Swiss TPH

Heat-related deaths in Switzerland

Indications of adaptation during last 25 years despite increase in temperatures

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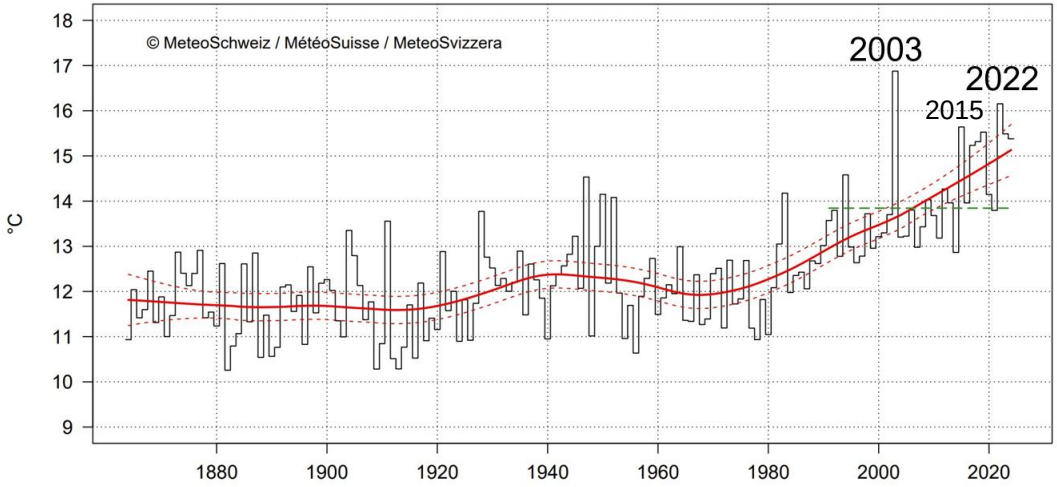
Swiss Tropical and Public Health Institute

- Improving health and well-being of people and communities
- Combining research, services, and education and training
- 900 employees and students from over 80 nations

The increasing heat stress is one of Switzerland's priority climate-related risks

Average summer temperature is increasing in Switzerland.



Public health policies to prevent heat-related health effects in Switzerland

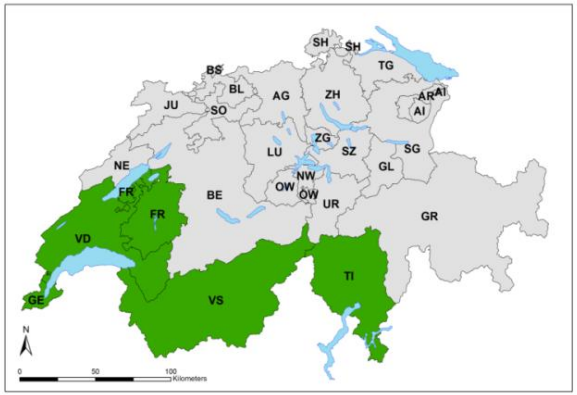
2003

Heatwave

2004-2014

National & cantonal programs

Some French and Italian speaking cantons implemented heat-health action plans



2015

Heatwave

2016-now

Awareness raising

Heat toolbox for cantons

New measures in cantons

New heat warning system 2021

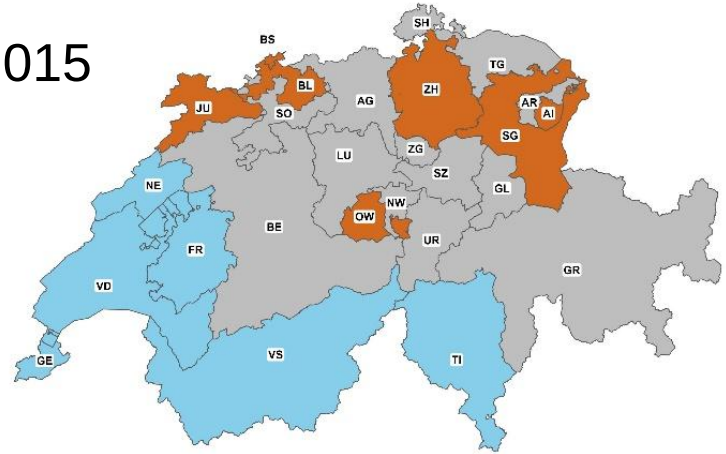
Education & seasonal awareness (Prevention)	Extreme weather event response & preparedness	Long-term adaptation
Information and recommendations for action for a wide range of stakeholders	Heat-heath warning systems & protection of must vulnerable population groups.	Long-term adaptation to increasing heat stress: reduce exposure, build resilience and reduce vulnerabilities. Multi-disciplinary

