Prevention of Heat-related Illnesses at work in Japan

1 legislations

2 governmental guidelines

3 governmental services

4 NGO and civil activities

Seichi Horie

University of Occupational and Environmental Health, Japan

Legislations

Industrial Safety and Health Act

Article 22 (1) An employer must take the necessary measures to prevent the following health impairments:
(i) …;
(ii) health impairments due to things such as radiation, high temperatures, low temperatures, ultrasonic waves, noises, vibration, abnormal atmospheric pressures;
(iii) …;

Legislations

Industrial Safety and Health Act

(Work Environment Monitoring)
Article 65 (1) An employer, …must conduct the necessary work environment monitoring for indoor… in which hazardous operations take place that are specified by Cabinet Order and keep records of the results.

(Medical Checkups)
Article 66 (1) An employer, …must have workers undergo medical checkups by a physician.
(2) An employer, …must implement medical checkups by a physician regarding customized test items for workers engaged in hazardous work operations….

Legislations

Order for Enforcement of Industrial Safety and Health Act

(Workshops Which Should Conduct Working Environment Assessments)
Article 21 (1) The workshops prescribed by the Cabinet Order set forth in paragraph (1) of Article 65 of the Act are as follows:
(i) …;
(ii) indoor workshops having hot, cold or humid conditions, as prescribed by Order of the Ministry of Health, Labour and Welfare;
(iii) …;

Legislations

Ordinance on Industrial Safety and Health

(Appointment of an Industrial Physician)
Article 13 (1) The appointment of an industrial physician…must be made as follows:
(i) to appoint a person…
(ii) …
(iii) for the workplace where 1,000 workers or more are regularly employed or 500 workers or more workers are regularly engaged in the following work, to appoint a person exclusively assigned to the workplace:
(a)work handling a large quantity of high-temperature substances or the work in extremely hot places;
(b)…

Legislations

Ordinance on Industrial Safety and Health

(Workshop that Should Carry Out Working Environment Measurement)
Article 587 The indoor workshops having hot, cold or humid condition specified by the Order of the Ministry of Health, Labour and Welfare set forth in Article 21, item (ii) of the Order are as follows:
(i) indoor workshops where the work of smelting or refining minerals or metals by blast furnaces, open-hearth furnaces, converters or electric furnaces, is carried out;
(ii) indoor workshops where the work of melting ores, metals or glass by cupola, crucible, etc., is carried out;
…
(viii)indoor workshops where the work of casting molten glass into glass products is carried out;
…
(xv) humidifying indoor workshops where the work of cotton-spinning or cotton-weaving is carried out; and
(xvi) beyond what is set forth in the preceding items, the indoor workshops specified by the Minister of Health, Labour and Welfare.

Legislations

Ordinance on Industrial Safety and Health

(Adjustment of Temperature and Humidity)
Article 606 (1) As regards the indoor workshop having hot, cold or humid conditions and where there is a risk of being detrimental to health, the employer must take appropriate measures for adjusting the temperature and humidity such as cooling, heating, or ventilating the workshop.

(Measurement of Atmospheric Temperature and Humidity)
Article 607 (1) As regards an indoor workshop having hot, cold or humid conditions prescribed in Article 587, the employer must measure the atmospheric temperature, humidity and radiation heat in the indoor workshop (for radiation heat, limited to the indoor workshop set forth in items (i) through (viii) of the same Article), periodically once every period not exceeding half a month.

Legislations

Ordinance on Industrial Safety and Health

(Protection from Radiation Heat)
Article 608 (1) When an indoor workshop has facilities such as a blast furnace which generate a great deal of heat, etc., the employer must discharge the heated air directly to the open air or take measures to protect workers from the radiated heat released.

(Repair of Heated Furnace)
Article 609 (1) In repairing a furnace being heated, the employer must not allow workers to enter the furnace until it has been cooled off to a reasonable extent.

Legislations

Ordinance on Industrial Safety and Health

(Humidification)
Article 610 (1) When performing humidification due to the nature of the work, the employer must perform the humidification within the extent that it is not harmful and use clean water for atomizing.

Legislations

Ordinance on Industrial Safety and Health

(Atmospheric Temperature in a Pit)
Article 611 (1) The employer must maintain the atmospheric temperature inside a pit 37 degrees or lower; provided, however, that this does not apply when having workers engage in lifesaving or danger prevention work by taking necessary measures to prevent health impairment due to high temperature.

(Measurement of Atmospheric Temperature in a Pit)
Article 612 (1) As regards a workshop in pit set forth in Article 589, item (ii), the employer must measure the atmospheric temperature in the workshop periodically once every period not exceeding half a month.
(2)The provisions of Article 590, paragraph (2) apply mutatis mutandis when measurements pursuant to the provisions of preceding paragraph have been carried out.

Legislations

Heatstroke Special Alert, Climate Change Adaptation Law

Heatstroke Alert is alarmed when Forecasted max WBGT>=33 C
Heatstroke Special Alert is alarmed when Forecasted min WBGT>=35 C?
Designated Cooling Shelters will be released to the public.

Heatstroke Alert

Stay indoor and avoid heat

Actively speak to elderly citizens

Strengthen prevention behaviours

Quit physical activities

Measures WBGT

https://www.wbgt.env.go.jp/

Governmental Guidelines

Governmental Notice for Prevention of Heat-related Illnesses, Labour Standards Bureau, revised in 2021

WBGT Standard Values* with reference to ISO 7243

physical workload	acclimatized worker	non-acclimatized worker
rest	33	32
mild	30	29
moderate	28	26
heavy	26	23
extremely heavy	25	30

*values must be adjusted by the values announced by ACGIH TLVs according to clothing ensembles

Governmental Guidelines

Governmental Notice for Prevention of Heat-related Illnesses, Labour Standards Bureau, revised in 2021

1. Work environment control

i) Reduction of the WBGT value: Construct roofs to block heat, direct sunlight, and reflections and install ventilation, cooling, and dehumidification equipment

ii) Preparation of rest areas: Prepare cool rest areas in the shade. Prepare ice, cold wet towels, and drinking water.

Horie S. JMAJ 2013; 56(3):186-192

Governmental Guidelines

Governmental Notice for Prevention of Heat-related Illnesses, Labour Standards Bureau, revised in 2021

2. Work control
i) Shortened work hours: Secure break time, shorten the length of continuous work, avoid heavy physical labor and change the work areas.
ii) Acclimatization to heat: Set a period for acclimatization to heat (seven days or longer)
iii) Intake of water and salt: Regular intake before, during, and after work; create an intake checklist and confirm
intake by a tour of inspection. Intake one or two cups of 0.1 to 0.2% salt water, sports drink containing 40 to 80 mg
sodium per 100 mL, or oral rehydration solutions every 20 to 30 minutes.
iv) Clothes: Avoid clothing made of endothermic and thermal fabrics and wear clothes with moisture and air permeability, cool garments and a hat with air permeability
v) Tour of inspection during work: Check the health conditions of workers.

Horie S. JMAJ 2013; 56(3):186-192

Governmental Guidelines

Governmental Notice for Prevention of Heat-related Illnesses, Labour Standards Bureau, revised in 2021

3. Health management

i) Response to the result of health examination: Implement measures following the opinion of physicians based on the result of health checkups.

ii) Daily health management: Provide guidance on a lifestyle to avoid lack of sleep and ill health, alcohol drinking on the previous day and skip breakfast.

iii) Checking the health condition of workers: Check the condition by talking to workers before and during work.

iv) Condition of workers who should stop working: The heart rate per minute continuously exceeds the value obtained by subtracting the age from 180 for several minutes. The heart rate exceeds 120 one minute after the peak of work intensity. The body temperature during a break does not return to the level before the start of the work. Body weight decreases by 1.5% or more after work. Such symptoms as acute and intense fatigue, vomiturition, dizziness, and unconsciousness occurred.

v) Checking physical conditions: Check the body temperature and weight during the break.

Horie S. JMAJ 2013; 56(3):186-192

Governmental Guidelines

Governmental Notice for Prevention of Heat-related Illnesses, Labour Standards Bureau, revised in 2021

4. Occupational health education
Educating managers and workers in hot and humid environments (about the symptoms, preventive measures, first aid in an emergency, and cases of heat stroke)

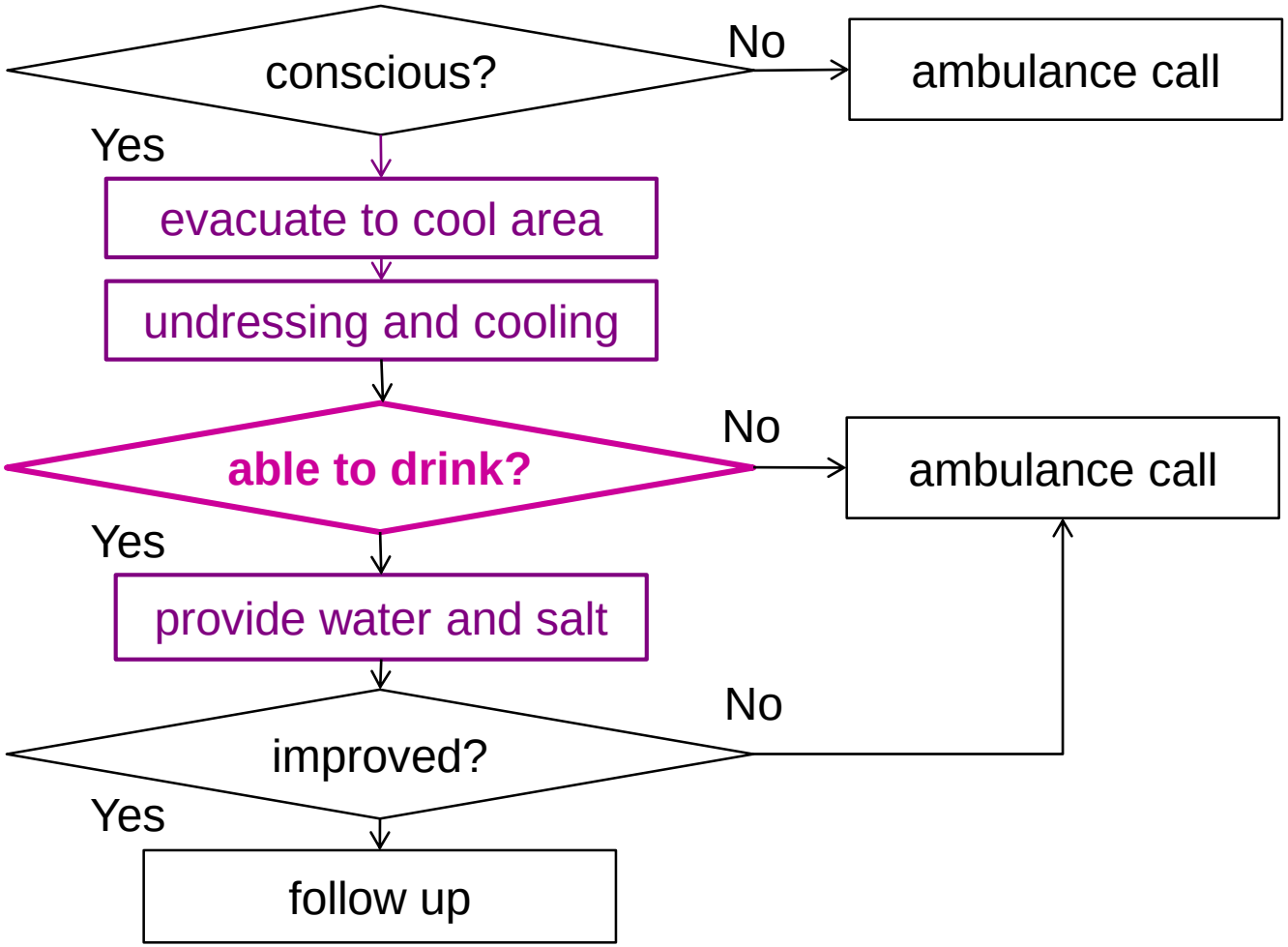
5. First aid
i) Creation of an emergency communication list and making it known to workers: know the locations of hospitals and clinics. Create an emergency communication list and make it known to workers.
ii) First aid: Cool the body in a cool place. Consume water and salt. Request emergency services and consult a physician (Fig).

