Policy Brief

PB

Volume 13

Issue 217 • SEP 2025

Reducing $PM_{2.5}$ Exposure in Homes and Public Buildings: Guidance on Clean Air Rooms and Air Purifiers in Thailand

Highlight

- Thailand faces severe fine particulate matter ($PM_{2.5}$) annually. In Bangkok, only 14.6% of children's bedrooms had air purifiers in 2023, while over 78% of households lacked them in 2021.
- Adoption is constrained by costs, standards, housing structures, maintenance, and behavior.
- National certification, incentives, and dedicated funding, along with standards, monitoring, evaluation, targeted subsidies, and clean technology, can transform clean air rooms into a permanent public health strategy.

Situation of Clean Air Rooms and Air Purifiers in Thailand

Thailand faces persistent $PM_{2.5}$ pollution that threatens public health, prompting broader use of clean air rooms and air purifiers in homes, schools, hospitals, and public facilities. Clean air rooms function as both preventive and mitigative health interventions by reducing exposure to harmful airborne particles.

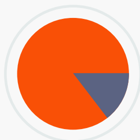
$PM_{2.5}$ | Volatile Organic Compounds (VOCs) | Ozone | Airborne Microorganisms

Early childhood centers face multiple air pollutants with health risks worsened by high indoor temperatures and poor ventilation in air-conditioned ones

Department of Health (DOH) has issued guidelines encouraging households, public buildings, and child development centers to establish **clean air shelters**, which can reduce $PM_{2.5}$ concentrations by 20–70%

National and local authorities, including **the Ministry of Public Health (MoPH), the Bangkok Metropolitan Administration (BMA), and the National Health Security Office (NHSO)**, have implemented targeted initiatives to expand access to such facilities

In early childhood centers in Bangkok, **35.6%** of children remained indoors for more than 9.5 hours per day.

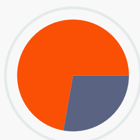


In 2023,

83.8%

of children's bedrooms **did not** had air purifiers

55.8% of households that used air purifiers used them **6-7 days/week**



In 2021,

78%

of Bangkok residents **did not** have $PM_{2.5}$ air purifiers

The demand for air purifiers in Thailand has risen sharply due to the increasing severity of annual $PM_{2.5}$ pollution. However, **no systematic government programs provide them free to the public, apart from occasional donations from public agencies or private organizations to schools, child development centers, and hospitals in high-risk areas.**

Challenges of Clean Air Rooms and Air Purifiers

High cost and affordability

Air purifiers are expensive, with additional costs for electricity and filter replacement, all borne by individuals without government support

Lack of information and standards

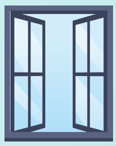
Without standards or clear labeling, people often rely on advertisements or sales claims when buying

Lack of long-term policy support

Government remain short-term and crisis-driven, limited projects, limited budget, no household incentives, and no sustained budget

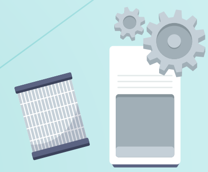
Environmental and housing constraints

Open-ventilated and and non-air-conditioned rooms make sealed clean rooms impractical



Maintenance and occupant behavior

Air purifier performance declines due to user habits. Limited awareness and inconsistent maintenance reduce effectiveness

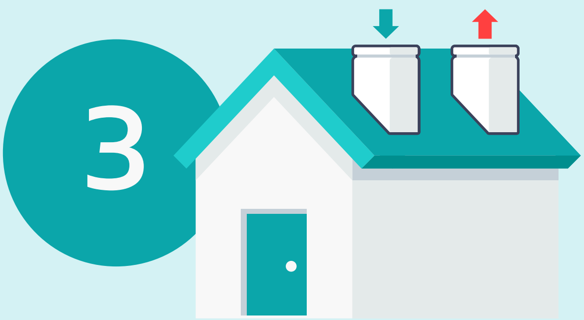


What is a "Clean Air Room"?

