



Resilient Communities for the Management and Prevention of Health Impacts from Air Pollution: Lessons learned from Thailand



Resilient Communities for the Management and Prevention of Health Impacts from Air Pollution: Lessons learned from Thailand

Supported by
the World Health Organization Thailand



World Health
Organization

Thailand



Preface

Air pollution is a global issue with profound implications for the health of individuals residing in affected areas. Such pollutants contribute to both acute and chronic health conditions. Thailand, in particular, grapples with air pollution challenges stemming from various human activities, including transportation, industrial processes, and open burning for diverse purposes across different regions. Specifically in northern Thailand, the primary cause of air pollution arises from open burning practices, whether in agricultural or forested areas, prevalent from February to April each year. Contributing factors to this issue include the region's topography and climate, which confine particulate matter generated from these burning activities within the area. Consequently, a smog phenomenon occurs, significantly impacting the health of individuals in the affected region. This impact is evident through an increase in the number of patients, particularly those with aggravated or severe respiratory conditions, during the smog season.

Absolutely, ensuring public health and tackling the impacts of air pollution is critical for all regions grappling with these issues globally. While numerous countries have implemented measures and policies to handle and alleviate the health consequences of air pollution at a national level, empowering communities to manage and prevent these impacts presents a sustainable solution. This approach not only tackles air pollution and its health effects but also boosts the capacity and resilience of communities to effectively address a range of challenges they might encounter.

The lessons drawn from the Resilient Communities initiative in Thailand, aimed at managing and mitigating health impacts arising from air pollution, offer a valuable model and guideline for other communities globally. These insights, gathered from specific areas in the upper northern region of Thailand—Pang Ma Pha District in Mae Hong Son Province and Chiang Dao District in Chiang Mai Province—provide practical strategies and recommendations that can be adapted by other communities to effectively manage and prevent health impacts caused by air pollution within their own localities.

The Department of Health involved in compiling this information expresses gratitude to everyone who contributed data, shared experiences, and provided assistance in coordinating efforts, leading to the successful implementation of this initiative.

Project Management Team
2023



Table of Contents

	Page
Introduction	1
Lessons Learned from Success Communities	6
Ping Khong, Chiang Dao District, Chiang Mai	7
Mae Na, Chiang Dao District, Chiang Mai	18
Sop Pong, Pang Ma Pha District, Mae Hong Son	28
Conclusion	38
Bibliography	43



Introduction

Air Pollution

Air pollution refers to the occurrence of contaminating substances, whether chemical, physical, or biological, both outdoor and indoor air pollution. It is a critical environmental issue globally, prevalent in contemporary times. The primary causes stem from the release of pollutants into the atmosphere from various human activities. These pollutants have significant impacts on human health, both acutely and chronically. Many types of air pollutants, such as fine particulate matter (PM) and other air pollutants, are classified as human carcinogens (IARC monograph, 2013). The World Health Organization (WHO) reports that approximately 6.7 million people worldwide die each year due to air pollution. Alarmingly, 99% of the global population resides in areas experiencing air pollution issues, leading to various significant diseases, including stroke, heart disease, lung cancer, and respiratory diseases, both acute and chronic. Vulnerable groups, including children, the elderly, pregnant women, and individuals with pre-existing health conditions, face a higher risk of adverse health effects from exposure to air pollutants. Furthermore, disadvantaged populations, such as those with low income or residing in remote areas or developing countries, may experience more severe impacts due to lower adaptability to air pollution (WHO, 2023).



