Association between temperature and health outcomes of population in Thailand

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What causes the most death in Thailand?

Top 10 causes of death in 2017

2007 ranking
1. Stroke
2. Ischemic heart disease
3. Road injuries
4. Lower respiratory infect
5. HIV/AIDS
6. Alzheimer's disease
7. Liver cancer
8. COPD
9. Lung cancer
10. Chronic kidney disease

2017 ranking
1. Ischemic heart disease
2. Stroke
3. Lower respiratory infect
4. Alzheimer's disease
5. Liver cancer
6. Chronic kidney disease
7. Lung cancer
8. HIV/AIDS
9. Road injuries
10. Cirrhosis
11. COPD

Diseases of the circulatory system (I00-I99)

Diseases of the respiratory system (J00-J99)

http://www.healthdata.org/thailand
Objective:
To identify the temp effect on mortality in Thailand

Specific objectives:
1) To identify specific causes of deaths associated with temp
2) To indicate populations at risk in terms of age, region and seasonality

Cardio-circulatory diseases (I00-I99)
(Guo et al., 2012; Pudpong & Hajat, 2011)

Respiratory diseases (J00-J99)
(Bunker et al., 2016; Yu et al., 2012)
**METHODS**

Daily Mortality & Weather (Mean temp, RH) & Air quality ($O_3$, $PM_{10}$)

- Data available in 20 provinces
- 1 Jan 2009 – 31 Dec 2015 (7 yrs)
- Total 242,963 deaths classified by ICD-10

**Association analysis** (STATA version 13)
- Linked with Mean temperature at lag 0-13
- Time series using Poisson regression models
- The results are presented by relative risks (RR) of mortality associated with changes in temp for both diseases and stratified by...

<table>
<thead>
<tr>
<th>By age groups</th>
<th>By region</th>
<th>By season</th>
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<tbody>
<tr>
<td>Cardio-circulatory disease for 0-59 and ≥ 60 yrs, Respiratory disease for 0-14, 15-59 and ≥ 60 yrs</td>
<td>Middle, Northeast, North, South</td>
<td>Winter (Sep-Feb), Summer (Mar-Jun), Rainy (Jul-Aug)</td>
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Cardio-circulatory diseases (I00-I99): 142,534 deaths

Respiratory diseases (J00-J99): 100,159 deaths
RESULTS

Main findings

Identifying the temp effect on mortality in Thailand

• There was a significant relationship between mortality for two diseases and temp in Thailand.
• The pattern of the relationship was inverse J-shape (non-linear relationship)
  • RR of 1.40 at the lowest daily mean temp (16.7°C)
  • RR of 1.22 at the highest daily mean temp (34.8°C)
• Minimal impact on mortality at 30.5°C = “Optimum temperature”
RESULTS (cont.)

Specific findings
Indicating pop at risk in terms of age

Stratified by age groups
Age gr ≥ 60 yrs was at the highest risk for both diseases

RR of cardio-circulatory deaths by age groups

RR of respiratory deaths by age groups
RESULTS (cont.)

Specific findings

Indicating pop at risk in terms of region

- Associations were different by region.
- The N and NE were at the highest risk with regard to temp changes.
RESULTS (cont.)

Specific findings

Indicating pop at risk in terms of seasons

- In winter, RR at low temp were greater than other seasons.
- In summer, temp reached 30 C, RR increased with higher temp.

RR of cardio-circulatory deaths by seasons

RR of respiratory deaths by seasons
There was an association between temp and mortality for cardio-circulatory and respiratory systems in Thailand. The association was found at high risk especially in pop at age ≥ 60 yrs, in North and Northeast regions, and during winter and summer.

**Conclusions**

Health impacts from temperature are preventable and need to increase policy & public awareness for better prevention.

**Recommendations**

- To prevent more health impacts in future climate, Heat-health warning system are needed.
- Collaboration with health & non-health sectors and active community for action.
**Discussion**

**Implication of this study**

- Used as baseline for monitoring long-term impacts of temp on health and for future projections of changes in CC-related mortality.
- Monitoring an achievement of goals set in “Thailand’s Adaptation Plan on Climate Change and Health 2018-2030”

**Limitations & Future studies**

Due to limitations of daily data and aggregated analysis at country level,

- Assess health impacts related to temp by using morbidity data.
- Conduct a similar assessment at provincial and city levels.
- Explore association between temp and other potential health outcomes such as renal diseases, NCD, pregnant outcomes

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**Goal 3.** Ensure healthy lives and promote well-being for all at all ages

**Goal 13.** Take urgent action to combat climate change and its impacts
References:


