

A Study on the Home Environment and Home Hygiene: Home and Community Education in Light of the New Normal of COVID-19

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住環境と住居衛生に関する研究 —新しい生活様式をふまえた住教育—

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ABSTRACT

The hygiene models in modern public health aver that health is dictated by the hygienic environment of residential areas as well as social stratification. Modern city planning are geared towards creating clean and healthy living environments that are attractive. Housing environments are affected by the health and well-being of the individual, family, and local community.

Modern public health is focused on the well-being of individuals and families, their living environment, and the local culture of the immediate community. While extending healthy life expectancy is a goal for the promotion of good health and welfare, the number of COVID-19 cases has highlighted regional health inequalities.

After the new normal, staying at home has caused the function of housing to be reconsidered. Bearing in mind global warming, infection prevention, and solving cabin fever from staying at home, we considered housing in a thermal environment and the indoor air quality of the living environment as suggestions for adapting to the new normal.

KEY WORDS : New Normal, Housing Education, Public Health, Global Warming, Dump Houses

INTRODUCTION

COVID-19 Infectious Diseases Experts' Conference calls for the importance of behavioral changes¹, implements basic infection control measures such as washing hands, airing and health monitoring and ensuring physical distance, avoiding Three Cs (Fig.1). We repeatedly called for proposals such as 10 tips for reducing contact by 80% (Fig.2).

Along with the epidemic of the new

coronavirus, it is said that after the new normal, such as home-based work based on behavior that avoids the Three Cs such as business, entertainment, sports, and education decentralized attendance. Above all, by waiting at home, the function of the house is being reconsidered. This paper will discuss infection control and unhygienic housing issues based on the current situation.

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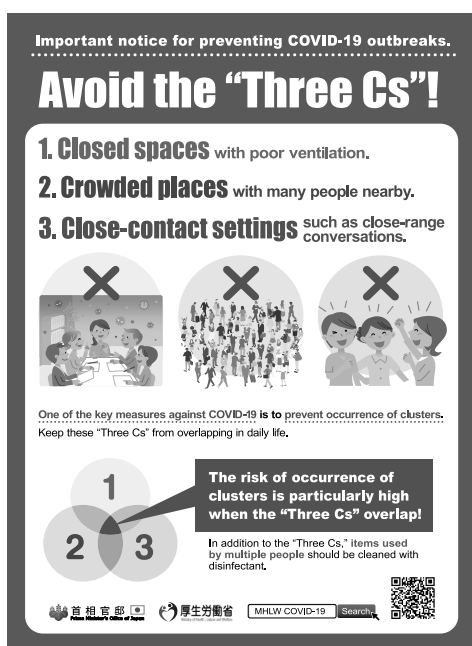


Fig. 1 Three Cs notice: Ministry of Health, Labour and Welfare

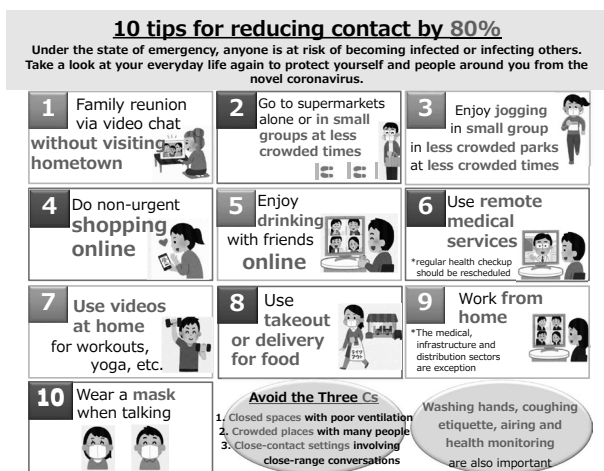


Fig. 2 Ten Tips for Reducing Contact by 80%: Ministry of Health, Labour and Welfare

METHODS

Trace the health policy based on the White Paper on the Environment, the report of the Ministry of Health, Labour and Welfare². It will describe future issues of the indoor air quality that are new attention from change the lifestyle in housing education.

Experiences related to Health:For students

In the class of housing concerned our health, to record and verify the paradigm shifts brought to the health and the living environment, I asked the participants for experiences about health at home, and their opinions³. Number of responses was 39, and they also instructed the consideration of the improvement points for our health and houses. The class conducted in July 2020, shown the tasks (Table 1).