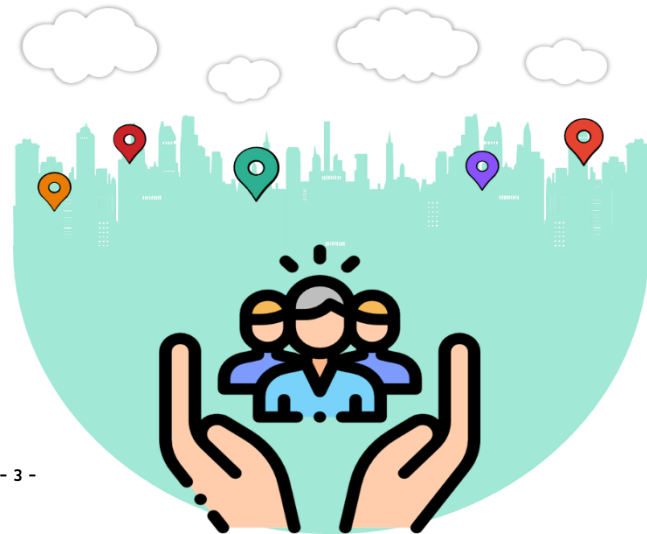


The Situation in the Upper Northern Region

The upper northern region of Thailand faces severe air pollution issues, particularly concerning fine particulate matter. This problem is notably prevalent during the dry season, typically spanning from December to April each year. The primary cause of this pollution is open burning practices, especially the burning of biomass materials such as agricultural residues and forested areas for land preparation and expanding cultivation areas. Such burning releases air pollutants, including fine particulate matter smaller than 2.5 micrometers (PM2.5), into the atmosphere in significant quantities, leading to the occurrence of haze. Satellite imagery studies reveal that areas where burning practices typically occur often coincide with times when farmers dispose of agricultural residues to prepare land for cultivation. Additionally, such burning is frequently observed in forested areas. Apart from agricultural burning, there is also burning resulting from collecting forest resources by locals.

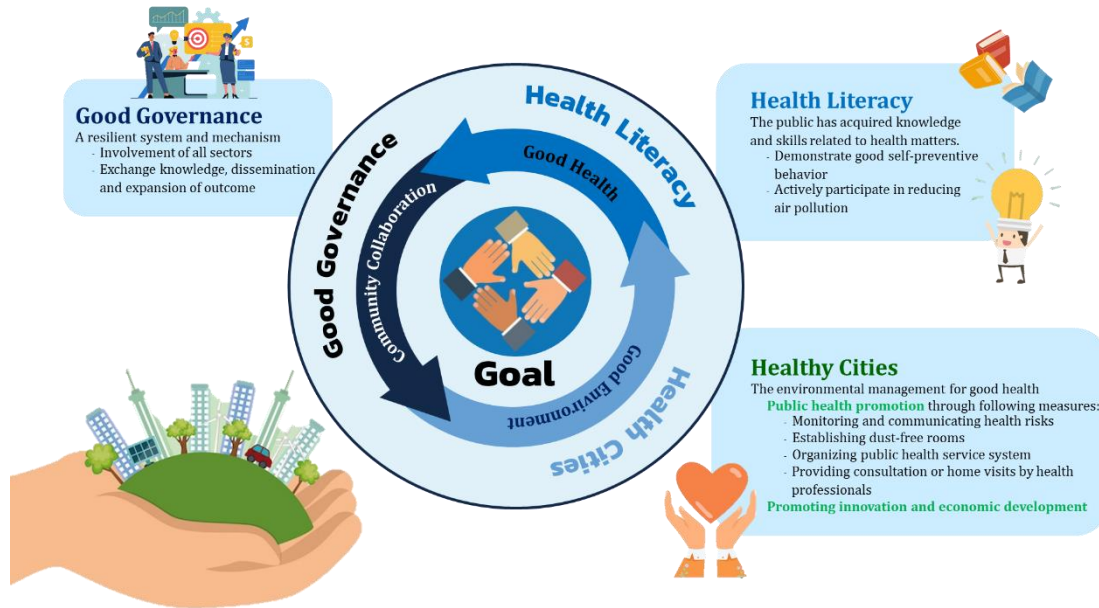
Strengthening Community Development for Addressing Air Pollution Challenges