Heat toolbox: Catalogue of measures for public authorities (Federal Office of Public Health)

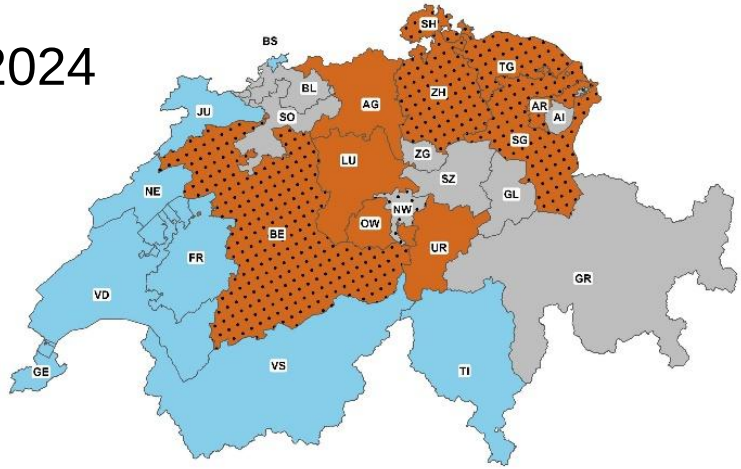
Adaptation measures in other sectors (e.g. spatial planning)

The number of cantons implementing public health measures is increasing

2015



2024



Cantonal heat-health action plan (HAP) | Other measures | None | HAP in development

Source: Ragettli et al., in preparation

Monitoring the effect of policies to prevent heat-related health effects

Impacts indicator:

Heat-related deaths (since 2023)

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Office for the Environment FOEN

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Eidgenössisches Departement des Innern EDI
Bundesamt für Gesundheit BAG

Swiss TPH
Swiss Tropical and Public Health Institute
Schweizerisches Tropen- und Public Health-Institut
Institut Tropical et de Santé Publique Suisse
Associated Institute of the University of Basel

Indicator Climate:

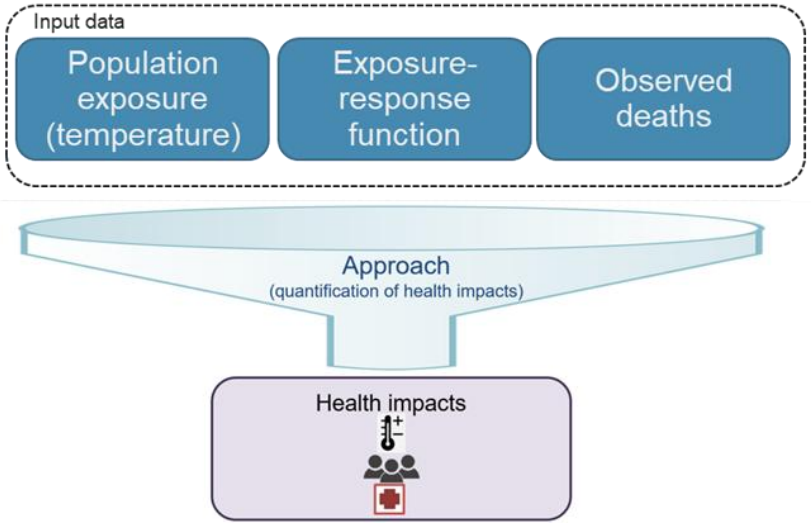
Website Federal Office for the Environment

Response to heat:

Surveys on implementation of measures in the health sector

- Population / vulnerable groups (2023)
- Cantonal health authorities (2024)
- Health professionals (2025)
- Hospitals (2026)

Methods for determining heat-attributable deaths



Solid (daily) estimates that are linked to measured temperature and that consider adaptation and rising heat awareness (through yearly-updated ERF)

