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Perceptions of heat-health impacts and the effects of knowledge and preventive actions by outdoor workers in Hanoi, Vietnam

Which heat-health behavior changes make a difference?

Perceptions of heat-health impacts and the effects of knowledge and preventive actions by outdoor workers in Hanoi, Vietnam

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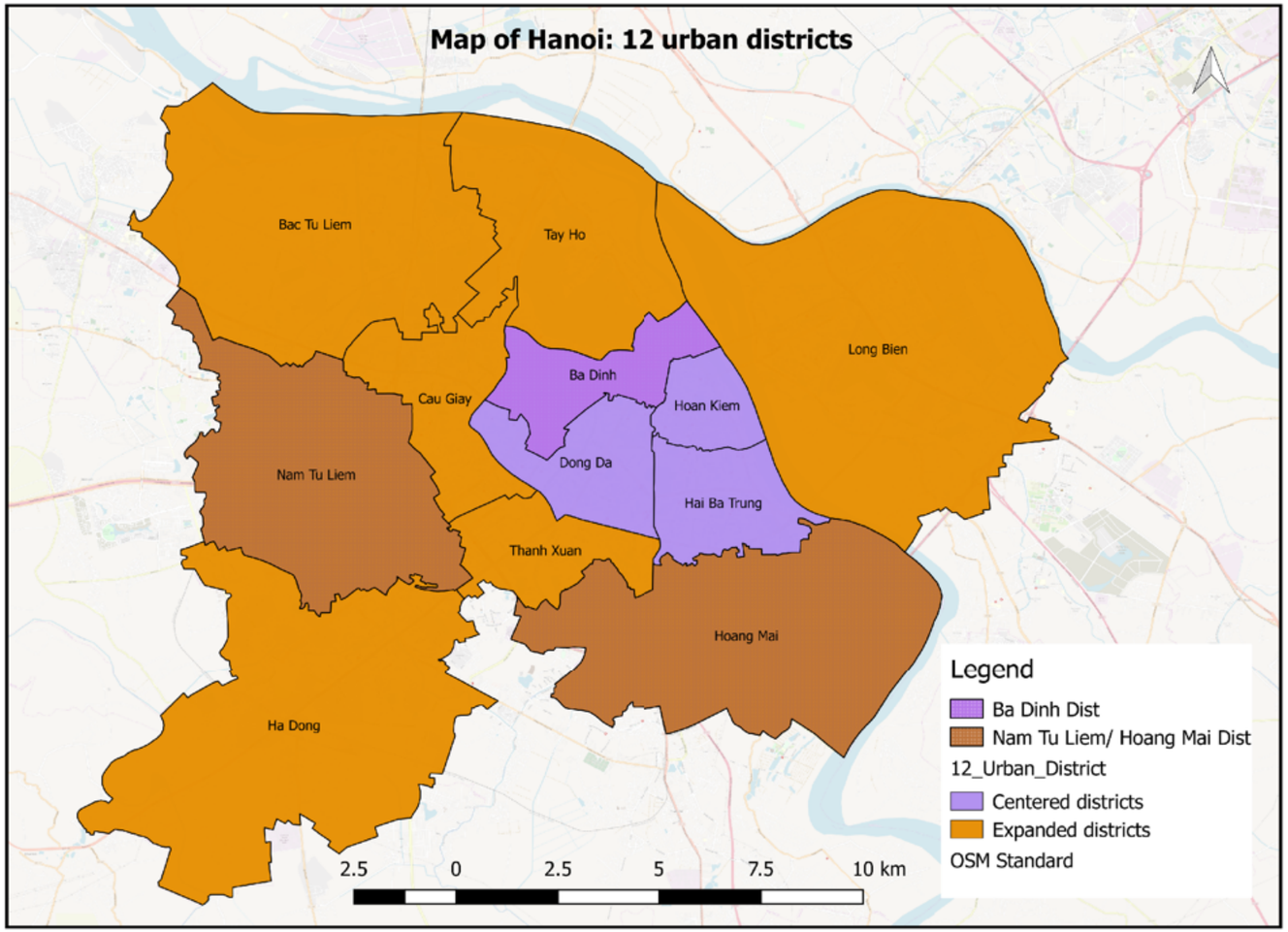
Lohrey at al, Science of the Total Environment 794 (2021)
https://doi.org/10.1016/j.scitotenv.2021.148260