Thailand has consistently made efforts to address air pollution issues and mitigate their health impacts. However, challenges persist annually despite the implementation of legal measures and policies from the top-down over the past year, which have proven insufficient in effectively addressing haze pollution. Previous research has proposed an approach to tackle the particulate matter problem in the northern region by advocating for equitable reduction of burning practices, promoting enforcement, and fostering community participation. This approach underscores the necessity of a participatory process within the community involving social partners and collaboration among stakeholders, considering limited resources, workforce, and skills in each sector. The goal is to establish mutual agreements and shared practices within the community (Acharee Tiptanatoranin, 2015). Additionally, continuous and equitable efforts to raise awareness and understanding among all involved parties are crucial. The focus should be on building effective networks that can serve as models and expand to other areas. Simultaneously, there must be strict and fair law enforcement measures in place (Wijarn Simachaya, 2011).



Community Development

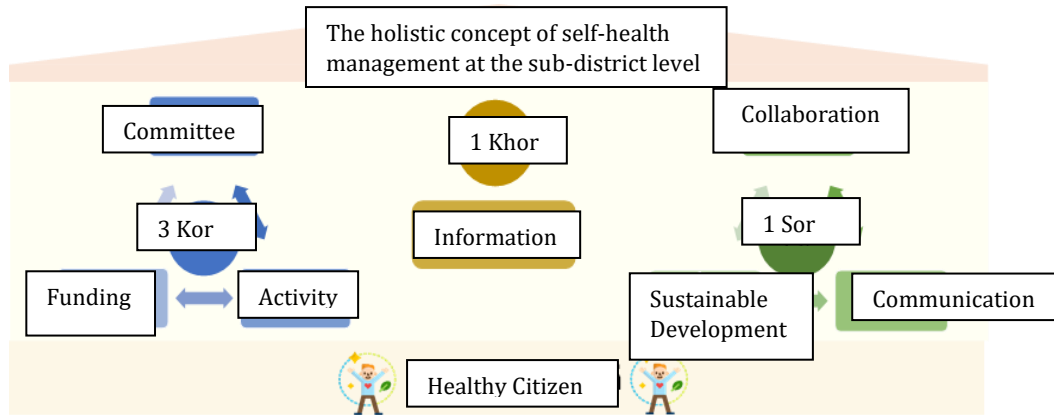
The framework for building resilient communities to manage and mitigate health impacts caused by air pollution integrates the three core principles outlined in the Shanghai Declaration. It also encompasses the holistic concept of self-health management at the sub-district level. These elements serve as fundamental principles and essential components for community development in the context of handling and preventing health risks associated with air pollution, as illustrated in the figure.



The establishment of resilient communities in environmental health management relies on the principles of community resilience through the primary health care model known as “The Trigonal Theory” (3Kor). This model comprises three key components: committee or manpower, funding, and activities represented by the “3Kor”. Furthermore, it encompasses “1Khor,” emphasizing information, and “3Sor,” encapsulating collaboration, communication, and sustainable development. Achieving success in community development for environmental health management necessitates active collaboration between the public and diverse stakeholders. Therefore, promoting and supporting these efforts from stakeholders in the execution of operations will ensure continuous success.

Primary Health Care Model:

- 3 Khor (sub components) - Committees/Manpower, Funding, Activities
- 1 Khor (sub component) - Information
- 3 Sor (sub component) - Collaboration, Communication, Sustainable Development



Lessons Learned from Success Communities



Ping Khong, Chiang Dao District, Chiang Mai

The sub-district of Ping Khong is situated along the curves of the Ping River, located approximately 18 kilometers north of Chiang Dao District. Covering a total area of 258.40 square kilometers, it comprises 16 villages with a population exceeding 14,000 people. This community boasts cultural diversity, harmoniously hosting various ethnic groups, including the Mhong, Lisu, Lahu, Tai Yai, Pga K' Yaw, and urban Thais.