Population exposure: daily mean temperature May – September (MeteoSwiss)

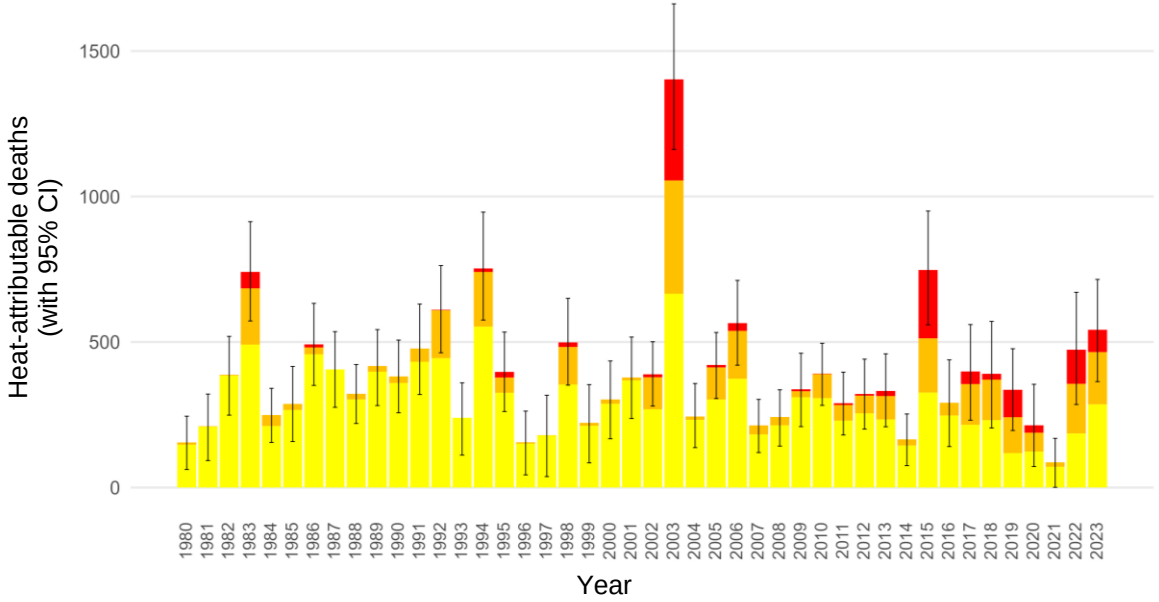
Exposure-response function (ERF)

- Modeled with distributed lag non-linear models (DLNM)[1] in R using the *dlnm* package[2]
- Yearly-updated ERF based on 10-year period (year of analysis + 9 previous years) → takes potential adaptation into account
- Lagged / delayed effects of temperature up to 7 days after exposure were considered

Observed deaths (daily) by great area, cantons, age (<75 and ≥75 years) and sex → enables sub-group analyses

[1] Gasparrini et al. 2016, https://doi.org/10.1093/aje/kwv260
[2] Gasparrini 2011, https://doi.org/10.18637/jss.v043.i08