Thanks for the support from the German Red Cross,
and to my collaborators from the National Unviversity of Singapore (Prof. Jason Lee, Melissa Hua), the Red Cross Climate Centre (Clemens Gros) and the German Red Cross (Jerome Faucet)

Methods

KAP survey in Hanoi (VN)

- 1027 outdoor workers were interviewed by the Red Cross in 3 Hanoi districts in Nov. 2018
- Questions focused on
  - self-reported symptoms from heat
  - knowledge about heat-health impacts
  - use of early warning systems
- Workers were grouped by principal occupation
  - Street vendors (“Informal”), Shippers, Construction workers, “Others”



Methods

Data analysis

We used generalized regression models and ordered logistic regression to explain *health impacts*:

- “Did you get any of the following symptoms?”
- “With above symptom, did you go to see the doctor?”

Explanatory variables:

- sex
- age
- occupation group
- house ownership (proxy for the quality of the house)
- air-conditioning device in the bedroom
- income
- access to weather forecasts

Descriptive statistics

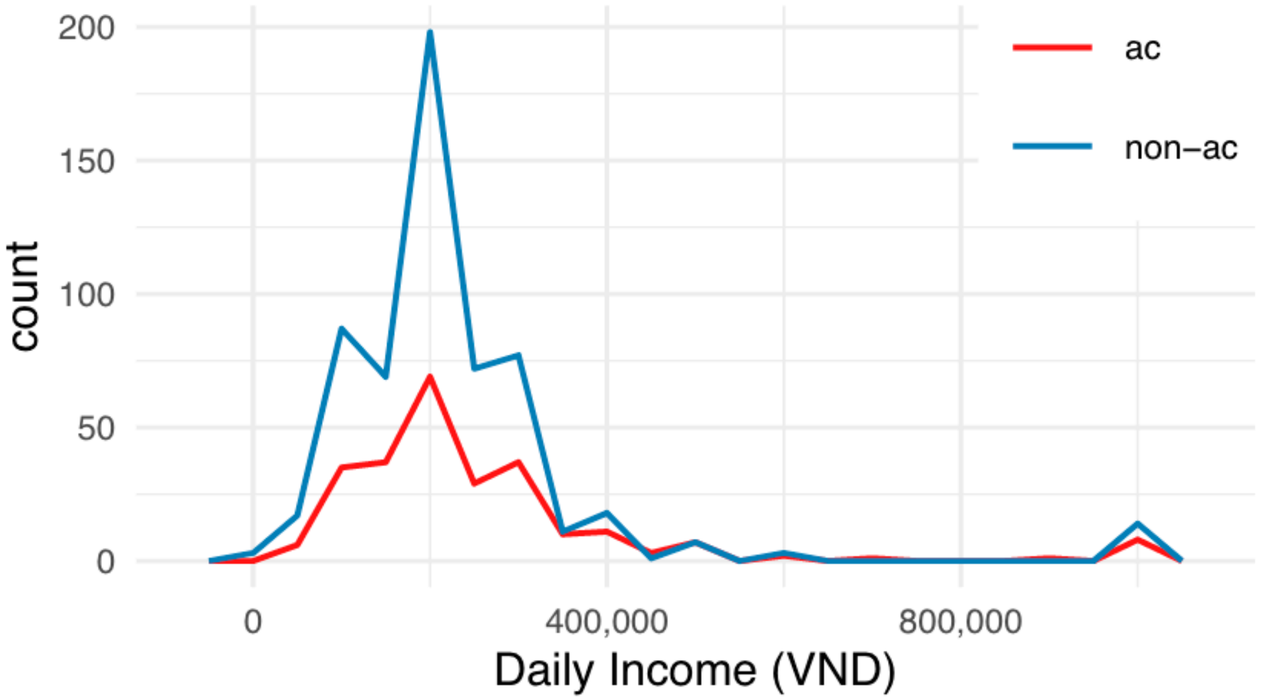
Demographics

Occupation	Mean age [years]	Share elder [%]
Builder	38.1	4.4
Shipper	41.4	11.2
Informal	45.0	12.6
Non-working	63.2	80.6
Other	34.7	10.8