The sub-district of Ping Khong serves as the site for the Huai Luek Royal Project Development Center, dedicated to providing arable areas for the local population. This initiative focuses on researching and cultivating a diverse range of crops, including vegetables like lettuce, Chrysanthemum, Aster Peacock, cantaloupe, passion fruit, pomegranate, and guava juice. The peak season, typically from November to March, coincides with the availability of a variety of locally grown produce for visitors to explore and purchase.

The entire Ping Khong sub-district falls under the jurisdiction of the Ping Khong Sub-district Municipality. Initially established as the Ping Khong Sub-district Council before separating from Muang Ngai Sub-district, it officially gained recognition as the Ping Khong Sub-district Administrative Organization in 1996. Subsequently, in 2008, it attained the status of a Sub-district Municipality, becoming the fifth in Chiang Dao District. The sub-district is well-equipped, hosting a total of seven schools and three sub-district health promotion hospitals.





Lessons Learned from Environmental Management and Mitigating Health Impacts of Air Pollution: Ping Khong Sub-District, Chiang Dao District, Chiang Mai



Input

Human Resources

- Community Leaders
- Off-Road Motorcycle Club
- Village Health Volunteers (VHVs)
- Military

Physical Resources

- Ping Khong Sub-District Municipality
- Sub-District Health Promotion Hospital
- Educational Institutions (e.g., university)

Financial and Support Resources

- Municipality
- Huai Luek Royal Project Development Center
- Department of Forestry
- Breath Council



**Process and Activity
(Preparedness - Implementation -
Monitoring - Evaluation)**

Environment

- Burning Activities Management
- Rapid Forest Fire Suppression Off-Road (Enduro) Motorcycle Club

Economic and Quality of Life Development

- Alternative Crops

Society and Public Health

- The Mechanism of Village Health Volunteers
- Innovation in Dust Protection Masks



Output

- Demonstrate behaviors focused on reducing pollution and actively engaging in self-health care for their overall well-being.
- Enhance environmental quality by diminishing community burning practices, thereby reducing air pollution.
- Form networks and engage community leaders actively.
- Generate positive economic outcomes for the community, such as increased income.
- Create community or sub-district policies and measures that prioritize environmental and health concerns.

Environment



Burning Practice and Fuel Management

The community management structure of Ping Khong Sub-district operates under the jurisdiction of the Ping Khong Sub-district Municipality, overseen by a prominent community leader serving as the mayor. This leader, a resident of the area with prior experience in municipal administration, enjoys strong rapport within the community. Their expertise in community management significantly bolsters the effectiveness of initiatives addressing forest fires, haze-related issues, and health impacts in the area. Collaboratively, the community actively engages residents and local organizations, displaying a high level of cooperation. Additionally, the sub-district appoints a committee comprising municipal representatives and community leaders from each village.



Mr. Thotsaphat Laochang
Mayor, Ping Khong, Chiang Dao District, Chiang Mai Province

For preparedness, Ping Khong Sub-district has proactively developed a plan to manage burning activities and fuel in anticipation of the smoke season, emphasizing preparedness. The sub-district committee, comprising village headmen from each community, consolidates data on firebreaks and designated burning areas to address fuel concerns ahead of the smoke season. This information is then forwarded to the municipality, which crafts a comprehensive sub-district firebreak and controlled burning plan, seeking approval from the district office. Notably, Ping Khong stands as the pioneering sub-district within the district to create such an advanced plan.

Following this, the community engages in outreach efforts facilitated by village leaders, disseminating the schedule for firebreaks and controlled burning areas in each village. Furthermore, manpower and surveillance centers are established within each village, tasked with monitoring and promptly responding to fire incidents, ensuring swift action when needed.