Table 1 Task of the Class:Health and Environment

1. Read materials, white papers or public papers of institutions, and extract important articles.
2. Examine the background our lives, raising issues related to home and health.
3. List your life-related problems and new efforts to solve them, and discussion.

CHANGES THE MEANING OF HEALTH

(i) Meanings of Health

Health is defined in the preamble of the World Health Organization as follows; Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity⁴. It is necessary to consider the well-being of individuals, families and communities. By this definition, World Health Organization is working to secure a healthy and safe life for people in a wide range of fields. Health is interpreted as the well-being of individuals, families, and communities.

(ii) Hygiene Problems in Urban:

The Beginning of Modern Public Health

The Industrial Revolution since the 18th century drastically changed lives, caused population concentration in cities and increased slums, and air pollution caused

by industrialization devastated the living environment. Modern public health begins with the model whose main purpose is to prevent malnutrition and infectious diseases in cities. Dense and unsanitary cities have been improved by social infrastructure with water and sewer networks and waste treatment plants.

Environmental health in the 19th century was improved based on the physical and social environment affects the health condition, such as water and sewage, streets, houses, water supply and drainage, and garbage collection system⁵. Therefore, the improvement of the urban environment focused on the improvement of water and sewage systems⁶.

In the sanitation of cities and homes in the 19th to 20th centuries, daylight, ventilation, water and sewage, rodent and insect repellent, and cleaning methods had been advanced.

(iii) Suburban Residential Area for Healthy Life

Developed for health of urban people, the suburbs reflect the principles of modern urban planning. For example, the rural city plan aimed to leave from cities unhealthy condition, and escape to low-density residential spaces near by the cities.

The hygiene models in modern public health aver that health is dictated by the hygienic environment of residential area as well as social stratification. Summer resorts and beaches were developed for the purpose of promoting health, and suburban were also developed as healthy residential areas. These planning were new healthy environments in the process of modernization Japan⁷. Neighborhood theory planed the new community, bounded by roads and closed to the outside for the

separation of motor vehicle noise and living space caused by motorization.

The idea of Discreet in these modern city plans was to create a model that a healthy town must be dispersed, not crowded, and quiet. Modern city planning are geared towards creating clean and healthy living environments that are attractive. The suburbs control measures gives a new meaning, such as smart growth, for an environment that supports health promotion.

(iv) New Public Health in Modern Period

In developed countries, health levels had improved through an epidemiologically in which the main cause of death shifts from infectious diseases to lifestyle-related diseases. Here are the changes in public health as to where responsibility for health lies. To prevent disease and improve health as an alternative to the hygiene-model, attention has been paid to classical individual risk factors such as smoking and lack of exercise, and changes in lifestyles at risk to health have been promoted. Then, the approach to the personal health care was not effective, and a new public health model established⁸. The determinants of lifestyle related to health are not only due to voluntary decision-making by individuals, but also due to social situations to which individuals belong.

(v) Health Promotion Act

The idea of health promotion comes from the definition of health in 1946, advocated by World Health Organization. Health promotion was recognized as primary prevention by Clark E.G. and Leavell H.R. in 1953⁹. Health promotion meant strengthening general resistance to

disease prevention and avoiding infection opportunities through health education.

In 2013, Health Japan 21 of the second term is a ten-year plan begun, the policies, ideas, and specific goals that form the basis of the plan are included in the Basic Direction for Comprehensive Implementation of National Health Promotion, hereafter referred to as the Basic Directions, established by the Minister of Health, Labour, and Welfare in accordance with Article 7 of the Health Promotion Act¹⁰.

(vi) Healthy and Long-Lived Society

The factors should to understand behind the difference in healthy life expectancy and concern to promote well-being at each local area. The most important index for clarifying the health disparity is healthy life expectancy, and strengthening efforts to reduce it.

A healthy longevity society is to form a society, where people can enjoy a healthy life and longevity based on Article 17 of the Health and Medical Care Strategy Promotion Law, no.48 of 2014. To formulate policies that the government should take to promote research and development in the medical field and creation of new industries that contribute to a healthy and longevity society, comprehensively and systematically. The target period is 5 years from 2020 to 2024, and will be reviewed on the results of follow-up.

(vii) SDGs Goal 3:

Good Health and Well-Being

The 2030 Agenda for Sustainable Development set the international goals from 2016 to 2030. It was adopted by the United Nations Summit of Sustainable Development held in September 2015 based on the success of Millennium

Development Goals (Fig.3). Great progress has been made against several leading causes of death and disease.