Total heat-attributable deaths per year 1980-2023



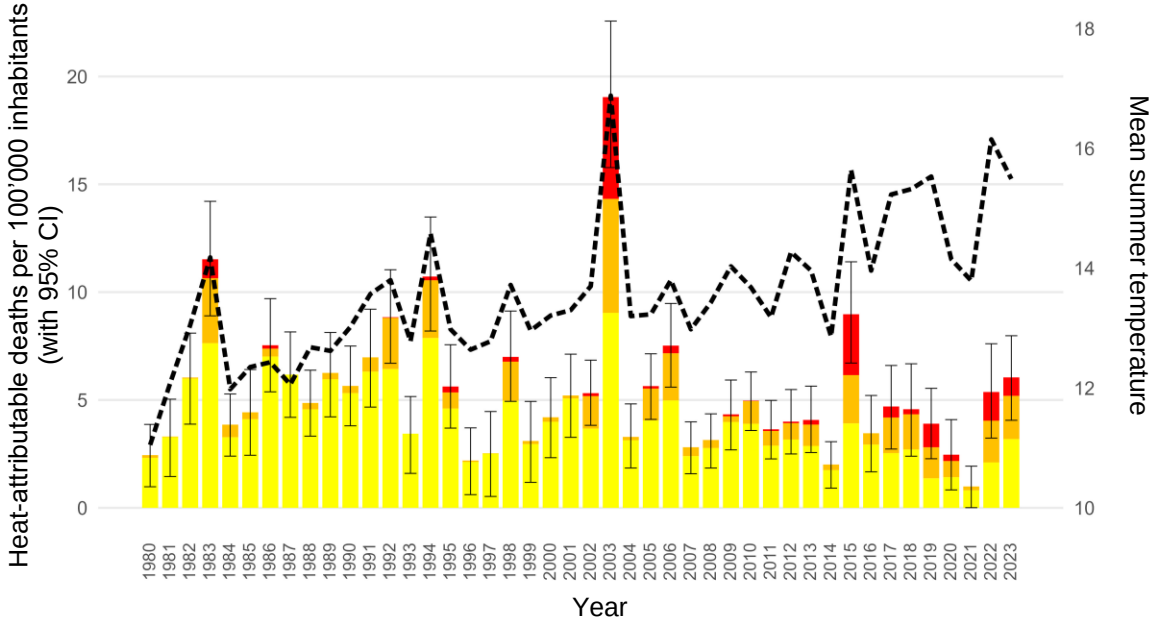
Heat intensity
(Daily mean temperatures)

- Very hot (≥27°C)
- Hot (25°C to <27°C)
- Moderately hot (minimum mortality temperature to <25°C)

2023: ~ 540 heat-attributable deaths between May and September in CH

Note: heat intensity categories based on the heat warnings of MeteoSwiss:
https://www.meteoswiss.admin.ch/weather/weather-and-climate-from-a-to-z/heat-warnings.html

Heat-attributable deaths per 100’000 inhabitants 1980-2023



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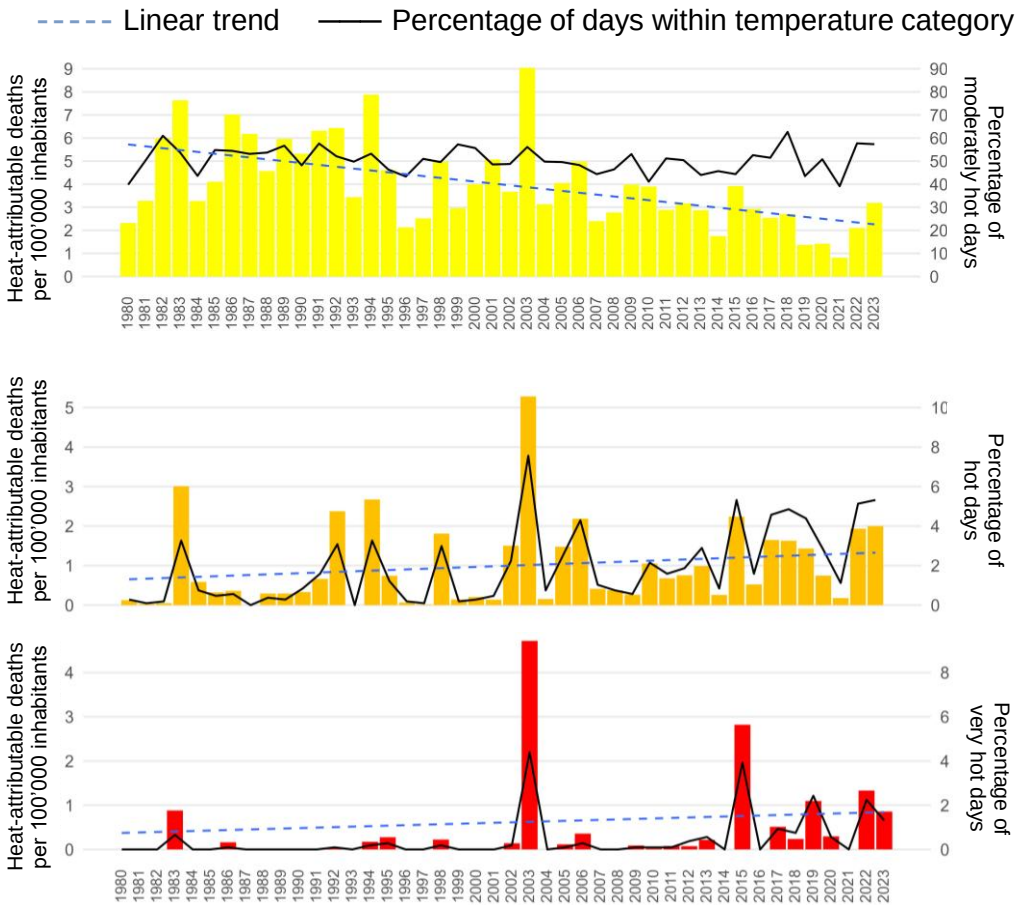
-------- **Mean summer temperature**