The management and regulation of burning practices and fuel rely on satellite-derived data concerning hotspots supplied by central agencies like the district chief, alongside observations made during surveillance efforts. To combat fires, the municipality mobilizes local personnel, including volunteers, utilizing equipment such as blowers. Support comes from both the municipality's resources and external organizations like the Breath Council.

However, the daily expenses, covering necessities like food, water, and vehicle fuel, are sustained through revenues garnered by organizing motocross races in the region. These funds are voluntarily contributed by participants who engage in firefighting activities within the sub-district.



Rapid Forest Fire Suppression Off-Road (Enduro) Motorcycle Club

The volunteer team from the off-road (Enduro) motorcycle club originated with Mr. Somkiat Phuriborriboon, a community member with a pre-existing passion for off-road motorcycle riding and a history of participation in various competitions. As interest in off-road motorcycle activities grew within the community, a team gradually coalesced around this interest. In 2019, Mr. Somkiat assumed the role of assistant village headman in the Ping Khong community, enhancing community engagement and initiating volunteer firefighting efforts.

Subsequently, Mr. Somkiat extended an invitation to the off-road motorcycle team from the community to engage in volunteer firefighting activities. Presently, there are over 20 off-road motorcycles deployed as a rapid mobility unit for forest fire suppression.



Mr. Somkiat Phuriborriboon
Assistant Village Headman, Ping Khong Village
Rapid Forest Fire Suppression Off-Road (Enduro) Motorcycle Club



Preparedness: Key human resources involved in preparing and mobilizing the Rapid Forest Fire Suppression Off-Road (Enduro) Motorcycle Club include Mr. Somkiat, who serves as the assistant village headman, and around 20 community members actively engaged in the motorcycle club. Additionally, community volunteers play a significant role in firefighting efforts. The firefighting equipment, including buckets, beating tools, and blowers, receives support from the municipality, the Department of Forestry, and the Breath Council.

To sustain these efforts, the community and the off-road motorcycle club organize motorcycle competitions, generating income that contributes to various welfare activities associated with firefighting. This financial support encompasses expenses such as fuel, water, and food, ensuring the smooth operation of firefighting endeavors.

Implementation: During a fire incident, the municipality receives GPS data either from the district office or ground-level sources. They then collaborate with the Rapid Forest Fire Suppression Motorcycle Club to ensure the prompt mobilization of manpower, equipment, and the motorcycle team. This coordinated effort aims to swiftly reach the fire site and conduct suppression or containment operations efficiently. Additionally, the Rapid Forest Fire Suppression Motorcycle Club extends its support to neighboring areas, assisting in firefighting efforts beyond its immediate vicinity.



Alternative Crops

The Ping Khong Sub-district initially focused on mono-crop cultivation, particularly corn, a crop commonly linked to agricultural burning for land preparation and residue disposal, contributing to regional air pollution. However, in the past 5-6 years, farmers have shifted towards cultivating alternative economic crops that do not necessitate burning practices. This transition includes the cultivation of perennial trees like Nam Dok Mai mango, avocado, and other non-burning reliant crops. The Huai Luek Royal Project in the area has played a pivotal role in encouraging this shift. Moreover, a new generation of farmers has emerged within the community, engaging in the cultivation of diverse species of roses and adopting online marketing channels for their produce.

Preparedness evolved from the challenges faced by Ping Khong in addressing the prevalent issue of cornfield burning among local farmers. Community leaders, including the municipality, acknowledged the gravity of this issue and endeavored to encourage farmers to redirect their focus towards cultivating perennial trees. This shift is primarily economically driven, prompted by the decreasing



prices of corn, while alternative perennial crops promise higher and more sustainable income opportunities.

The Huai Luek Royal Project Development Center has actively promoted the cultivation of alternative crops, specifically the Nam Dok Mai mango (Barracuda mango) and avocado. The center's staff has provided agricultural expertise to local farmers in the area. Concurrently, the municipality has supported this initiative by inviting specialized experts for each plant type to educate and assist interested farmers. Consequently, the cultivation of corn in the Ping Khong Sub-district has decreased substantially, now comprising only 20% of the agricultural output. Despite a recent rise in the market price of corn, farmers have reintroduced corn cultivation while integrating it with mango orchards, thereby reducing the necessity for burning in the area.