Horie S. JMAJ 2013; 56(3):186-192

Governmental Guidelines

Governmental Notice for Prevention of Heat-related Illnesses, Labour Standards Bureau, revised in 2021

Fig. First aid



Governmental Guidelines

Governmental Notice for Prevention of Heat-related Illnesses during Radioactive Cleanup Work after Fukushima Nuclear Power Plant Accident, Labour Standards Bureau, 2011

Stop work from 2pm to 5pm in July and August

平成23年6月10日

【照会先】
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報道関係者各位

東電福島第一原発における熱中症予防対策の強化を指導

東京電力福島第一原子力発電所において、緊急作業に従事する労働者の熱中症が発生していることから、東京電力に対し協力会社を含め、7、8月の14時から17時の炎天下における作業について、事故収束に向けた工程に配慮しつつ原則として作業を行わないなど、熱中症の予防対策の強化について指導いたしました。

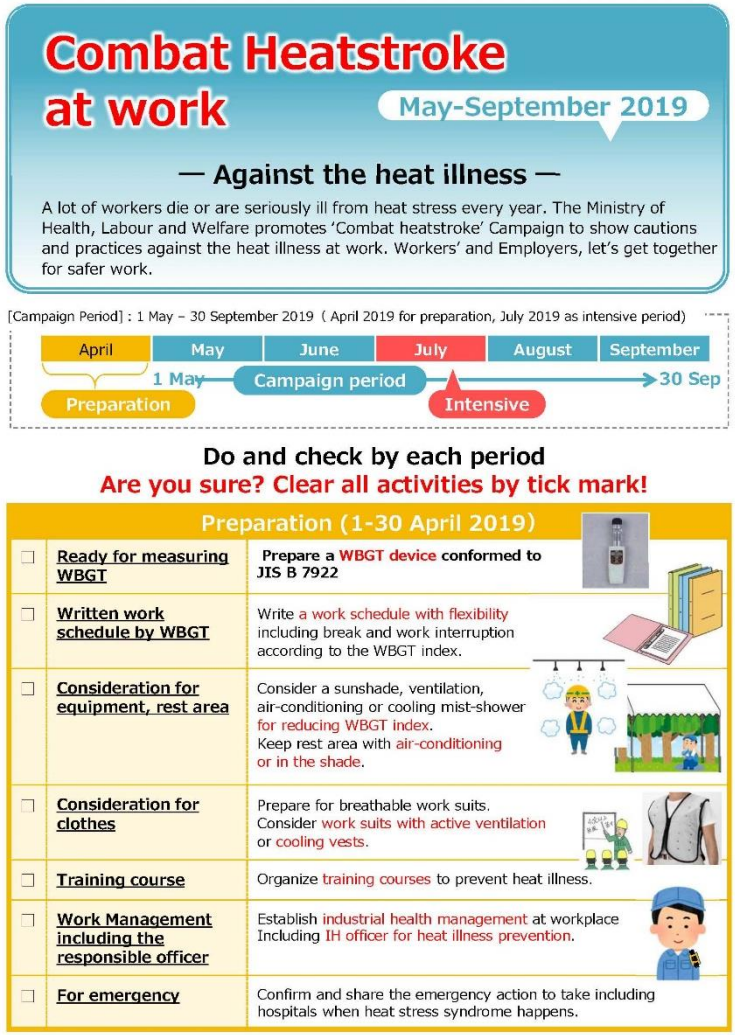
【指導内容のポイント】
○　冷房付きの休憩施設を早急に増設すること。

○　熱中症による死亡災害が多く発生する7月、8月の14時から17時の炎天下における作業について、事故収束に向けた工程に配慮しつつ原則として作業を行わないこと。

○　作業管理者が、水分及び塩分の摂取について注意喚起するとともに
　1　労働者の自覚症状の有無にかかわらない水分及び塩分の摂取
　2　作業開始前の労働者の睡眠の状況、朝食の摂取、発熱や下痢等の体調
について、チェック表を用いること等により個人ごとに確認すること。

Governmental Guidelines

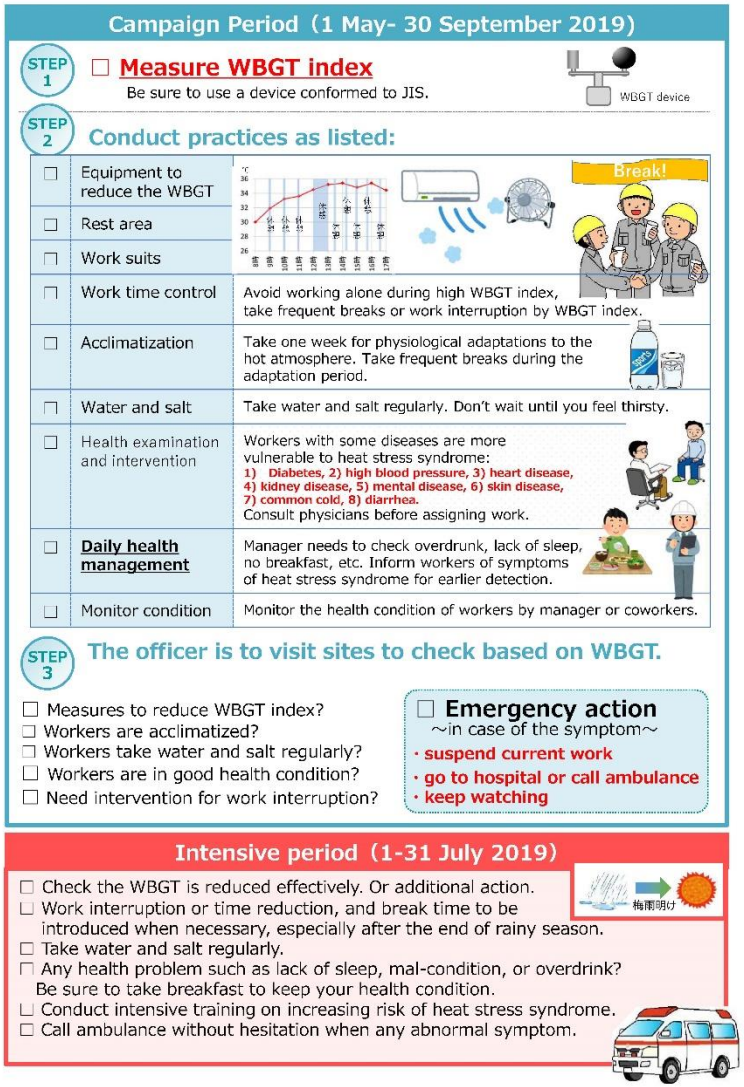
Governmental Notice on Combat Heatstroke at work, Division of Industrial Health, Labour Standards Bureau, 2023



Measure WBGT.
Write a work schedule with flexibility.
Consider a sunshade, ventilation, air-conditioning for reducing WBGT.
Keep rest area with air-conditioning or in the shade.
Prepare for breathable work suits.
Consider work suits with active ventilation or cooling vests.
Organize training courses to prevent heat illness.
Assign industrial health officer for heat illness prevention.
Confirm and share the emergency action to take when heat stress syndrome happens.

Governmental Guidelines

Governmental Notice on Combat Heatstroke at work, Division of Industrial Health, Labour Standards Bureau, 2023



Equipment to reduce the WBGT

Avoid working alone during high WBGT

Take frequent breaks by WBGT index.

WBGT Standard Values + 1.0	15 min/h
WBGT Standard Values + 2.0	30 min/h
WBGT Standard Values + 3.0	45 min/h
WBGT Standard Values > 3.0	stop work

Acclimatization Take 1 week for physio-logical adaptations to the hot atmosphere.

Take water and salt regularly. Don't wait until you feel thirsty.

Health examination and intervention

Manager needs to check overdrunk, lack of sleep, no breakfast, etc.

Monitor condition of coworkers.

Governmental Guidelines

Guideline for the Prevention of Heat-related Illnesses in Mass Gatherings, Ministry of the Environment, 2018

Prevent causing long waiting line

Create shades in airy spaces

Governmental Guidelines

Guideline for the Prevention of Heat-related Illnesses in Mass Gatherings, Ministry of the Environment, 2018

