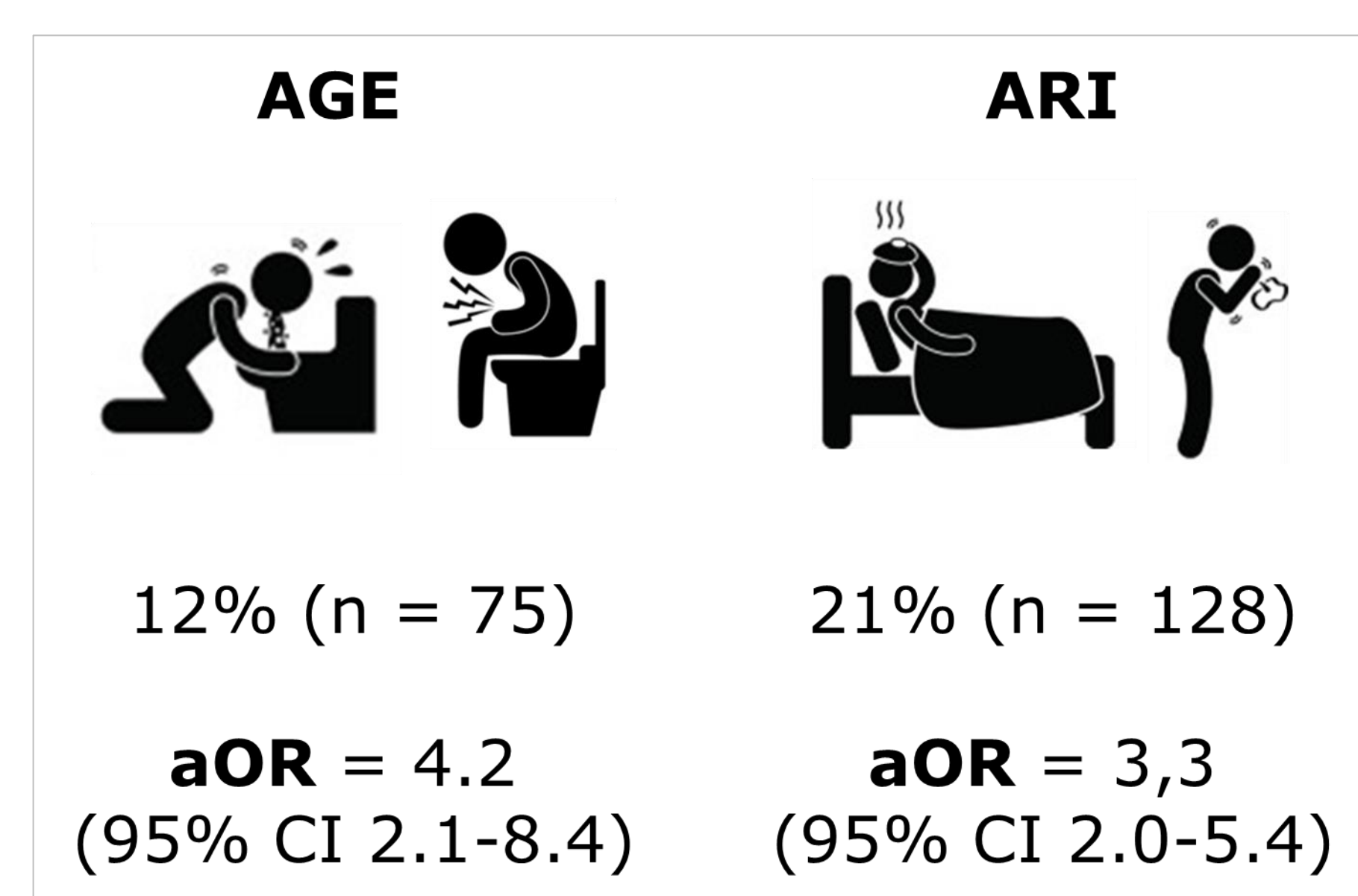


Table 1. Significant risk factors for acquiring AGE/ARI after contact with floodwater

Type of exposure	Number of participants exposed N	Number of participants with AGE N	aOR AGE (95% CI) ^a	Number of participants with ARI N	aOR ARI (95% CI) ^b
Performing post-flooding cleaning	130	24	8.6 (3.5, 20.9)	32	5.5 (3.0, 10.3)
Skin contact with floodwater	527	71	4.0 (1.8, 9.0)	121	3.6 (1.9, 6.9)
Cycling through floodwater	86	24	2.3 (1.0 – 5.0)	n.s.	n.s.

- Risk factors for AGE were skin contact with floodwater, performing post-flooding cleaning operations and cycling through floodwater (**Table 1**).
- Skin contact with floodwater and performing post-flooding cleaning operations were identified as risk factors for ARI (**Table 1**).

Conclusion

- The results show that direct exposure to pluvial floodwater increased significantly the risk of AGE and ARI.
- As it is predicted that the frequency of pluvial flooding events will increase in the future, there is a need for flood-proof solutions in urban development and increased awareness among stakeholders and the public about the associated health risks.