Fig. 3 Sustainable Development Goals: UNITED NATIONS

Good health is essential to sustainable development and the 2030 Agenda reflects the complexity and interconnectedness of the two. It takes into account widening economic and social inequalities, rapid urbanization, threats to the climate and the environment, the continuing burden of HIV and other infectious diseases, and emerging challenges such as non-communicable diseases. Universal health coverage will be integral to achieving SDGs, ending poverty and reducing inequalities. Emerging global health priorities not explicitly included in the SDGs, including antimicrobial resistance, also demand action (Table 2).

But the world is off-track to achieve the health-related SDGs. Progress has been uneven, both between and within countries. There is a 31 years gap between the countries with the shortest and longest life expectancies. While some countries have made impressive gains, national averages hide that many are being left behind¹¹.

Table 2 Adopting Sustainable Development Goals

In 2015, the United Nations General Assembly adopted the SDGs.
 World Goals for 2030, 17 goals, 169 targets.
 Achieve the SDGs need integrated improvement of environment, economy and society.

Japan's Efforts to Achieve the SDGs
 In 2016, the SDGs implementation guidelines were decided.
 In 2017, SDGs Action Plan 2018 was decided.

(viii) Reduction of Health Disparity

Health disparity is defined as the difference in health status among groups due to differences in regional and socioeconomic conditions. Since data on regional disparities can be accumulated with considerable accuracy, and by clarifying the disparities between local governments, the effect of promoting voluntary efforts will be placed by each local government can be expected.

In addressing the issue of extending healthy life expectancy, health promotion and disease prevention play an extremely important role. Add to this, early detection of disease, prevention of disease seriousness through appropriate treatment management, and prevention of nursing care, and various nursing care and services are required. Depending on the health level and risk of each inhabitant, and the needs of health, medical care, welfare and nursing care, it must be build a comprehensive community care system, to provide these efforts seamlessly and comprehensively.

Other important efforts that contribute to the formation of a healthy and long-lived society include promotion of measures against Antimicrobial Resistance and new coronavirus infections¹².

ENVIRONMENT ISSUES FOR STUDY

(i) Spaceship Earth Suggestions

Spaceship Earth is a concept advocated by Buckminster Fuller, an American architect and philosopher in 1963¹³. He warned that seeing all the events of the world on a global scale was important for the survival of the planet and humanity. The current environmental problems are as follows, Global warming, Ozone layer depletion, Acid Rain, Radioactive-Contamination, Tropical Rainforest Reduction, Desertification, Household Waste and Hazardous Waste Discharge, River and Marine Pollution, Wildlife Reduction, Pollution in Developing Countries.

(ii) Global Warming and Extreme Weather

The Intergovernmental Panel on Climate Change clearly stated in its Fifth Assessment Report, that there is no doubt that the climate system is warming, even taking into account internal natural movements such as the sun, volcanic activity.

The number of heat stroke transports and deaths is on the rise. Nearly half of the emergency transporters were older than 65 years old. The years with the highest number of deaths, in 2010 and 2018, on record the hottest days.

Increase in the frequency of landslides and floods due to the increase in short duration strong rainfall and heavy rainfall.

(iii) Dump-House, one of the Sick-Houses

Sick house syndrome is a term for health disorders resulting from indoor air pollution in new build houses. Including the sick house problem, caused by indoor chemical pollution on the high airtightness of buildings. There are many issues surrounding the air environment

of architecture, for the building air environment are piled up, Ventilation and Air-condition system to realize more comfortable and healthy air environment.

The state where the problem can be confirmed, mold and water leakage, musty odor, building deterioration, microbial contamination, due to excessive moisture that can be measured or visually. The generation of mold odor and mold is harmful to health because mold is inhaled and polluted in our lungs. In a house flooded after flood damage, molds are generated in the room, and the odor of mold is plagued.

The case of the flood around River Kuma in Kumamoto Prefecture on July 2020, clay and sand flowed into houses in the basin. Therefore, the growth of mold in the room can no longer be suppressed. A case of mold allergy by a cleaning volunteer has been reported.

Homes are a favorable environment for molds growth. Compared to open traditional houses, molds are growing against the backdrop of an increase in sensitive houses (Table 3). Diseases caused by mold include allergies, infectious diseases, and poisoning, which are harmful to human health. Since some mites feed on mold, the growth of mold leads to the growth of mites (Table 4). It is important to know its causes and take measures.