・入場待ちの長蛇の列
・列が日なた

long waiting line

整理券や指定席の活用
待機列を日陰に誘導
ゲートを増やす
暑さ対策を呼びかける

issue numbered ticket
guide to shady area

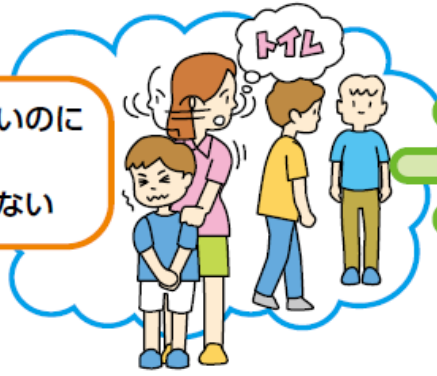
・のどが渇いたのに売店がない
・自動販売機が売り切れ

sold out beverages

給水所、自販機、売店
をわかりやすく
欠品防止

keep enough storage

・トイレはどこか聞きたいのに
スタッフがいない
・誰がスタッフかわからない



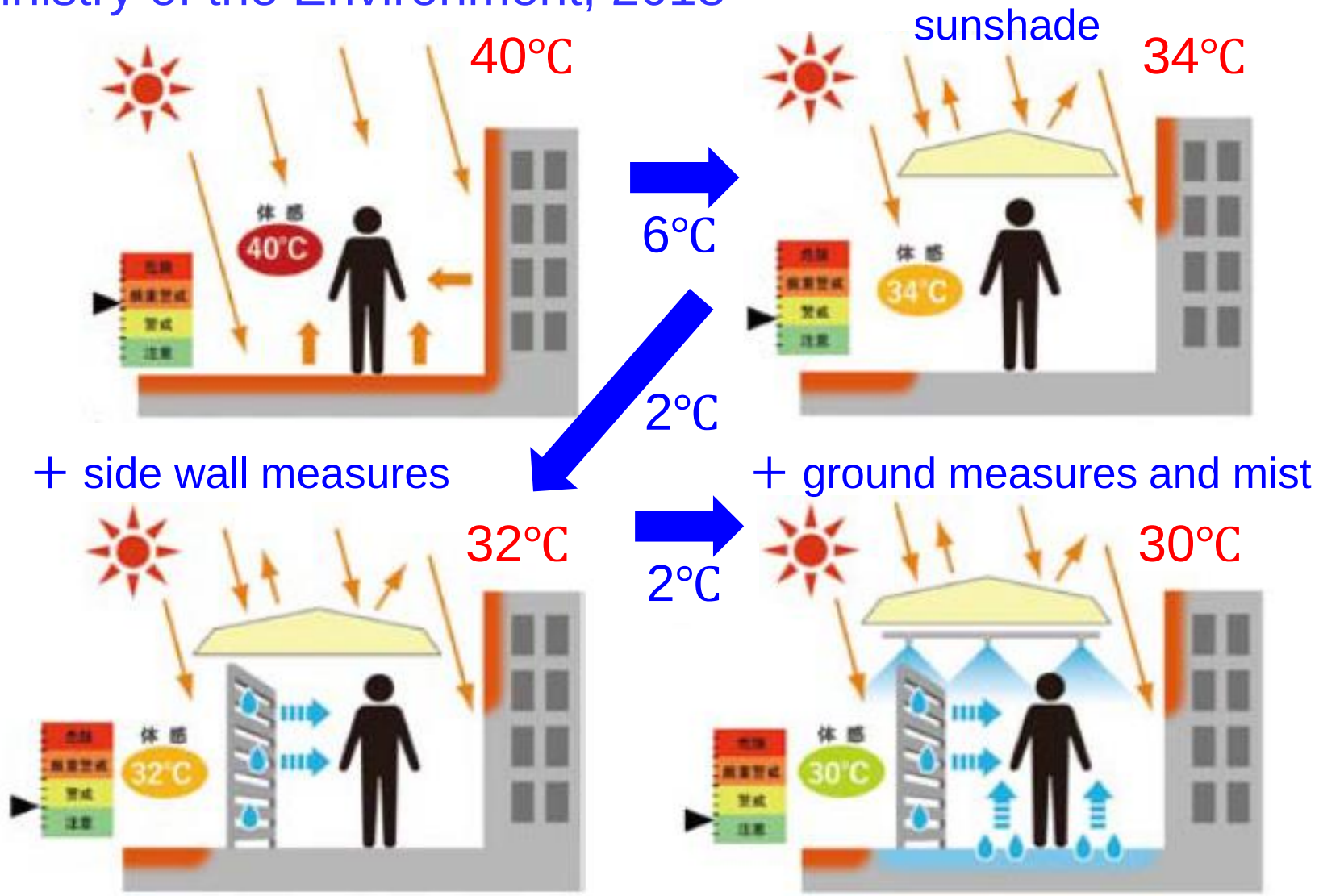
insufficient staffs

わかりやすい服装
声をかけやすい雰囲気
放送で案内

place clear and plain signs

Governmental Guidelines

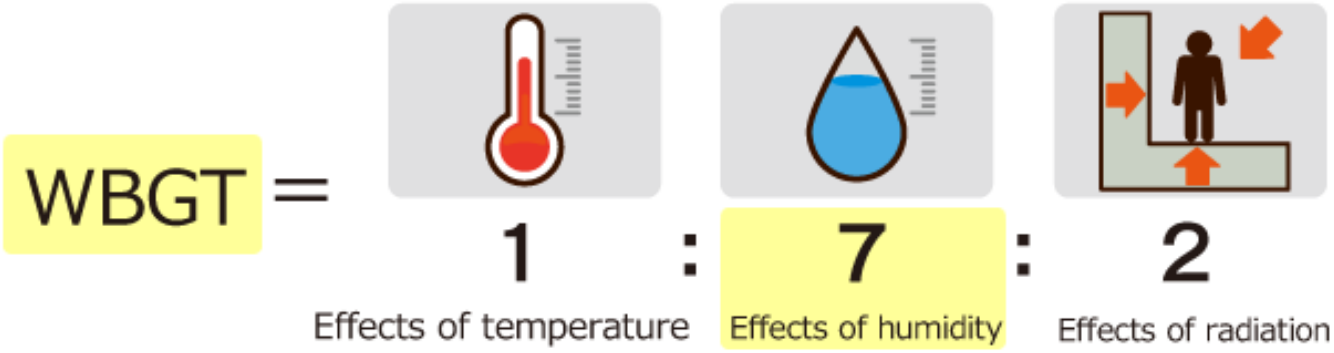
Guideline for the amelioration of heat in urban area, Ministry of the Environment, 2018