Descriptive statistics

Air-conditioning in the bedroom

- Those who owned a house were 50% more likely to have AC in the bedroom
- Most elderly have ac in bedroom
- Focus group discussions revealed that AC use was **too expensive** for most



Descriptive Statistics

Heat symptoms

- *Heat cramps*, *exhaustion* and *stroke*
- Heat cramps were experienced by 58%–70% of respondents
- Symptoms of heat exhaustion were reported in 65% of the informal street vendors, and in 40% of the builders and shippers.
- A majority of the respondents reported to have suffered from tiredness, sweating, and thirst.
- 4% reported to have fainted. Out of those that reported fainting, 88% were female
- Symtoms reported are consistent with other studies

Table 1
Reported symptoms (Q. B2), category (heat cramps, heat exhaustion or heat stroke) and share of symptoms reported by all respondents, share of these symptoms among builders, and values reported in a study on construction site workers in Ahmedabad, India (Dutta et al., 2015). The list of symptoms included in the survey was non-exhaustive, the heat injuries mentioned are not mutually exclusive and do not necessarily occur independently of each other.

Symptom	Classification	Total	Builders	Dutta et al. (2015)
Heavy sweating	Cramps	746 (73%)	74%	74%
Thirsty	Cramps	685 (67%)	64%	79%
Cough	Cramps	234 (23%)	18%	–
Muscle cramps	Cramps	233 (23%)	17%	18%
Tiredness or weakness	Exhaustion	796 (78%)	73%	–
Headache	Exhaustion	582 (57%)	47%	38%
Dizziness	Exhaustion	558 (54%)	46%	34%
Cold, clammy skin	Exhaustion	184 (18%)	18%	–
Nausea or vomiting	Exhaustion	134 (13%)	12%	22%
Feeling hot	Stroke	591 (58%)	49%	–
Fainting	Stroke	42 (4.1%)	2.5%	20%

Descriptive statistics

Knowledge of heat symptoms and EWS

- 17.8% of participants could not name any heat exhaustion symptoms, and 66% no heat stroke symptoms
- 78% of the respondents received weather forecast information, 71% of them by TV

Descriptive statistics

Knowledge of heat actions

- 14% could not name any actions against heat exhaustion, and 41% none against heat stroke.
- “Move to a cool place” was the only remedial action that was known by the majority of respondents
- Respondents drank about 0.5 L more water on “heat days”

Regression Analysis

SocioEcon & heat impacts

- Women were more likely to report health impacts by 50% ($p < 0.05$).
- Builders and the others group reported 45% and 55% fewer symptoms as compared to informal street vendors
- Builders were twice as likely and people with multiple jobs were four times as likely to consult a doctor
- Neither AC nor house ownership had any effect on heat-health impacts

Table 2
Influence of socioeconomic characteristics on self-reported heat-health impacts. Dependent variables are (1) if any impacts have been reported (log), (2) total number of symptoms reported (linear), (3) consulting a doctor because of heat-related symptoms (log). Values in brackets denote the standard error.

	Dependent variable		
	Any health impact *logistic*	No. symptoms *normal*	Visited doctor *logistic*
	(1)	(2)	(3)
Age	−0.005 (0.009)	0.016** (0.007)	0.028*** (0.008)
Sex (*male*)	−0.695** (0.299)	−0.435* (0.222)	−0.267 (0.253)
Income (1000 VND)	−0.001 (0.001)	−0.001** (0.001)	−0.0003 (0.001)
Child carer	0.422 (0.267)	0.122 (0.176)	0.209 (0.198)
Homeowner	−0.056 (0.285)	−0.372* (0.195)	0.119 (0.219)
Occ. (*builders*)	−0.142 (0.343)	−0.611** (0.256)	0.829*** (0.291)
Occ. (*shippers*)	0.661* (0.393)	−0.187 (0.270)	0.440 (0.319)
Occ. (*others*)	−0.583 (0.386)	−0.776** (0.312)	0.565 (0.361)
Occ. (*mult. jobs*)	−0.533 (0.471)	0.111 (0.414)	1.460*** (0.416)
Constant	2.783*** (0.487)	5.610*** (0.354)	−2.797*** (0.420)
Observations	836	742	741
Log likelih.	−282.475	−1,627.668	−370.872
Ak. Inf. Crit.	584.949	3,275.337	761.744

* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

Regression Analysis

Heat knowledge on heat impacts

- Knowledge of symptoms for both heat exhaustion and heat stroke **increased** the likelihood of also reporting heat symptoms and doctor visits
- Those who had fainted in the previous heatwave showed double the odds ($p < 0.01$) of knowing about preventive measures against heat exhaustion

Table 3
Logistic regression on the effect of knowledge on several heat exhaustion symptoms. Values in brackets denote the standard error.

	Dependent variable		
	Any health impact	Visited doctor	Fainting
	(1)	(2)	(3)
Age	−0.004 (0.009)	0.026*** (0.008)	−0.005 (0.009)
Sex (*male*)	−0.408* (0.245)	0.131 (0.188)	−0.497** (0.244)
Income	−0.001 (0.001)	−0.0002 (0.001)	−0.001 (0.001)
Child carer	0.385 (0.267)	0.200 (0.196)	0.355 (0.266)
Homeowner	0.147 (0.275)	0.079 (0.208)	0.100 (0.273)
Knows HE symptoms	1.046*** (0.242)	0.601** (0.289)	
Knows HE prevention			0.888*** (0.264)
Constant	1.776*** (0.497)	−3.032*** (0.480)	1.953*** (0.495)
Observations	836	741	836
Log likelihood	−279.872	−376.622	−283.321
Akaike Inf. Crit.	573.745	767.243	580.641

* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

Regression Analysis

Influence of preventive actions

- Whether respondents have taken any action at all did not influence heat health indicators
- Increased drinking correlated with **higher** number of reported heat symptoms
- Respondents who rescheduled outdoor activities, took longer lunch breaks and changed their working schedules in response to hot weather also reported **more** symptoms ($p < 0.05$).

Table 4
Linear regression with total number of symptoms as dependent variable, testing for the influence of preventive actions around drinking. (1) Increasing water intake (reporting different drinking amounts for "normal" and "hot" days), (2) responding to act upon heat by "drinking plenty" and by (3) following weather updates. Values in brackets denote the standard error.

	Dependent variable		
	Number of symptoms		
	(1)	(2)	(3)
Age	0.018*** (0.007)	0.019*** (0.007)	0.018*** (0.007)
Sex (*male*)	−0.652*** (0.168)	−0.577*** (0.167)	−0.603*** (0.166)
Income	−0.001*** (0.001)	−0.001*** (0.001)	−0.001*** (0.001)
Child carer	0.088 (0.176)	0.053 (0.176)	0.053 (0.176)
Homeowner	−0.261 (0.189)	−0.282 (0.189)	−0.318* (0.189)
Increased water intake	0.464*** (0.162)		
Drinking plenty (*Q. D8/2*)		0.831*** (0.267)	
Weather updates (*Q. D8/10*)			0.608*** (0.173)
Constant	5.132*** (0.349)	4.571*** (0.421)	4.964*** (0.357)
Observations	742	742	742
Log Likelihood	−1,629.128	−1,628.368	−1,627.042
Akaike Inf. Crit.	3,272.255	3,270.736	3,268.085

* $p < 0.1$.
*** $p < 0.01$.

Regression Analysis

Influence of weather forecasts

- Respondents who received heatwave forecasts had double the odds of reporting heat-health impacts
- Those who found weather forecasts “definitely useful” were more than triple as likely to report heat-health impacts

Table 5
Logistic regression models for investigating whether respondents reported any health impact from heat and which role weather forecasts played. Model (1) included “Received Forecast” (Q. C1) as additional independent variable, model (2) included the perceived usefulness of forecasts as additional independent variable (Q. C6). Values in brackets denote the standard error.