Table 3 Increase in Allergens:due to Housing and Lifestyle

Change of House	
Highly airtight house use of new building materials	
Moisture increased in house, dust increased.	
Mite breeding Mold breeding Chemicals increase.	
Changes in Daily Life	
Thermal control Installation of large furniture such as beds and wardrobes	
Diversification of volatile chemical substances such as insect repellents and aromatics	
Deterioration of ventilation due to absence of family.	

Table 4 Countermeasures against causes of Mites and Molds

Protection of Mite and Mold	
Heating dehumidification feeding house bedding.	
Drying in the sun, UV ray disinfection, turn the ventilation fan when cooking.	
Indoor drying in rain increases humidity.	

(iv) Infectious Diseases and Climate Change

The effects of global warming are causing significant problems for the nature and living. Habitat of mosquitoes is expanding, for example, the carriers of infectious diseases. The case affected by dengue fever was reported in 2014, it was the report after 70 years. The distribution area of *Aedes albopictus* is considered to be the area where the annual average temperature is above 11°C, and it has been moving northward through the Northeast Japan since 1950. In 2016, a case of dengue hemorrhagic fever occurred in a returnee from abroad, died by the disease. In 2019, cases of dengue infection were reported in Japan. Since 1995, the number of deaths due to heat stroke has increased, reaching a record high in 2010, when the heat was record-breaking. Heat stroke is one of the direct effects from heat in summer, and has a correlation with climate variability.

(v) Living in Multiple Locations

Spread of COVID-19 infection, the function of housing has changed completely due to the remote working. While the lifestyle of Multi-Centered-Life that stay while moving all over Japan is becoming a reality, the existing residential areas will be sorted to find if they are really comfortable to live in, and the dwelling-style will come to relocate.

As an example of the growing lifestyle business with COVID-19 infection, related divorce, ADDRESS which a service that allows

living in a house that operates in various parts of Japan for a fixed amount, enables to relocate for 40,000 yen per month¹⁴.

PRACTICE OF HOUSING EDUCATION

(i) Healthy and Hygienic Housing

As a modern situation about health and environment, I will introduce some examples of living environment. I investigated the physical condition abnormalities affected by the season; the following answers were obtained (Table 5).

About half of the respondents reported their physical condition and colds caused by the use of air conditioning (Table 6). An unexpectedly common problem in housing health was the problem caused by mold.

Table 5 Climate-induced Deterioration of Health

no.	Symptoms
3	I open the windows when wake up in the morning, so that mold and ticks do not occurs.
4	I often feel headaches and drowsiness due to the changing seasons. During the rainy season, is hot and cold, I tend to get sick.
11	After sleeping with the air conditioner on, my throat is dry.

Read textbooks and materials, thought about behavioral changes such as adjusting room temperature and ventilation.

Table 6 Seasonal Sick House Syndrome

Sickness, Dryness, Dehydration in Air Conditioner	(20)
Mold	(3)
Heat Stroke	(2)
Dryness, Dry Contact, and Eyes Flicker	(1)
Abnormality on the Skin due to Ticks	(1)
Headache	(1)
Lethargy	(1)
Barometric Pressure	(1)
Disturbance of Autonomic Nerves	(1)
Asthma	(1)

n = 39, multiple answers, () : number of cases

(ii) Promotion of Behavior Change

Now that the importance of behavior change is pointed out (Fig. 4), environmental behaviors for maintaining health are shown and summarized (Fig. 5).

Example of practicing "New Lifestyle"

(1) Basic infection prevention measures for each person

Three basics for preventing infection:

① **Keeping physical distance**, ② **wearing a mask**, ③ **washing hands**

- Keep a distance of two meters as much as possible, or at least one meter, between two persons
- Choose outside rather than inside if you are to play
- Avoid standing right in front of each other during conversation as much as possible
- Wear a mask when you go out or talk inside even without any symptoms
- Wash your hands and face first when you get back home, followed by changing clothes and showering as soon as possible
- Carefully wash your hands with water and a soap for approximately 30 seconds (also possibly with hand sanitizer)

※ Pay more attention to your health, especially when meeting those who may have a high risk of serious symptoms, such as the elderly or people with chronic diseases.