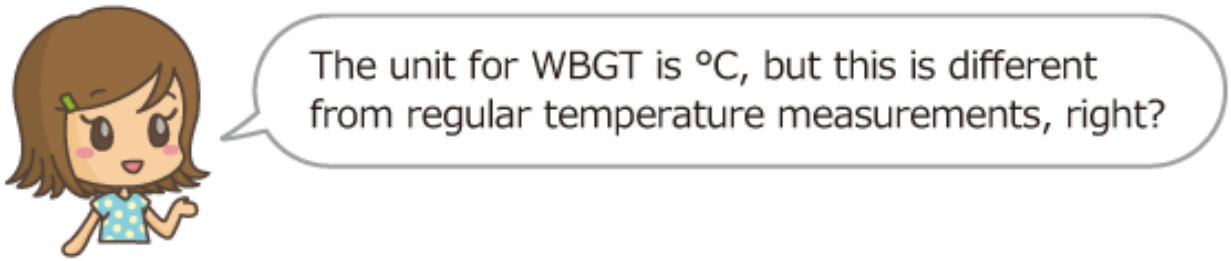


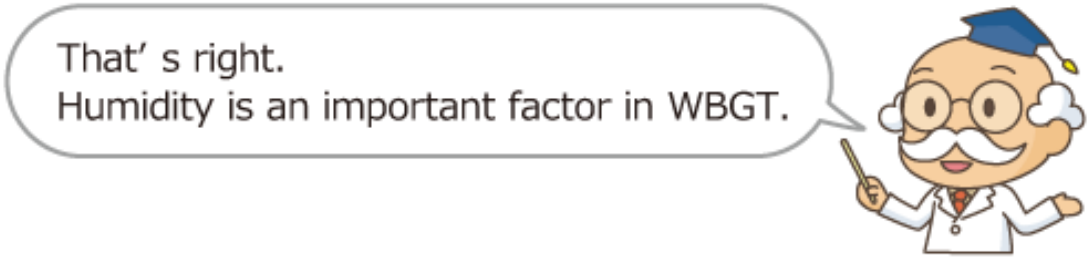
Governmental Guidelines

Documents issued by MOE, JMA, FDMA and OTIT

Information Site on Heat Stroke Prevention, MOE



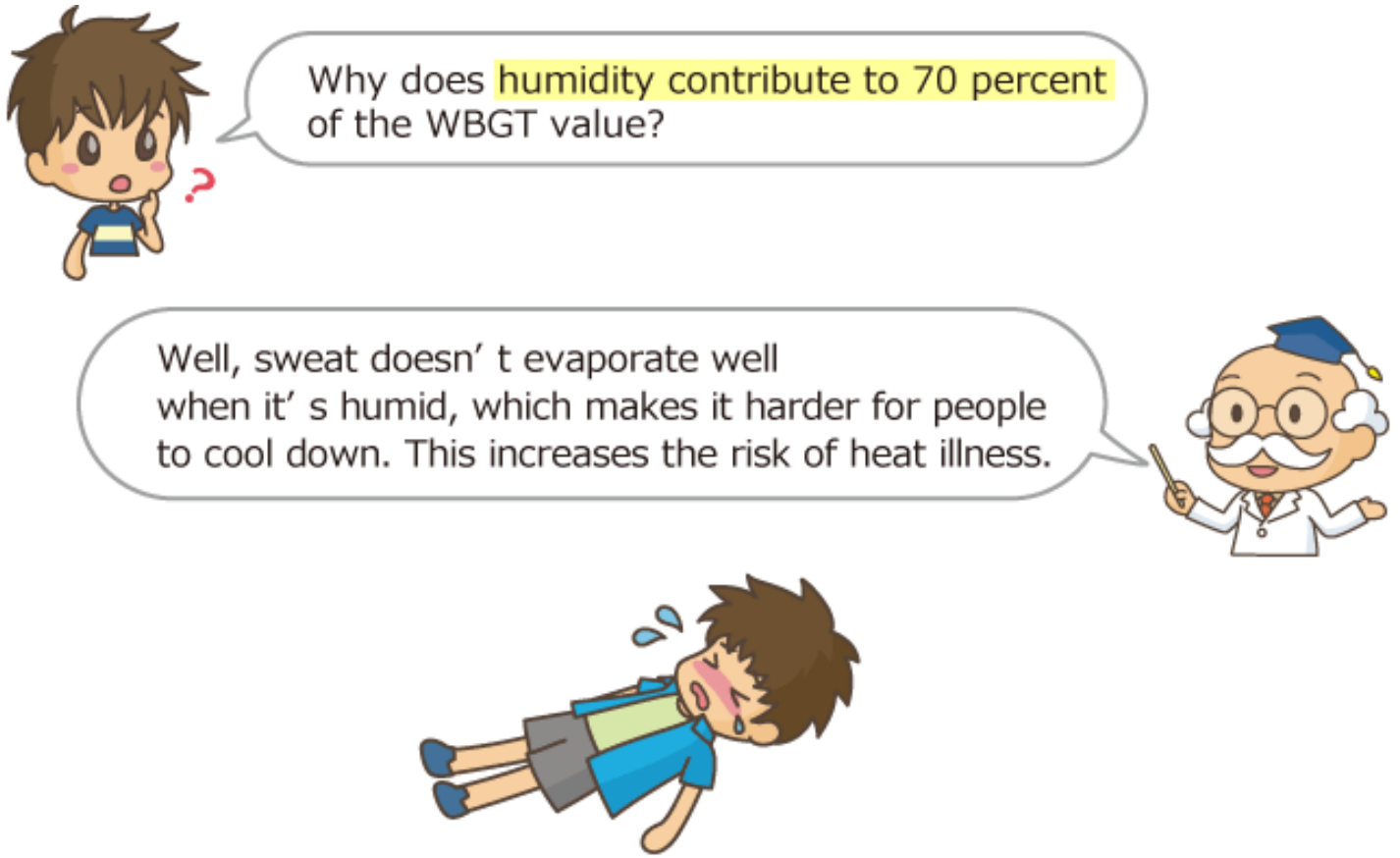




Governmental Guidelines

Documents issued by MOE, JMA, FDMA and OTIT

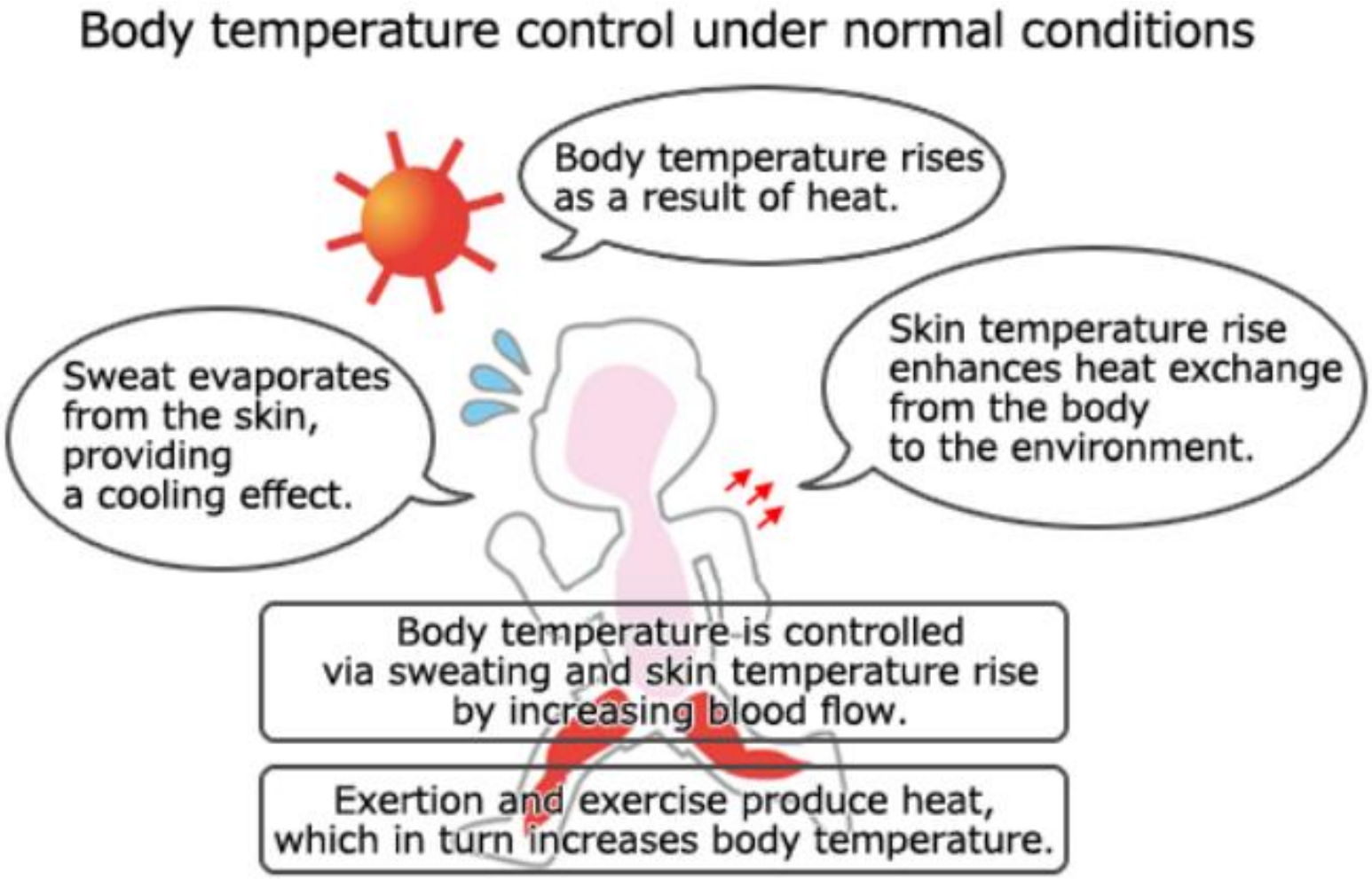
Information Site on Heat Stroke Prevention, MOE



Governmental Guidelines

Documents issued by MOE, JMA, FDMA and OTIT

Information Site on Heat Stroke Prevention, MOE



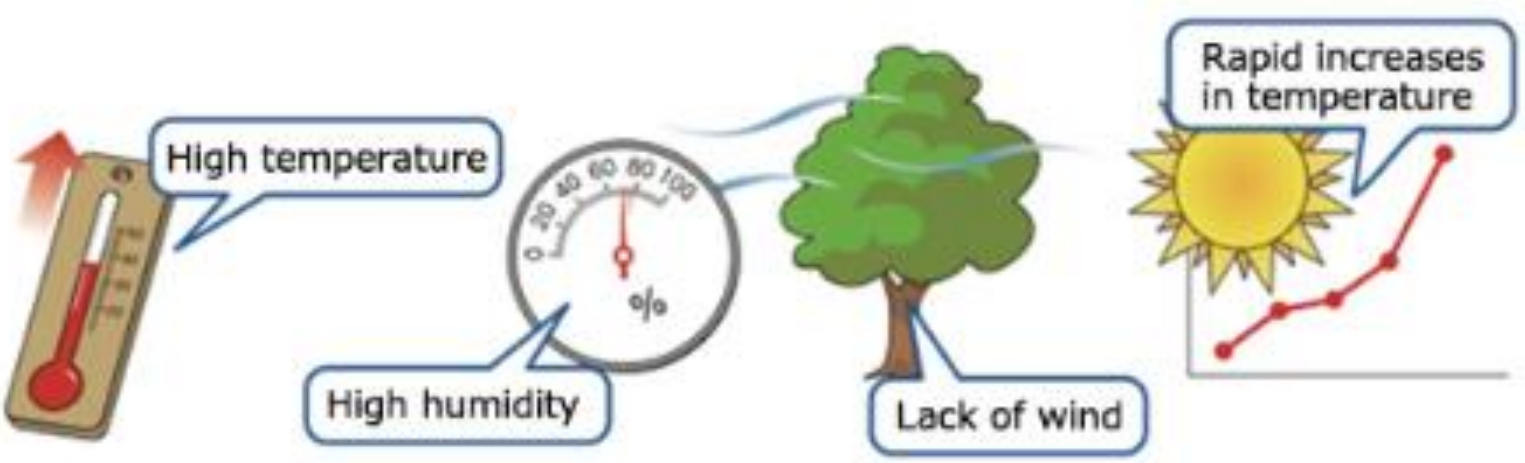
Governmental Guidelines

Documents issued by MOE, JMA, FDMA and OTIT

Information Site on Heat Stroke Prevention, MOE

Three conditions causing heat-related illnesses
1. Environment

- High temperature
- High humidity
- Lack of wind
- Strong sunlight
- Lack of ventilation
- Lack of air-conditioning
- Rapid increases in temperature
- Heatwaves

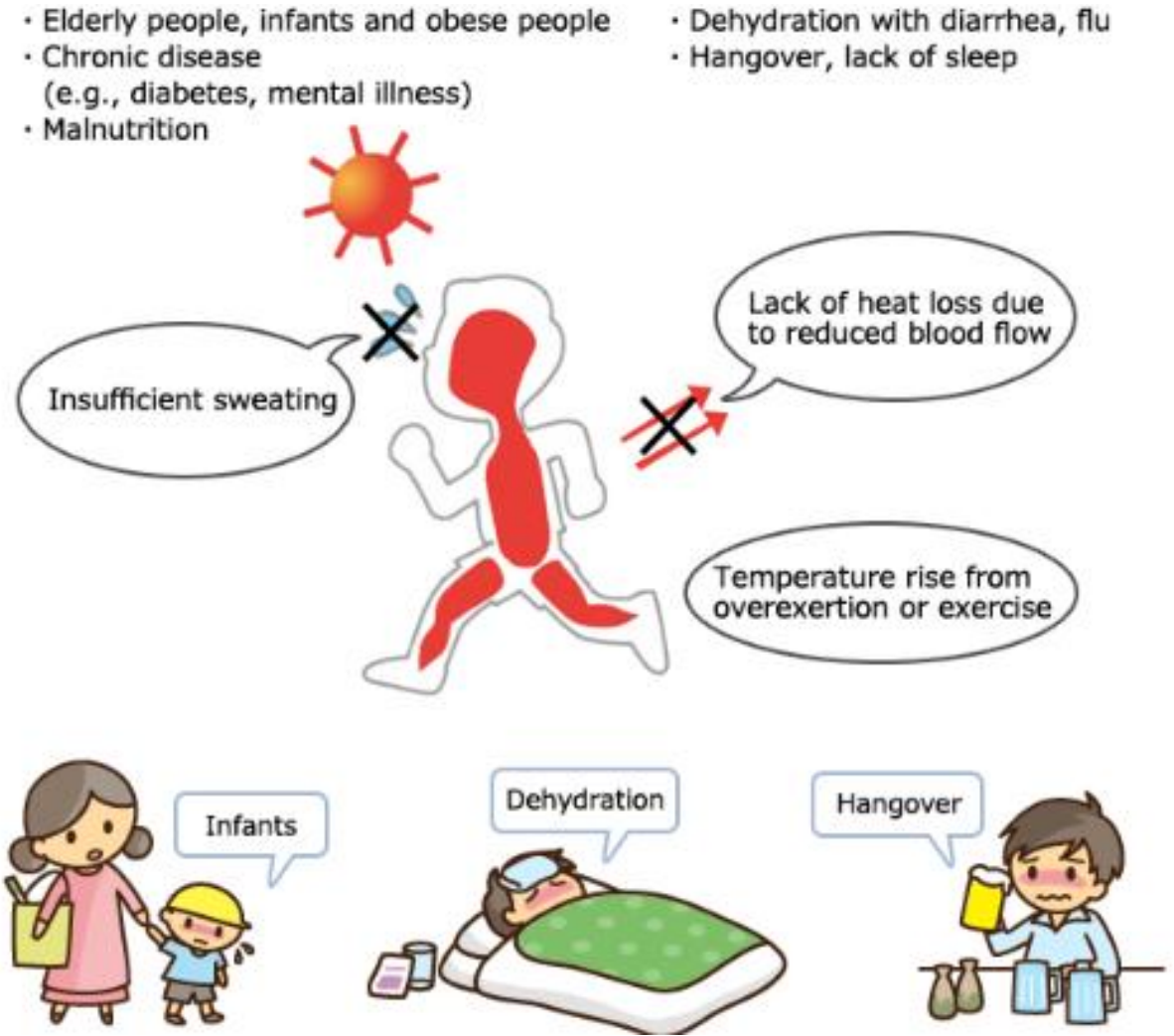


Governmental Guidelines

Documents issued by MOE, JMA, FDMA and OTIT

Information Site on Heat Stroke Prevention, MOE

2. Human Body



Governmental Guidelines

Documents issued by MOE, JMA, FDMA and OTIT

Information Site on Heat Stroke Prevention, MOE

3. Activity

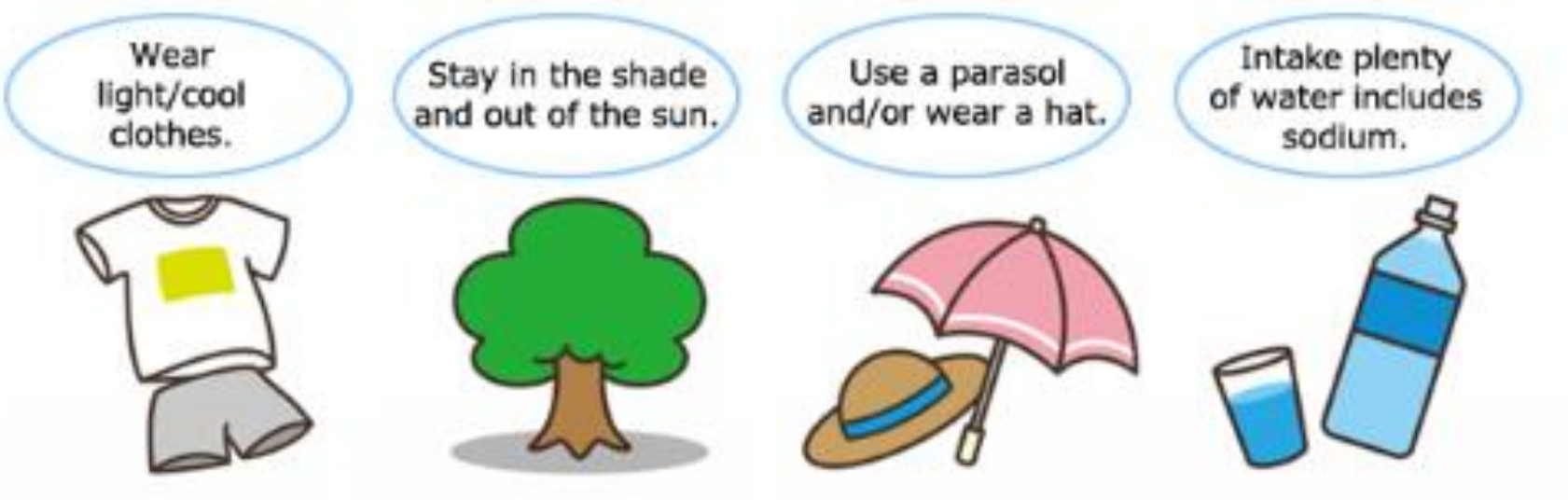
- Overexertion, unusual activity
- Extended periods of outdoor work
- Dehydration

Governmental Guidelines

Documents issued by MOE, JMA, FDMA and OTIT

Information Site on Heat Stroke Prevention, MOE

Preventing Heat- related Illnesses



Governmental Guidelines

Why guidelines are effective in Japan?