Simultaneously, the cultivation of roses has surged in popularity, especially during the COVID-19 pandemic. Mr. Komsit Laohang pioneered this business in 2019, capitalizing on the increased demand for roses amidst the coronavirus outbreak. Leveraging online platforms such as Facebook and TikTok, he effectively reached a broader customer base, illustrating the convenience and success of online sales for the emerging generation of entrepreneurs in the Ping Khong Sub-district.



Mr. Komsit Laohang
Rose Farming Entrepreneur in Ping Khong Sub-district



Mr. Wirachai Saeli
Chairman, Village Health Volunteer (VHV) Organization,
Ping Khong Sub-district

Health Care

In the healthcare domain of the Ping Khong Sub-district, the community relies on a single Sub-district Health Promotion Hospital, catering to primary healthcare needs. Village Health Volunteers (VHVs) play a crucial role in maintaining public health and well-being, contributing significantly to the community's overall health and quality of life.

Regarding health preparedness, prior to air pollution occurrences, public health officers and VHVs undergo training provided by the Ministry of Public Health. This training equips them with knowledge about air pollution, self-protection measures, and appropriate healthcare practices. Allocations from the budget are designated for procuring N95 masks, intended for distribution to the community during air pollution incidents.

When air pollution episodes occur, VHVs receive real-time information and updates through conference calls and online platforms like the Line application from municipal entities. Their role involves notifying and educating the community about the air pollution situation. VHVs conduct door-to-door visits to raise awareness regarding the health impacts of air pollution and distribute N95 masks. This effort is supported by both the municipality and public health authorities, including the Department of Health

Innovation in Dust Protection Masks

Chiang Mai University's Academic Working Party actively participates in supporting the development of dust protection masks through the CMU Model Project, aimed at addressing air pollution issues in the Northern Region. This initiative aims to establish a pilot area to implement sustainable and comprehensive solutions to combat the persistent problem of air pollution in the region. The approach involves a holistic strategy across all sectors. The designated pilot area for this project is Pa Tung Ngam Village in Ping Khong Sub-district, Chiang Dao District, Chiang Mai Province, specifically focusing on preventing and mitigating health impacts associated with air pollution.



Image: Academic Center for Air Pollution in Northern Thailand, Chiang Mai University

Mae Na, Chiang Dao District, Chiang Mai

Mae Na Sub-district, located approximately 3 kilometers south of Chiang Dao District, spans an area of 257.5 square kilometers, encompassing 13 villages and 14 hamlets with a population of approximately 10,000 individuals. The residents, predominantly native or Thai nationals, engage in diverse agricultural and animal husbandry activities, cultivating a variety of crops such as rice, corn, soybean, peanut, pepper, garlic, lychee, and longan in accordance with seasonal rotations. Supplementing their income through secondary occupations, some groups focus on trade and the processing of agricultural products. Additionally, bamboo weaving is a widespread practice among households, utilizing locally available bamboo. Further showcasing the community's adaptability, some families operate homestay businesses, leveraging the proximity of Mae Na Sub-district to the Chiang Dao Wildlife Sanctuary. Furthermore, the primary occupation in the community is tea cultivation, specifically for fermented tea leaves. In response to the potential threat of wildfires, community members collaborate on forest conservation efforts to safeguard the tea plantations in the area.