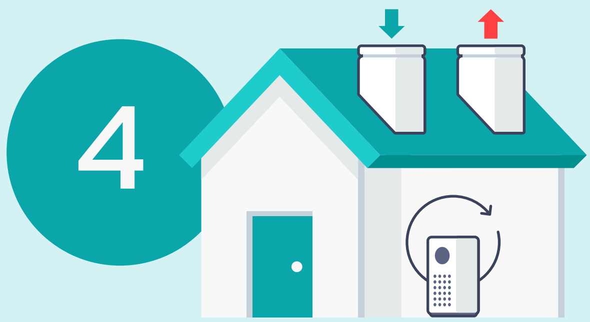
A clean air room is an indoor space designed to minimize $PM_{2.5}$ and other pollutants, often through the use of air purifiers. Authorities recommend their use during severe pollution. They block polluted air, filter indoors, and avoid pollutant-generating activities, creating safer environments with lower $PM_{2.5}$ levels. The DOH classifies clean rooms into four types based on use, budget, and maintenance. Official resources, including a map of certified rooms, guidelines, and the consultation hotline (1478), are available at DOH website (https://podfoon.anamai.moph.go.th/).

Closing doors and windows

Air filtration system or air purifier



Positive pressure fresh air unit



Air filtration system/air purifier combined with positive pressure fresh air unit

How to Create and Maintain a $PM_{2.5}$-Free Clean Air Room

Stay cool
Use fans, AC, or central air on recirculate to maintain comfort. consider solar-powered units or models with eco-friendly refrigerants

Avoid indoor pollution sources
Do not smoke, burn materials, cook, or use sprays, air fresheners, or strong-fume product

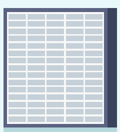
Air purifier / filter
- Match unit to room size. Place centrally or near pollutant entry
- High-Efficiency Particulate Air (HEPA) filter remove ≥ 99.97% of 0.3 µm particles, carbon filters adsorb VOCs and odors
- Clean Air Delivery Rate (CADR): AHAM recommends 2/3 room area and DOH advises at least three times room volume
- Higher airflow generally enables the unit to clean rapidly
- Certified models use about 40% less energy than standard ones, lowering costs
- Avoid air cleaners that emit ozone or reactive byproducts
- Check for trusted marks like TIS/TISI or other certifications
- Check decibel ratings, use low-noise or night mode for quiet operation
- Use DIY option if air purifier are unavailable (only temporary alternative)

Seal out outdoor air
Close all windows, doors, and vents in the selected room to prevent infiltration

Balanced ventilation
Ventilate using windows or HVAC intake to remove stale air, odors, and CO_2, and re-seal the room if conditions worsen

Keep surfaces clean
Wipe with a damp cloth or mop. Use a HEPA-equipped vacuum when needed to avoid resuspension

Optional



High-efficiency HVAC filters
Use a high-efficiency filter (MERV 13+), during pollution events, run the fan continuously for constant filtration

Positive Pressure Fresh Air Unit (PAU)
The systems reduce $PM_{2.5}$, CO_2 and VOCs by supplying filtered air, creating positive pressure to block pollutants

Avoid outdoor pollution sources
Near schools, add no idling zones, green barriers, and redesigned drop-off areas can reduce infiltration

Indoor air sensor
If air purifiers lack sensors, use an indoor monitor to track air quality and detect issues

Recommendations

- **Certification and designation programs:** Create national programs to certify purifiers and designate clean air rooms, with toolkits including HEPA filters, education, and awareness campaigns.
- **Standards and incentives:** Set technical standards, require accurate labeling, and offer subsidies or tax credits for HEPA purifiers in high-$PM_{2.5}$, along with targeted distribution to vulnerable groups.
- **Monitoring and evaluation:** Establish systems with air quality monitoring, KPIs, and partnerships to track and research cost-effectiveness in Thailand.
- **Indoor air quality audits:** Conduct regular indoor air quality (IAQ) audits in public buildings, using CO_2 as a ventilation proxy, logging peaks, and mapping outdoor sources near windows, air intakes, and doors.
- **Dedicated funding:** Secure long-term grants and retrofitting budgets for schools and public buildings, modeled after London's school air quality program.

Limitation

In this study, the research team conducted a rapid review of relevant academic and grey literature, expert interviews, surveys, and stakeholder consultations. A limitation of the study is that it was not carried out as a systematic review; therefore, some relevant literature may have been omitted from the search and analysis.