Workers' compensation cases
Law suit on compensation for damage by Civil Law
Social sanction by TV/ newspaper
→ damage public reliance
→ disappointment from investors
→ disappointment from contractee/ orderer eg. bid exclusion
→ disappointment from workers
→ anti-buying tendency by consumers
These tendencies are commercially disadvantageous.

Governmental Guidelines

Documents issued by Ministry of Health, Labour and Welfare

Information Site on Heat Stroke Prevention, Ministry of Health, Labour and Welfare
https://www.mhlw.go.jp/seisakunitsuite/bunya/kenkou_iryou/kenkou/nettyuu/nettyuu_taisaku/
Prevention of Heat Stroke (in English)
https://www.mhlw.go.jp/english/policy/health-medical/health/dl/heatstork.pdf
Promotion campaign for drinking water for health
https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/topics/bukyoku/kenkou/suido/nomou/index.html
Enjoy Good Health by Adopting the New Lifestyle to Prevent Heatstroke & COVID-19 Infection (in English)
https://www.mhlw.go.jp/content/000673017.pdf

Governmental Guidelines

Documents issued by MOE, JMA, FDMA and OTIT

Information Site on Heat Stroke Prevention, Ministry of the Environment
Environmental Health Manual on Heat Strokes
https://www.wbgt.env.go.jp/heatillness_manual.php
Leaflet, Cards and Movie on the Prevention of Heat Strokes (in English)
https://www.wbgt.env.go.jp/en/sp/heatillness_pr.php

Heat Illness Risk Information (in English), Japan Meteorological Agency
https://www.data.jma.go.jp/fcd/yoho/data/kouon/heat_illness.html

Fire and Disaster Information Agency
https://www.fdma.go.jp/disaster/heatstroke/post3.html

Heatstroke Prevention Actions, Organization for Technical Intern Training (in English)
https://www.otit.go.jp/files/user/210527-72.pdf
https://www.otit.go.jp/files/user/docs/200904-19.pdf

Governmental Services

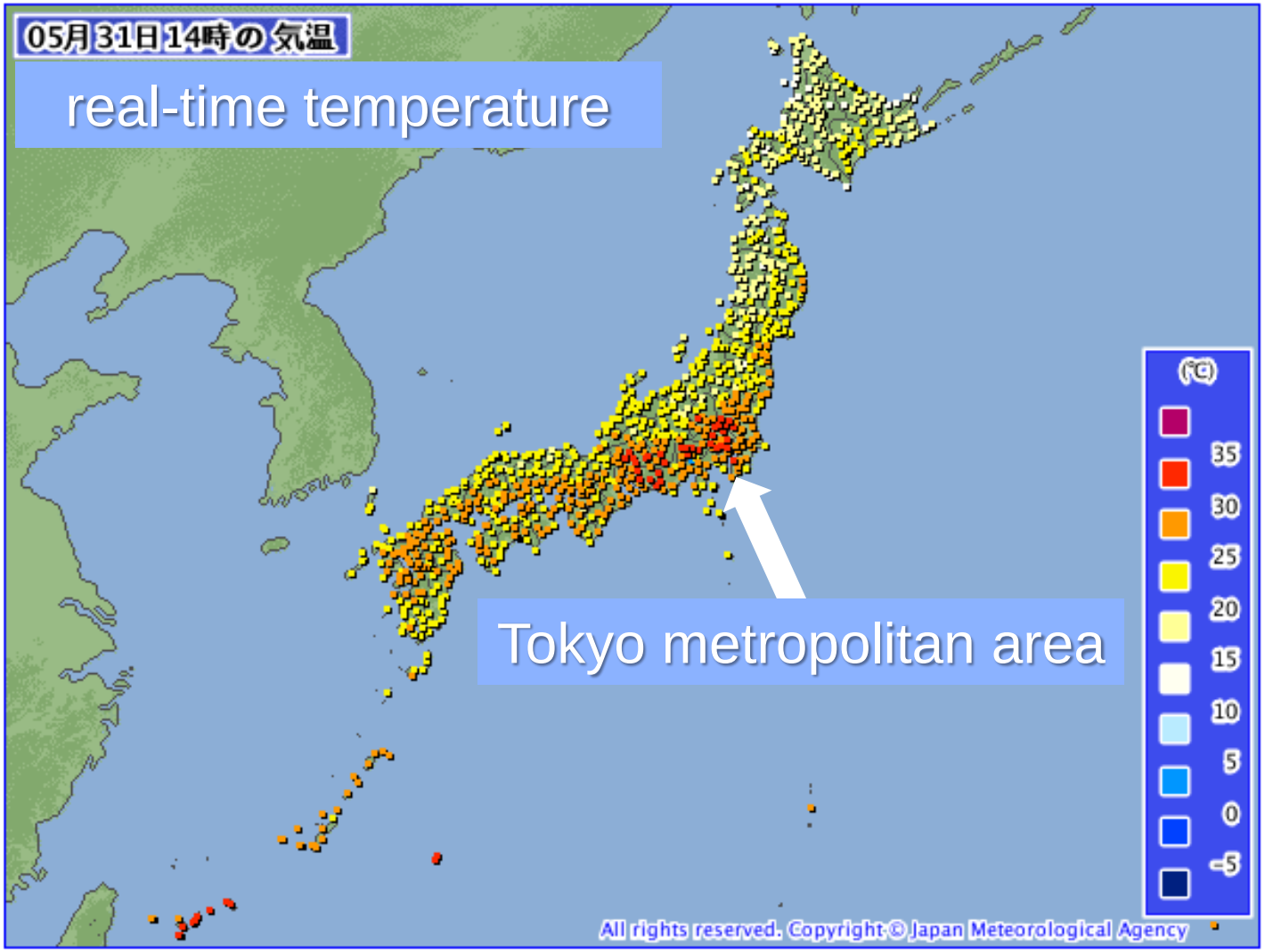
High temperature record in Japan

	temperature	city, prefecture	date
	41.1℃	Kumagaya, Saitama	2018-7-23
	41.1℃	Hamamatsu, Shizuoka	2020-8-17
5ys	41.0℃	Gero, Gifu	2018-8-06
	41.0℃	Mino, Gifu	2018-8-08
	41.0℃	Shimanto, Kochi	2013-8-12
6ys	40.9℃	Tajimi, Gifu	2007-8-16
	40.8℃	Tainai, Niigata	2018-8-23
74ys	40.8℃	Oume, Tokyo	2018-7-23
	40.8℃	Yamagata, Yamagata	1933-7-25

Governmental Services

Automated Meteorological Data Acquisition System (AMeDAS)

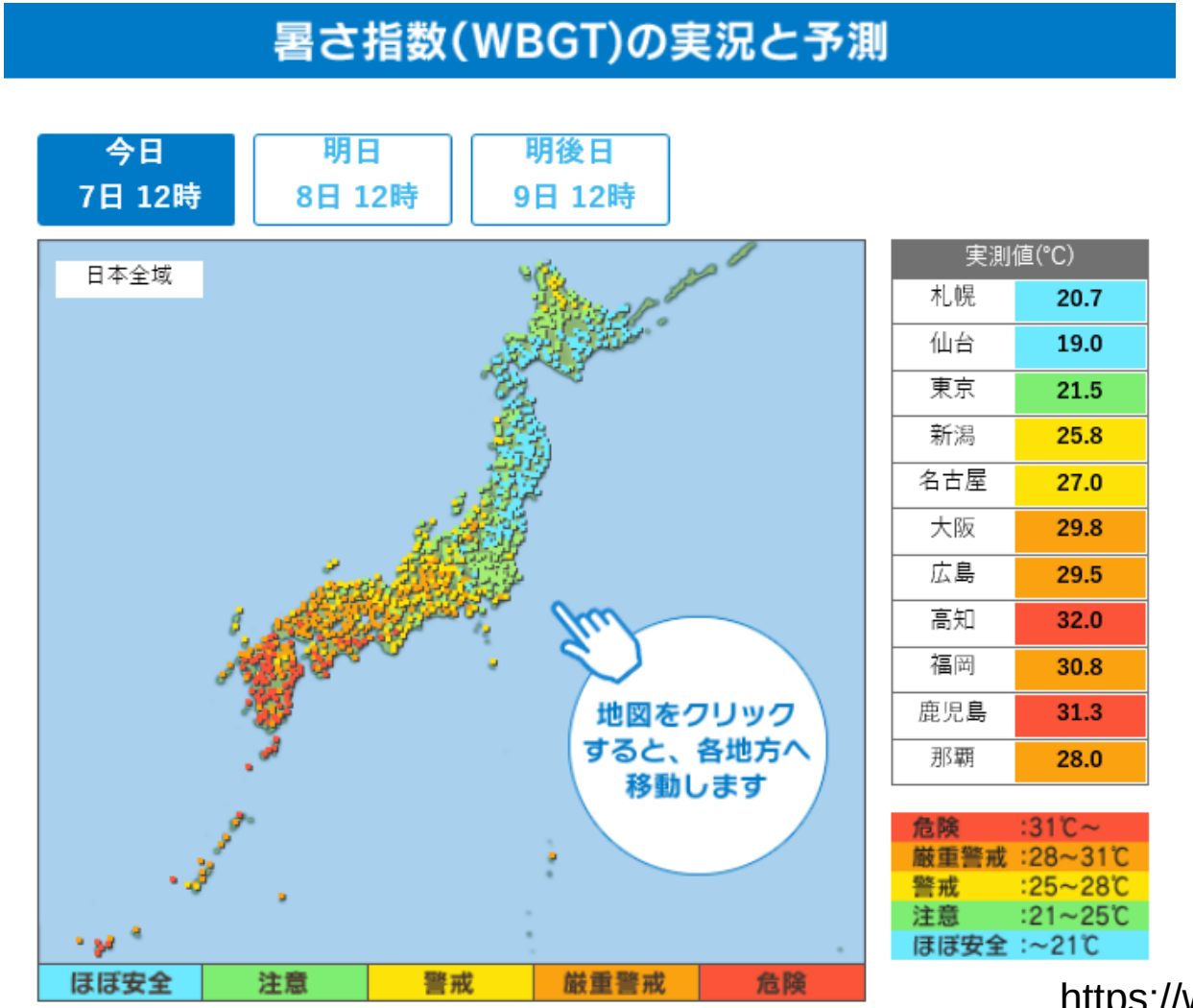
Detailed real-time climate data in Japan are available on JMA website



Governmental Services

Automated Meteorological Data Acquisition System (AMeDAS)