Infection prevention related to traveling

- Refrain from traveling to and from where the infection is prevailing
- Refrain from traveling upcountry or for leisure. Business trips only when it is unavoidable
- Keep a record of the people you meet and the time of meeting in case you get infected
- Carefully follow how the infection is prevailing locally

(2) Basic lifestyle for daily life

- Wash and sanitize hands frequently
- Make sure to observe coughing etiquette (by covering your mouth)
- Ventilate frequently
- Keep physical distance
- Avoid gatherings in crowded places, close contact settings and closed spaces
- Check your health condition and measure body temperature every morning

Do not force yourself to go out, and stay home if you have symptoms of fever or cold

(3) Lifestyle for each scene of daily life

Shopping

- Use online shopping
- Shop by yourself or in a small group, at off-peak hours
- Use electronic payment
- Plan your shopping in advance and shop quickly
- Refrain from touching displays like samples
- Keep a distance while lining up at the cashier

Leisure, Sports etc.

- Select places like parks at off-peak time
- Refer to videos for home muscle training or yoga
- Jog in a small group
- Keep a distance as etiquette when passing others
- Utilize booking systems for leisure
- Do not stay long in small rooms
- Keep a distance or stay online for singing or cheering others

Public Transports

- Refrain from chatting
- Avoid peak-hours
- Also take a walk or use bikes

Meals

- Take away or delivery
- Enjoy meals at outside spaces
- Serve individually, avoid sharing plates
- Do not sit face-to-face, rather besides
- Concentrate on eating, refrain from chatting
- Avoid serving alcohol, sharing glasses or sake cups

Family ceremonial occasions

- Avoid banquets or meetings with large numbers
- Decline participation when you have symptoms of fever or cold

(4) New working style

- Work remotely and rotate commuting shifts
- Keeping a distance while commuting during different working hours
- Open and widen working spaces
- Use online meetings
- Exchange business cards online
- Wear a mask and ventilate venues in case of a face-to-face meeting

※ Infection prevention guidelines for each business sectors will be prepared by relevant organizations.

Fig. 4 New Lifestyle:
Ministry of Health, Labour and Welfare

a) Adjusting the Thermal Environment

Since the temperature setting of the air conditioner is becoming more functional, AI can help us to measure the temperature. It is also useful to combine an air conditioner with fans, generating airflow make the body cool.

If the room becomes high during the daytime, the blackout curtains prevent the temperature from rising. And since water drops adhere to the air conditioner, mold will propagate if left unattended. Let's also use the

8 Tips for Precautions to Take at Home

If a family member is suspected to have COVID-19, follow the tips below.

(This is a revised version of the summary provided by the Japanese Society for Infection Prevention and Control) March 1, 2020 version

Separate rooms

- ◆ **Stay in a separate room.**
Avoid eating and sleeping in the same room with the infected person.
 - If you cannot separate the room or living area in your home due to childcare needs or space constraints, maintain a distance of at least 2 m from the infected family member. Also, use partitions, curtains, or other barriers to separate the living space.
 - If you have no choice but to sleep in the same room, position heads facing away from each other.
- ◆ **Infected person should not leave the room often.**
Minimize the use of shared areas, such as the toilet and bathroom.

Limit the number of people caring for the infected patient

- ◆ People suffering from heart, lung, or kidney disease, people with diabetes or reduced immunity, pregnant women, and other high-risk individuals should avoid taking care of the infected person.

Wear a mask

- ◆ **Do not move used masks to other rooms.**
- ◆ **Do not touch the surface of a used mask.** Hold the elastic straps or string when you put off the mask.
- ◆ **After you have removed your mask, always wash your hands with soap.**
(Alcohol disinfectant is also effective)
 - * If your mask gets dirty, immediately replace it with a new one that is clean and dry.
 - * If you do not have a mask, cover your mouth and nose with a tissue or other material when coughing or sneezing.

Wash your hands often

- ◆ **Wash your hands with soap or disinfect them with alcohol frequently.** Always wash your hands before touching your eyes, nose, mouth, or other parts of your face.

Ventilate your rooms

- ◆ **Ventilate your rooms regularly.** Keep the windows open in shared areas and other rooms for ventilation.

Disinfect frequently touched surfaces

- ◆ **Wipe frequently touched surfaces** (e.g., door handles, knobs, and bed guards) **with diluted household chlorine bleach and then wipe them with a damp cloth.**
 - The virus survives for a while after landing on objects.
 - Confirm that the main component of the bleach is sodium hypochlorite. Also, make sure that you dilute it before using according to the usage instructions (recommended concentration: 0.05% [i.e., if the concentration of the product is 6%, add 25 mL of the product to 3 L of water]).
- ◆ **Clean toilets and bathrooms frequently with a common household detergent and then disinfect them thoroughly with a household disinfectant.**
 - Towels, clothing, tableware, chopsticks, spoons, and the like can be washed as usual.
 - Items used by the infected person do not need to be washed separately.
- ◆ **Do not share items that have not been washed.**
 - Make sure that towels are not shared in toilets, washrooms, kitchens, and other such areas.