Scan QR code to follow our research

This document is part of the project "Development and Evaluation of Universal Coverage Benefit Package to Support Access to Health Care for Thailand" and "Interventions to Reduce Health Impacts of Air Pollution in Bangkok".

By Dr. Wissawa Malakan, Mrs. Angela Judhia Arkandhi, Mr. Sarin KC, Mr. Evan Huang-Ku, and Dr. Titiporn Tuangratananon

This research has received funding support from the Thailand Science Research and Innovation (TSRI) and the National Science, Research and Innovation Fund (NSRF) via the Program Management Unit for Human Resources & Institutional Development, Research and Innovation [B41G680024].

Author

Dr. Wissawa Malakan (HITAP)

References

1. Social Development Department. Bangkok Metropolitan Administration; 2023.
2. Navamindradhiraj University. Bangkok (Thailand): Navamindradhiraj University; 2023.
3. Supornpraditchai T. Acad J North Bangkok Univ. 2021;10(2), 107–124.
4. Department of Health. Nonthaburi (Thailand): Health Impact Assessment Division, Department of Health, Ministry of Public Health; 2024.
5. Attasuwan S. [cited 2025 Aug 9]. Available from: https://www.thebusinessplus.com/air-purifier/.
6. Sethasatsawat N. Thammasat University; 2019.
7. Hfocus. [cited 2025 Jul 3]. Available from: https://www.hfocus.org/content/2020/01/18384.
8. Foundation for Consumers. [cited 2025 July 3]. Available from: https://www.consumerthai.org.
9. Matichon. [cited 2025 Jul 3]. Available from: https://www.matichon.co.th/local/quality-life/news_4938259.
10. Department of Health. Ministry of Public Health, Thailand; 2025.
11. U.S. EPA. [cited 2025 Jun 27]. Available from: https://www.epa.gov.
12. Department of Health. [cited 2025 Jul 12]. Available from: https://anamai.moph.go.th/th/news-anamai/43983.
13. U.S. EPA. Washington (DC): U.S. EPA, Office of Air Quality Planning and Standards; 2003.
14. U.S. DOE. Washington (DC): Office of Environment, Health, Safety & Security. 2015 [cited 2025 Jul 26]. Available from: https://www.standards.doe.gov.
15. U.S. EPA. Washington (DC): U.S. Environmental Protection Agency; 2018.
16. Health Impact Assessment Division. [cited 2025 Jun 27]. Available from: https://multimedia.anamai.moph.go.th.
17. Department of Health. [cited 2025 July 2]. Available from: https://anamai.moph.go.th.
18. U.S. EPA. Washington (DC): U.S. EPA; 2017.
19. U.S. EPA. [cited 2025 Jun 27]. Available from: https://www.epa.gov/.
20. Greater London Authority. The Mayor's School Air Quality Audit Programme. London; 2018.
21. Saravanakumar R, et al. J Therm Anal Calorim. 2014;115(1):933–40.
22. South Coast Air Quality Management District. [cited 2025 Jul 23]. Available from: https://www.aqmd.gov/.
23. Greater London Authority. Programme report. 2018.

You can also download other Policy Briefs at **https://www.hitap.net/resources/downloads**

HITAP is a research organisation dedicated to studying both the positive and negative impacts of health technologies and policies. Its work supports government health policy decisions, including contributions to the National List of Essential Medicines and the National Health Security Office, as well as evaluations aimed at enhancing public policies.

Contact Information: Head Office : 88/22 Moo 4, 6th Building, 6th Floor, Department of Health, Ministry of Public Health, Tiwanon Road, Taladkwan Subdistrict, Muang Nonthaburi District, Nonthaburi 11000, Thailand

Tel. : +66 2590 4549, +66 2590 4374-5
Fax : +66 2590 4369

E-mail: **comm@hitap.net**
Website: **www.hitap.net**

This work is licensed under a Creative Commons Attribution-NonCommercial

hitap.net | HITAPTHAILAND | @hitap_thailand | HITAP_Thailand | hitap thai | @hitapthailand