Real-time and forcasted WBGT in Japan are available on MOE website



https://www.wbgt.env.go.jp/

Governmental Services

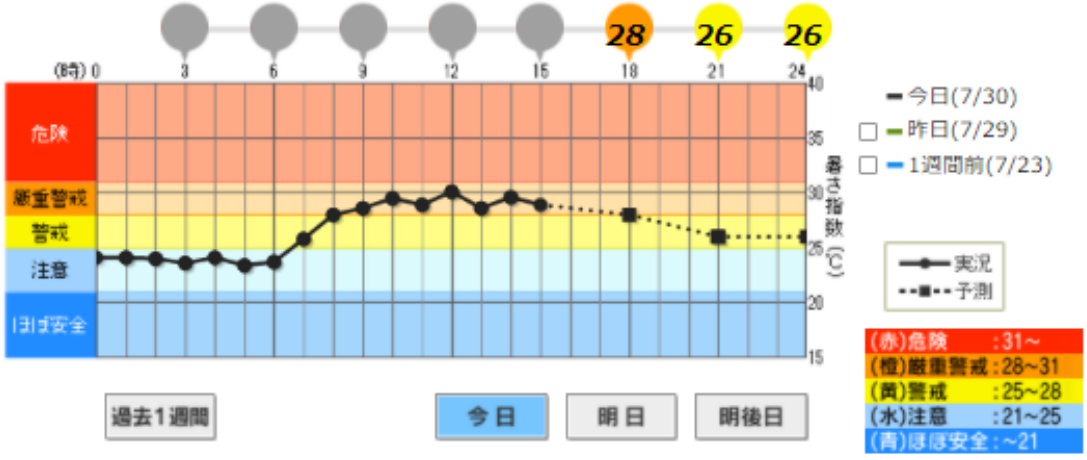
Automated Meteorological Data Acquisition System (AMeDAS)

Real-time and forcasted WBGT in Japan are available on MOE website

15時現在の暑さ指数
（通常の暑さ指数）

28.9（厳重警戒）

今日の予測



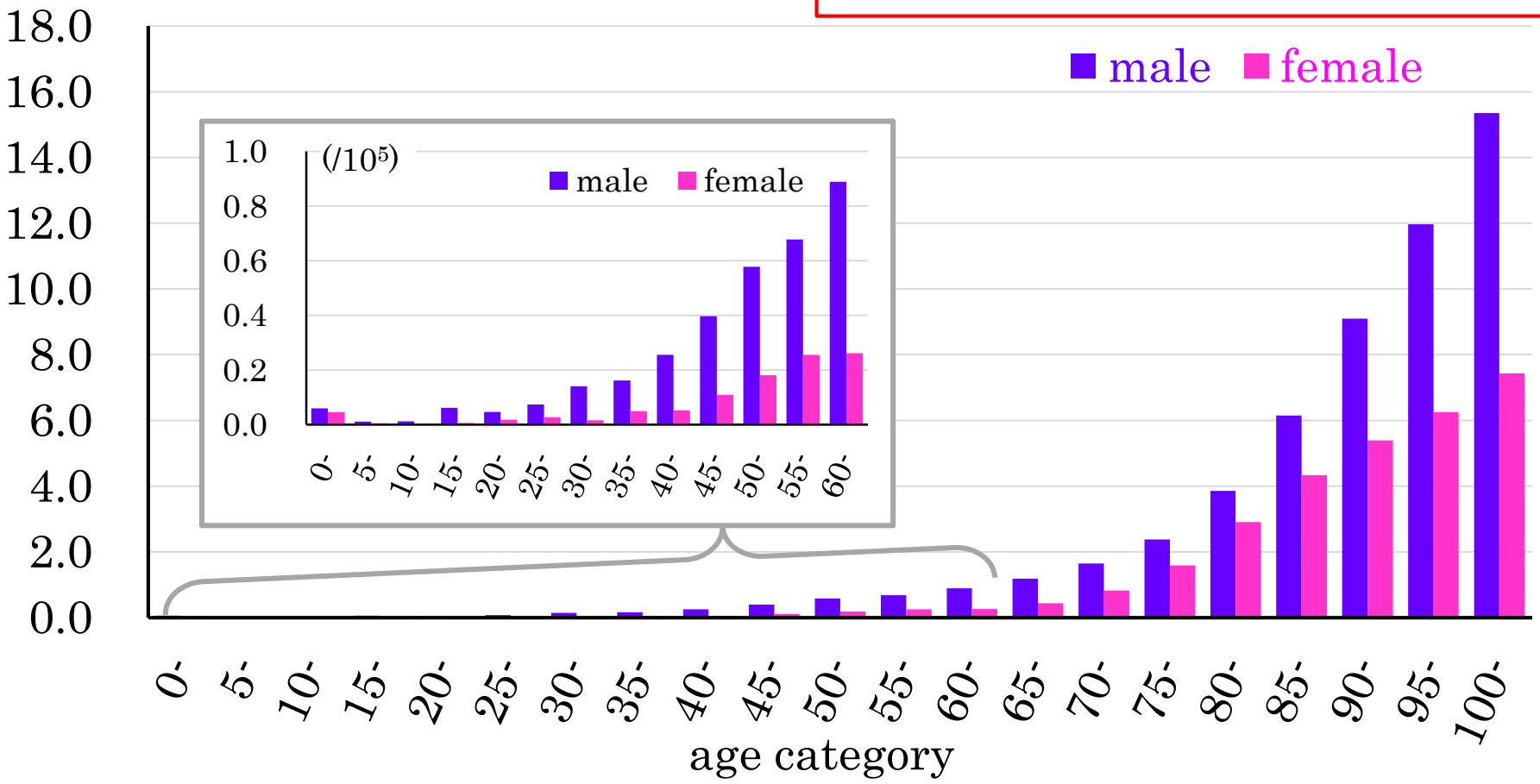
3日間の予測

	3時	6時	9時	12時	15時	18時	21時	24時
今日(7月30日)						28	26	26
明日(7月31日)	25	24	27	31	30	28	27	27
明後日(8月1日)	26	25	27	30	30	28	27	26

Governmental Services

Vital Statistics, Ministry of Health, Labour and Welfare

Aging markedly increases the mortality.
Male shows lower tolerance for heat.



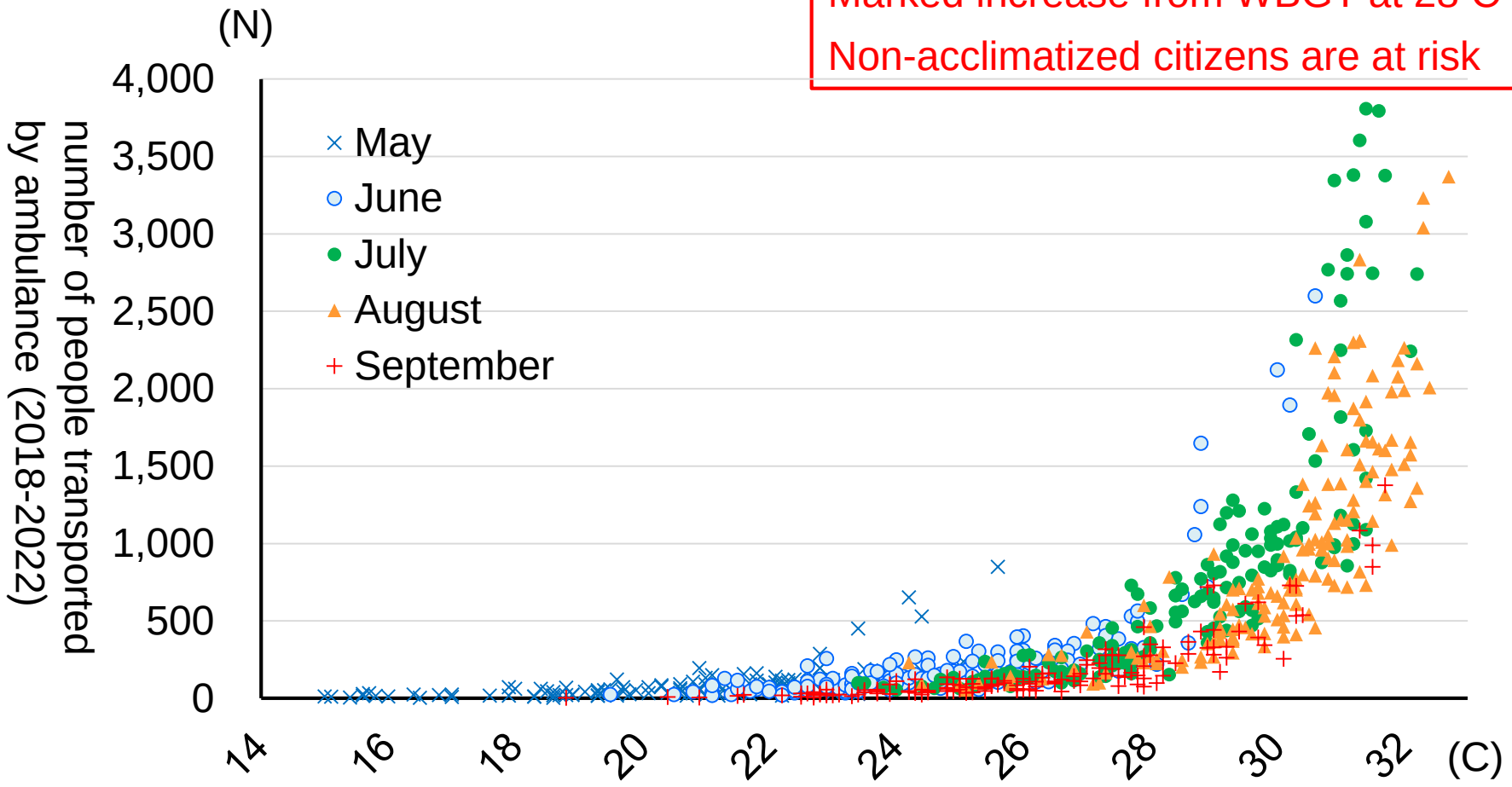
Source: vital statistics of Japan, 2005-2021