	Dependent variable	
	Any health impact	
	(1)	(2)
Age	−0.004 (0.009)	−0.004 (0.009)
Sex (*male*)	−0.565** (0.245)	−0.516** (0.246)
Income	−0.001 (0.001)	−0.001* (0.001)
Child carer	0.350 (0.266)	0.301 (0.274)
Homeowner	0.040 (0.272)	0.052 (0.278)
Received forecast	0.662*** (0.239)	
Forecast useful		1.176*** (0.247)
Constant	2.227*** (0.480)	1.840*** (0.492)
Observations	834	833
Log likelihood	−284.641	−275.335
Ak. Inf. Crit.	583.282	564.670

* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

Take home message

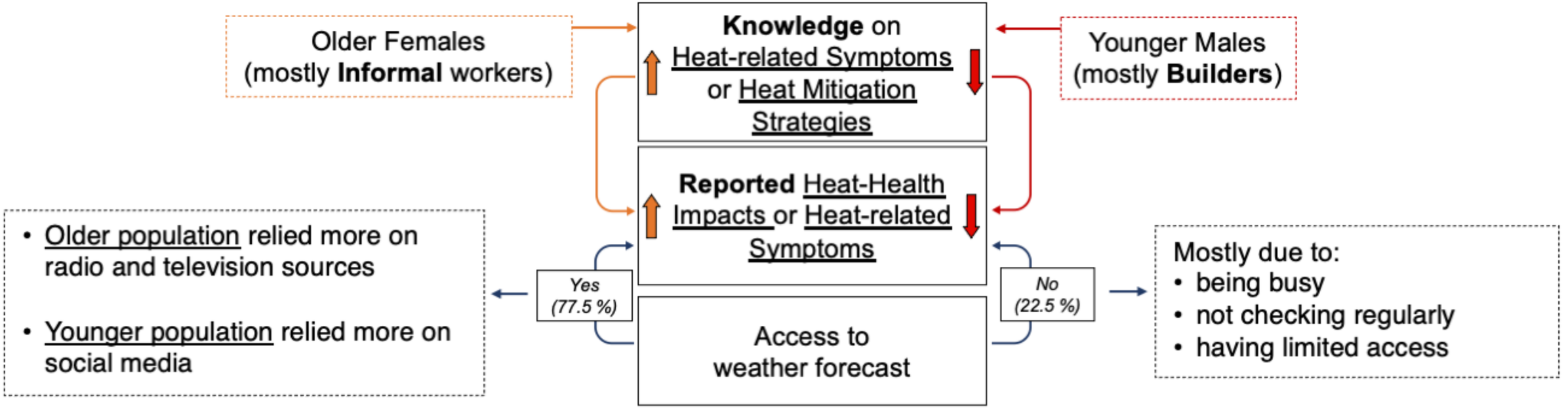
Self-reported heat-health impacts of outdoor workers in Hanoi, Vietnam

- Only small group-wise differences existed, except for construction workers
- Increased drinking did not decrease heat impacts
- Knowledge of heat impacts and actions **increased** reported heat symptoms. Likely a bias-problem!
- Air-conditioning in the bedroom **did not reduce** heat-health impacts

https://doi.org/10.1016/j.scitotenv.2021.148260

The Red Cross surveyed **1,027 Outdoor workers** in Hanoi, Vietnam

	Informal	Builders	Shippers	Others	Multiple Jobs	Non-working
Share of Male (%)	21.0	76.5	92.6	54.2	65.2	26.5
Mean age (years)	45 ± 12	38 ± 13	42 ± 14	35 ± 14	45 ± 15	63 ± 16



Many respondents were unaware of heat risks and hence neglected the detriments of the heat-related symptoms experienced. Interventions should aim to provide **more resources to older females**, who are more at risk, during extreme heat events. **Education on heat risks** and **combination of heat mitigation strategies** should be implemented especially for **younger, more motivated builders**. **Dissemination of weather forecasts** (and education materials) should be **tailored to the respective groups** – through mass media for the older population and social media for the younger population.