Wash dirty linen and clothes

- ◆ **Wear gloves and a mask when touching clothes and linen contaminated with bodily fluids. Wash them with a common household detergent and dry them completely.**
 - The virus may be detected in feces.

Dispose of garbage in a sealed bag

- ◆ **Put used tissues in a plastic bag immediately and seal the bag when you take it out of the room.** After that, wash your hands with soap immediately.

- The infected person should not go out.
- Family members and other persons living with the infected person should monitor their own health (e.g., by taking their temperature) and avoid unnecessary and non-urgent outings. Do not go to work or other public areas, especially if you have symptoms such as a cough or fever.

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Fig. 5 Eight Tips for Precautions to Take at Home: Ministry of Health, Labour and Welfare

ventilation and cleaning functions to dry the air conditioner.

Control room temperature to relieve headaches and lethargy. Also consider the amount of clothing. For example, during class, adjust the body temperature with a thin cardigan to prevent the room from getting too cold. When you're on the go, such as in a university classroom, cafe, or train, it's a good idea to check the air outlets of the air conditioners to decide where to sit.

b) Dehumidifying Function

It is dried because the air conditioner has a dehumidifying function. Higher humidity increases discomfort, and lowering room humidity provides comfort at the same temperature.

c) Mold Growth; One of the Air Quality Index

Water droplets adhere to the air conditioner, so if left unattended, mold will grow. Let's also use the ventilation and cleaning functions to dry the air conditioner.

If you're not feeling well, your symptoms tend to get worse, so enhance immunity and preparing the indoor environment, both are important. If you notice the smell of mold, ventilate, coughing is a barometer of pollution. As disinfection works, wipe it off and sterilize it. Sunbathing is good for adjusting the rhythm of the body and getting a bactericidal effect.

d) Bake-Out, VOC adsorption Plate

Sick house syndrome is a symptom that causes various damages to the human body that the components contained in the adhesive of furniture, wallpaper, and flooring volatilize and inhale it. Formaldehyde, toluene, xylene that caused sick house are called volatile organic compounds, which are volatilized by heat and diffused into the air. Bake-out is a method of removing volatile substances by raising the

room temperature. Due to the high air tightness of the room, the ventilation will be delayed, so installation of 24-hour ventilation was obligatory for buildings after 2004, and it was solved. Use it as the bathroom has a 24-hour ventilation system. After renovating your house, be sure to ventilate it enough and start living using air cleaner or VOC adsorption plate.

e) Ventilation System

Case of Asthma, body rejecting the air environment polluted badly, thinking as a signal and predict the pollution concentration, and take ventilation measures.

When opening the window, be careful to let pollen or PM 2.5, enter the room. Then we should notice that there are three ways of ventilation. Mechanical air supply is a ventilation system that can remove pollutants outdoors. The clean room that handles precision machinery is the first-type of ventilation system.

f) Ventilation: Temperature Difference

Temperature difference in the room, the warm air is light and flows up, whereas the cold air is heavy and falls down. Taking advantage of this property, ventilation of temperature difference is performed in inner garden, a townhouse in Kyoto. In summer, there is also a way to exhaust warm air from the skylight, in high places, with fan. In winter, circular warm the room returning the warm air to the room.

g) Poor Physical Condition due to Atmospheric Pressure

Those who are affected by changes in barometric pressure should look at the barometric pressure information of the Japan Meteorological Agency to notice the atmospheric pressure. Just like checking the temperature, you can know the daily atmospheric pressure and take measures against malfunctions.

CONCLUSION

In relation to health, the living environment has improved and cities and suburbs have developed. From the perspective of the living environment, health is interpreted as the well-being of individuals, families, and communities.

Health is well-being, and health inequalities are becoming more pronounced due to the effect of COVID-19 on each region. Health inequalities are measured using lifespan as an index. However, with the regional differences due to the large number of COVID-19 infections, they are now measured by a medical system that can accept patients with infectious diseases.

Infection control is possible in the practise of housing education. Just improving the environment and thinking about infection does not lead to positive behavioural change. Behavioural and lifestyle changes can be achieved through learning about the thermal environment and air quality.

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