Governmental Services

Emergency Service, FDMA

Marked increase from WBGT at 28 C

Non-acclimatized citizens are at risk



Average of the highest WBGT of the day at monitored cities*

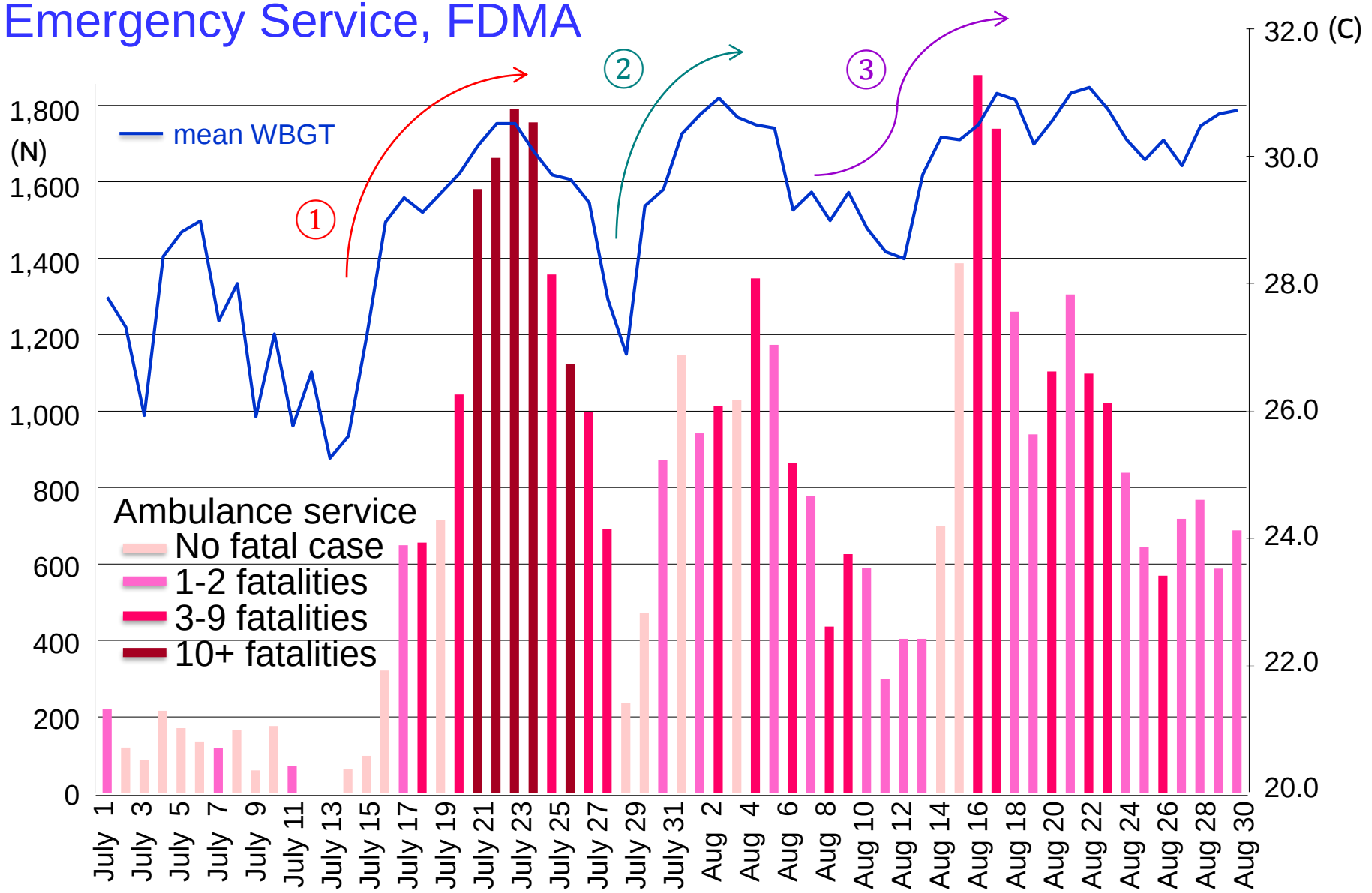
*Tokyo, Osaka, Nagoya, Niigata, Hiroshima and Fukuoka

https://www.wbgt.env.go.jp/

Governmental Services

Sudden heat causes increase of cases

Emergency Service, FDMA



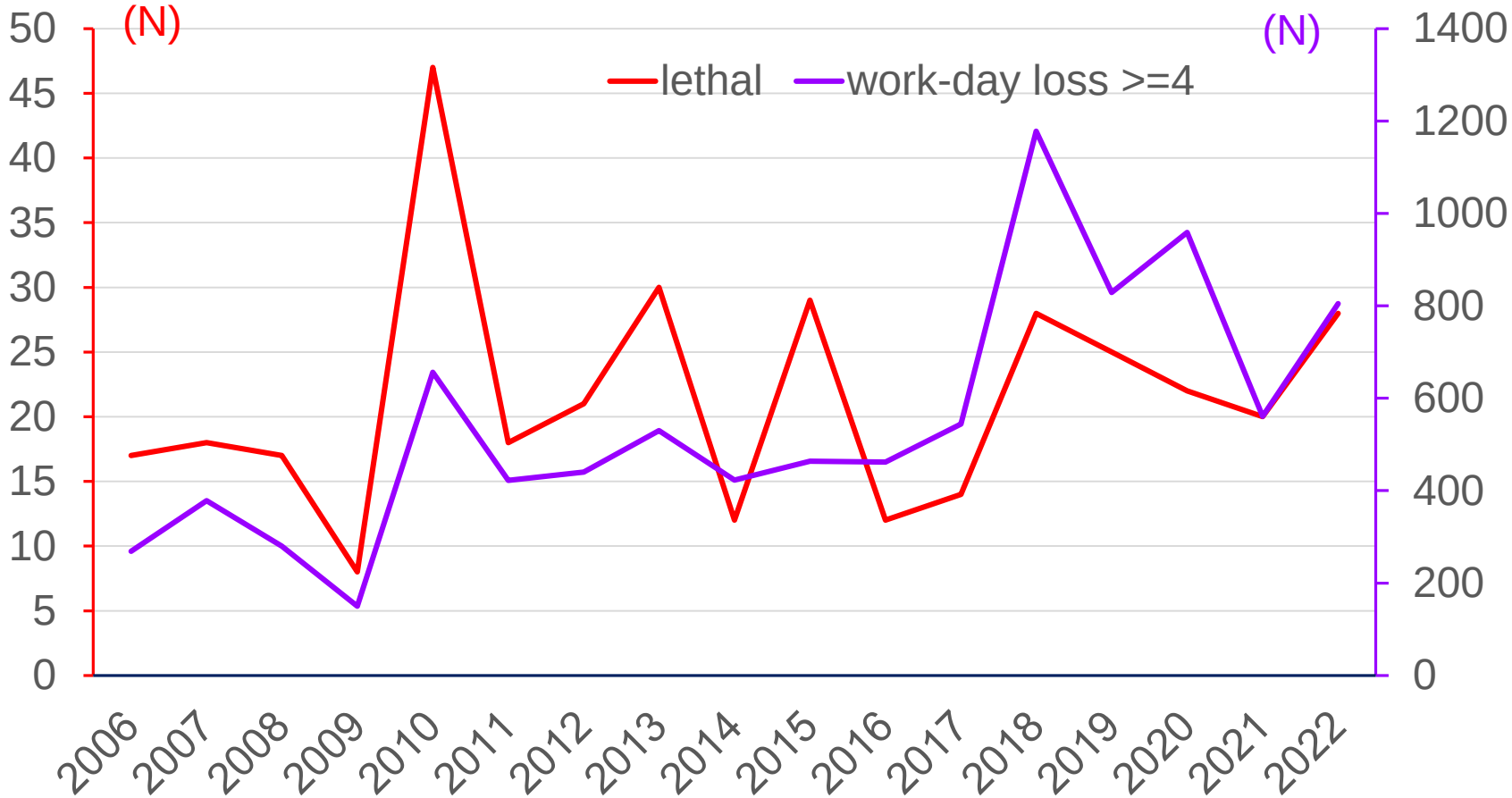
year 2010

https://www.wbgt.env.go.jp/

Governmental Services

Workers' Compensated Cases, MHLW

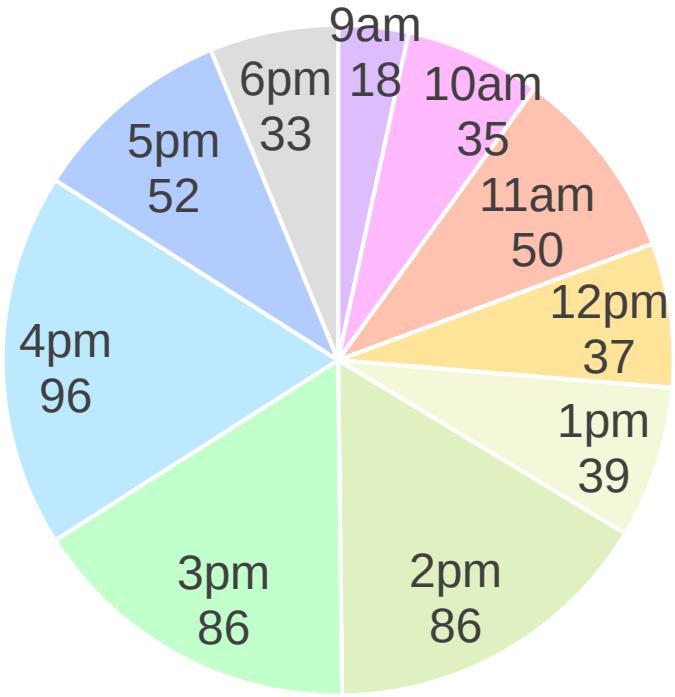
workday loss >=4 cases/ lethal cases
= 9,350／366= 25.5



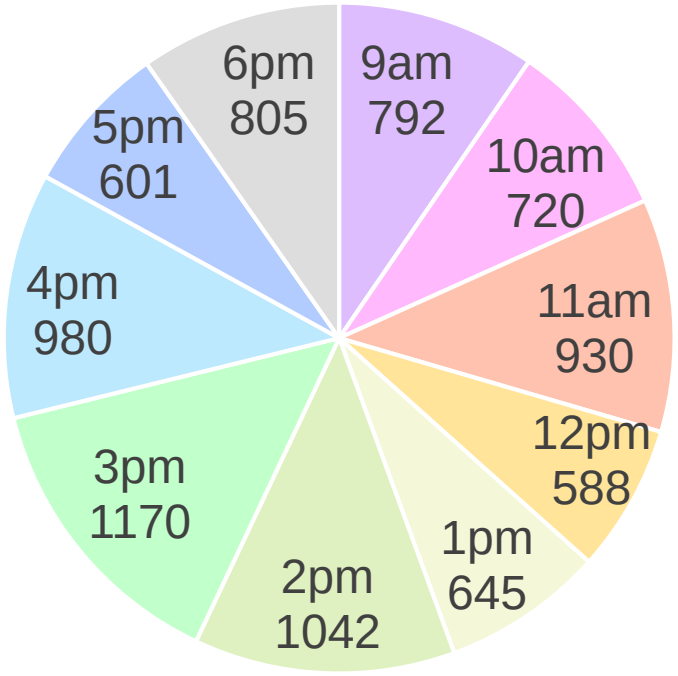
https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/koyou_roudou/roudoukijun/anzen/toukei.html

Governmental Services

Workers' Compensated Cases, MHLW



Fatal cases (N=306)



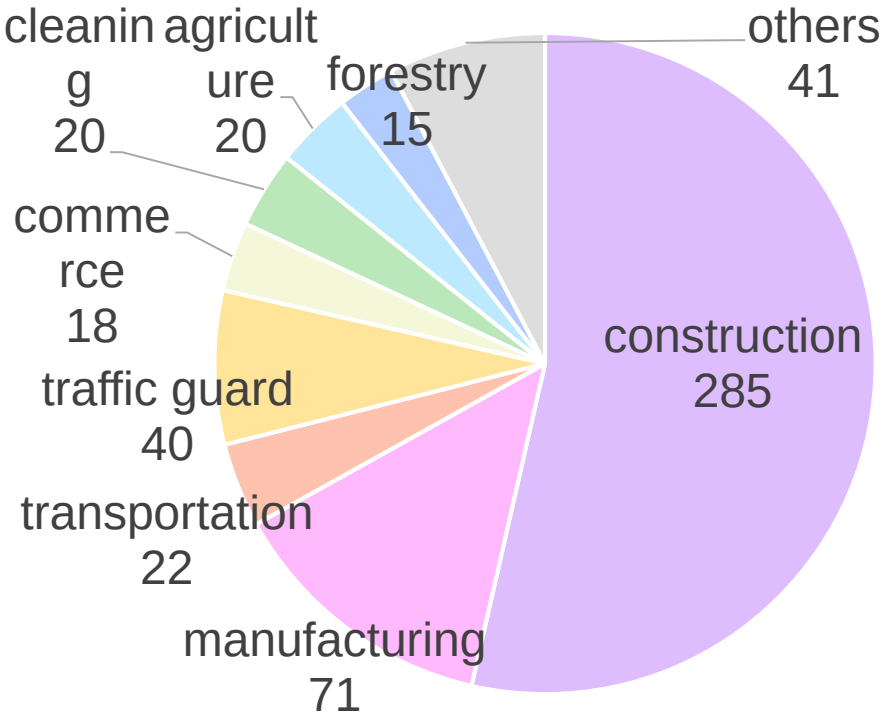
Workday Loss>=4 (N=8,273)