~ constant heat-attributable deaths in recent hot summers despite increase in mean summer temperature (dashed line) → Indication of adaptation

Heat-attributable mortalities by heat intensity



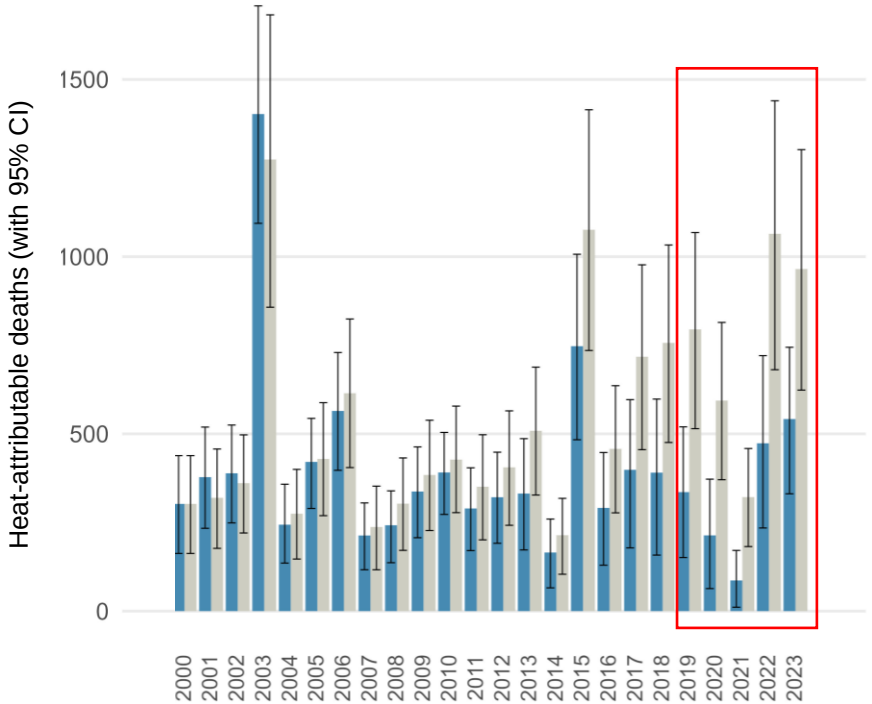
Decrease in heat-related mortality on moderately hot days

- Indication of adaptation

Increase in heat-related mortalities on hot and very hot days

- Need for additional action!

The role of adaptation



Yearly-updated ERF
(year of analysis + 9 previous years)

Fixed ERF
(based on the year 2000 + 9 previous years)

Reference approach

Adaptation is considered (yearly-updated ERF)

Alternative approach

No adaptation considered (fixed ERF from the year 2000)

- Using a yearly-updated ERF that considers adaptation resulted in lower heat-attributable mortality estimates in recent years than when using fixed ERF

ERF = exposure-response function
Similar analysis: Gallo et al. 2024, https://doi.org/10.1038/s41591-024-03186-1

Added value for health care system

The monitoring was implemented in 2023

- **Solid estimates** of heat-related health impacts
  - Directly associated to temperature
  - Takes into account the effect of moderately hot days and less pronounced hot spells
  - Takes into account the adaptation of the population to high temperatures
- Contribution to increase the **awareness** for heat-related-health risks.
- Inform public health authorities and practitioners about **effectiveness** of current adaptation measures.
- **Motivation for action** to protect the most vulnerable population.

Thank you for your attention!
Questions welcome ☺

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