

TEMPERATURE RELATED INFECTIOUS DISEASE MORTALITY AMONG INFANTS

A retrospective time-series study of Sweden, 1868-1892

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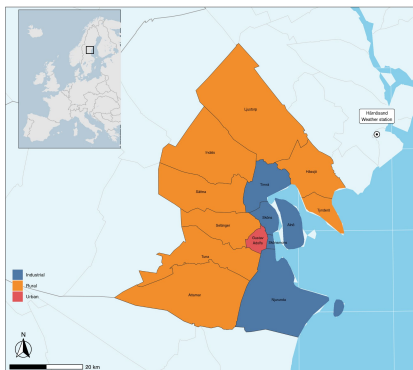
Climate conditions, such as ambient temperature, are crucial to infants' vulnerability to infectious diseases. However, little is known about how temperature affects infectious disease mortality among infants in cold climates with high mortality.

OBJECTIVES

The aim was to investigate the association between ambient temperature and infectious disease infant mortality.¹

STUDY POPULATION

All children born over the period 1868-1892 within 14 parishes surrounding the town of Sundsvall.² Births = 47,575. Deaths = 6,443



INFECTIOUS DISEASE MORTALITY

From the death and burial registers. Recorded by ministers and physicians following the same nosological system. Coded into the ICD10h-code system.³

Airborne infectious (898 deaths): whooping cough, pneumonia, smallpox, diphtheria, measles

Water- and foodborne infectious (456 deaths): gastrointestinal inflammation, diarrhea, cholera

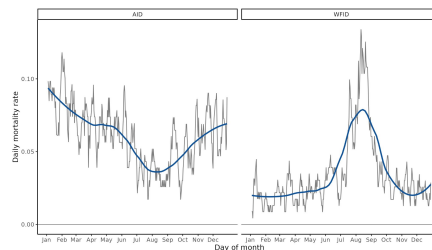
Other causes: convulsions, external causes, congenital and birth disorders, unknown

TEMPERATURE DATA

SMHI data with thrice daily temperatures from 1868 to 1892, from Härnösand Weather station.

Temperatures observed from -33.9 °C to +27.5 °C (daily mean).

Figure: Average daily infectious disease infant mortality rates, 1868-1892, based on 7 day mean death counts.



STATISTICAL ANALYSIS

Time-series analysis - the number of deaths by day - using Poisson reg.

Non-linear associations modelled using DLNM.⁴

Figure: Incidence rate ratios (IRR) with 95 percent confidence intervals for infectious disease infant mortality by past 14 days ambient temperature exposures. IRR on a log scale. Threshold at MMT breakpoint (+1°C, +7°C, +7°C)

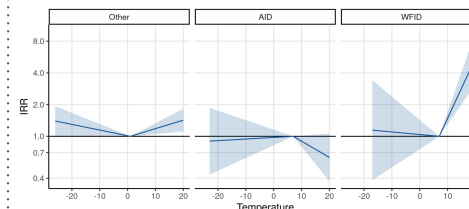
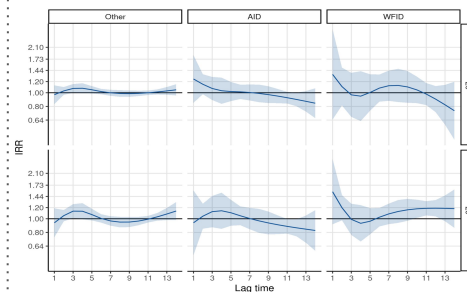


Figure: Lagged incidence rate ratios (IRR) with 95 percent confidence intervals for infectious disease infant mortality at -20 and +20 °C ambient temperature exposures over the past 1-14 days, compared to MMT. IRR on a log scale.



SUMMARY

- Strong association between high ambient temperature and Water- and foodborne infectious disease mortality
- WFID mortality peak 11 days exposure
- Airborne Infectious Disease mortality not related to low temperature

CONCLUSIONS

Pathogens thrive in warm temperatures = higher risks of exposure to WFID

AID mortality not associated to temperature related mechanisms (such as low immune responses)- possibly to seasonal behavioural mechanisms

FURTHER READING

1. Working paper: Junkka, J. & Hiltunen, M. (2022). <http://urn.kb.se/resolve?urn=urn:nbn:se:umu:diva-193107>
2. Historical data: Westberg, A., Engberg, E., & Edvinsson, S. (2016) [doi:10.51964/hlcs9351](https://doi.org/10.51964/hlcs9351)
3. ICD10h: Janssens, A. (2021) [doi:10.51964/hlcs9569](https://doi.org/10.51964/hlcs9569)
4. DLNM methods: Gasparrini, A., Armstrong, B., & Kenward, M. G. (2010). [doi:10.1002/sim.3940](https://doi.org/10.1002/sim.3940)