year 2010-2022

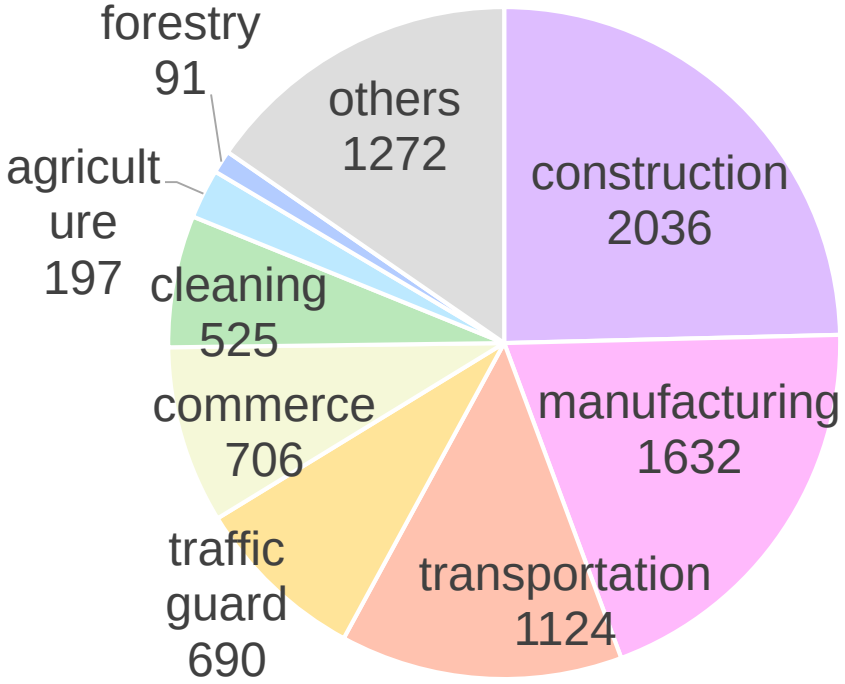
https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/koyou_roudou/roudoukijun/anzen/toukei.html

Governmental Services

Workers' Compensated Cases, MHLW



Fatal cases (N=306)



Workday Loss>=4 (N=8,273)

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NGO and civil activities

Research, Development, Broadcasting

Activities by public service organisations and sientific societies
  eg. sports, environmental, occupational organisations and societies
Newly developed merchandizes
  eg. fan-attached working clothes, fan-attached helmet, neck fan, ice slurry
Media campaign
  eg. TV, mewspaper, social media, website

NGO and civil activities

Japan Sports Association

WBGT	Guidance
≥ 31 C	Danger (exercise prohibited)
28 - 31 C	Severe Warning (heavy exercise prohibited)
25 - 28 C	Warning (rests should be provided often)
21 - 25 C	Caution (water should be replenished often)
< 21 C	Almost safe (appropriate water replenishment suggested)

A Guidebook for the Prevention of Heat Disorder During Sports Activities,
Japan Sports Association

NGO and civil activities

Japan Sports Association

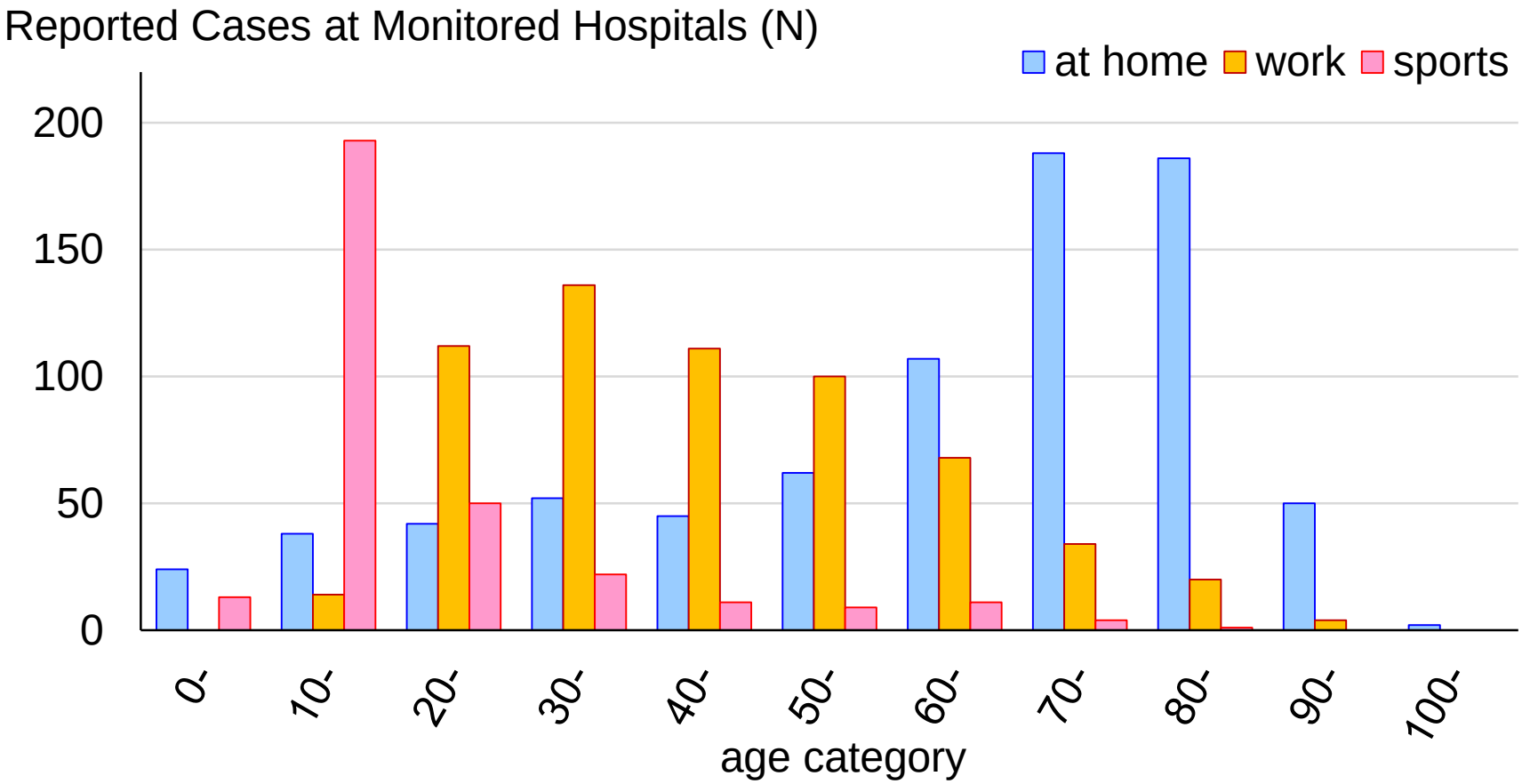
WBGT	Guidance
≥ 31 C	Danger (move into cooled indoor)
28 - 31 C	Severe Warning (stay under sunshade)
25 - 28 C	Warning (take enough rests at physical activity)
< 25 C	Caution (take due care at physical activity)

A Guideline for the Prevention of Heat Disorder in Daily Life,
Japan Society of Biometeorology

NGO and civil activities

Japan Society for Emergency Medicine

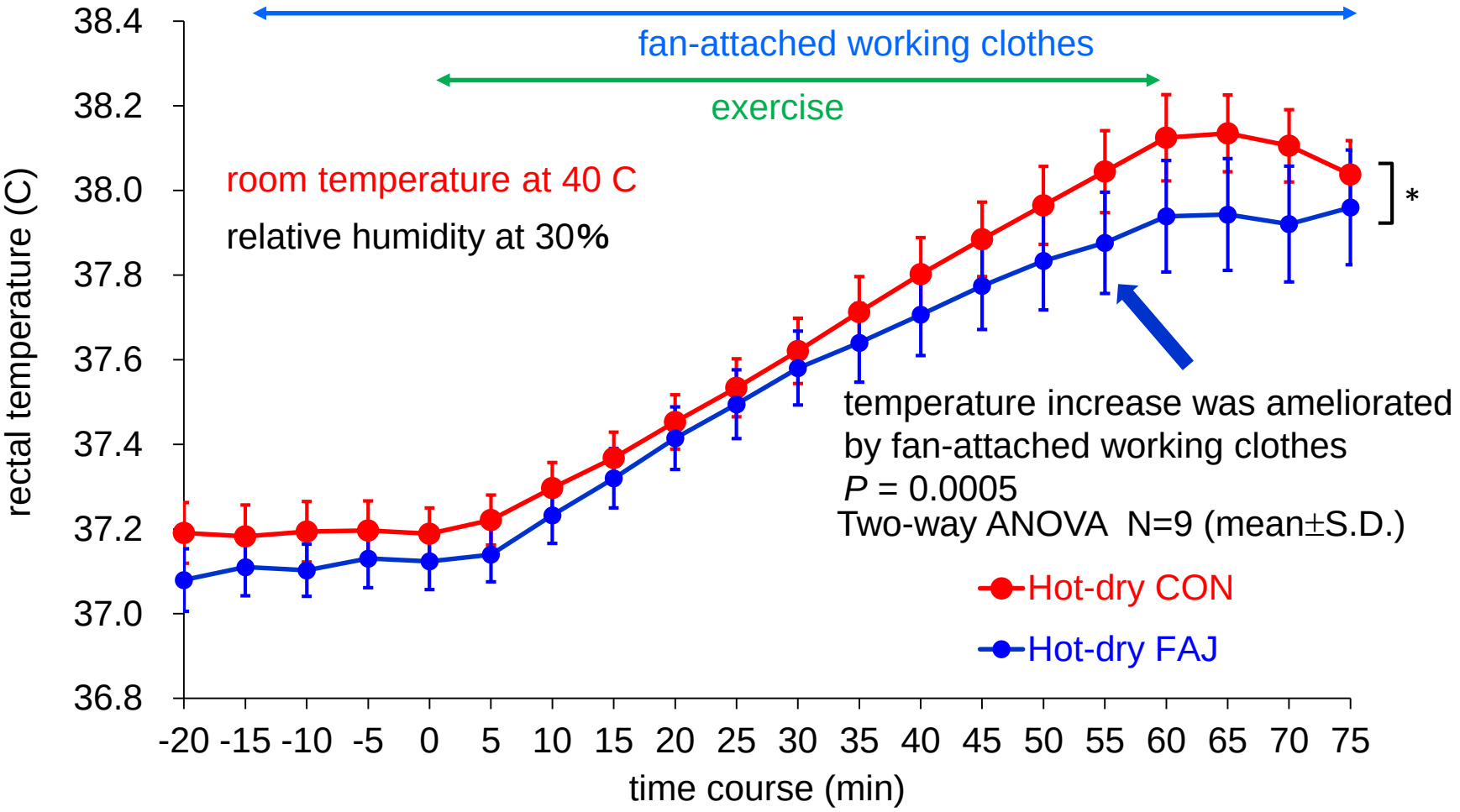
Age difference of the scene suffering from heat stroke



Heat Stroke Study 2012, Japan Society for Emergency Medicine

NGO and civil activities

Japan Society for Emergency Medicine



Mori K, Nagano C, Fukuzawa K, et al. Mitigation of heat strain by wearing a long-sleeve fan-attached jacket in a hot or humid environment. J Occup Health. 2022;64:e12323.