With its predominantly flat and valley-covered landscape, Mae Na is endowed with natural water resources, contributing to the flourishing forestry assets that make it a highly sought-after destination for ecotourism. The nine villages nestled amid hills, surrounded by mountains and forests, attract visitors seeking a unique and immersive experience. Distances from the Chiang Dao District Office range from 3 to 12 kilometers, while four other villages are situated 11 to 25 kilometers away from the Mae Na Sub-district Municipal Office. Presently, the population of Mae Na Sub-district reflects a rich cultural tapestry, comprising diverse ethnic groups such as the Thai Yai, Lisu, Musoe, Karen, and local Thai residents. The geographical proximity to various areas, including Mae Taeng District and different sub-districts within Chiang Dao District, has fostered cultural diversity. Social amenities in Mae Na Sub-district include a total of six schools and two sub-district health promotion hospitals.

Initially, Mae Na Sub-district operated as a Municipal Area before attaining the status of a Sub-district Administrative Organization in 1996. Subsequently, it achieved municipal status in 2012, solidifying its position as the most recent Sub-district Municipality within Chiang Dao District.





Lessons Learned from Environmental Management and Mitigating Health Impacts of Air Pollution:: Mae Na Sub-District, Chiang Dao District, Chiang Mai



Input



**Process and Activity
(Preparedness - Implementation -
Monitoring - Evaluation)**



Output

Human Resources

- Community Leaders
- Off-Road Motorcycle Club
- Village Health Volunteers (VHVs)

Physical Resources

- Mae Na Sub-District Municipality
- Sub-District Health Promotion Hospital
- Pa Miang Community

Financial and Support Resources

- Municipality
- Donation
- Highland Development Project (Royal Project)
- Mae Fah Luang Foundation
- Bamboo Econ Development Organization (BEDO)
- Business Sector

Information Resources

- Data on Air Pollution from Dustboy
- Fire Management Decision Support System (FireD)

Environment

- Burning Activities Management and Rapid Forest Fire Response Unit

Economic and Quality of Life Development

- Aesthetic Residences for Sustainable Living Initiative (Huean Na Por Yoo Por Pieng)
- Alternative Crops
- Carbon Credits
- Bio-Tourism

Society and Public Health

- Air Pollution Risk Monitoring and Communication System

- Raise awareness and knowledge.
- Demonstrate behaviors focused on reducing pollution and actively engaging in self-health care for overall well-being.
- Improve environmental quality (e.g., reduce community burning practices leading to decreased air pollution).
- Establish networks and engage community leaders.
- Yield positive economic impacts on the community (e.g., increase income).
- Develop community or sub-district policies and measures emphasizing environmental and health concerns.
- Obtain adequate community health services aligned with the local context

Economic and Quality of Life Development



Aesthetic Residences for Sustainable Living (Huean Na Por Yoo Por Pieng)

Starting in 2017, the "Aesthetic Residences for Sustainable Living (Huean Na Por Yoo Por Pieng)" project was initiated to elevate residents' quality of life. This project promotes Sufficiency Economy principles, targeting environmental concerns like waste management, air quality, and mosquito control, aiming to create a pristine and visually appealing community. Administered by the municipal authority without relying on budgetary allocations, the project actively encourages residents to cultivate homegrown vegetables, maintain clean living spaces, and participate in yearly competitions.

Additionally, the community has established two waste burial pits to facilitate efficient waste separation. For organic waste, including leaves and food scraps, composted fertilizer is proposed as a sustainable alternative to conventional burning practices. Notably, there's a strong emphasis on repurposing reusable items. The community's remarkable attributes include the absence of mosquito breeding sites, effective waste separation practices, and well-maintained surroundings. As a result, the community consistently organizes annual activities to sustain these positive traits.





Carbon Credit

The implementation of BEDO-BCG principles in the reserved forest area of Doi Luang, Chiang Mai Province, has been ongoing for two years, supported by the Carbon Credit project initiated by the Mae Fah Luang Foundation in collaboration with the Department of Forestry. The project's outset involves organic farming practices aimed at empowering communities by curbing burning and reducing fuel consumption. An annual budget allocation of 300 Baht per year for each cultivated forested area (1,600 square meters) serves as an incentive for forest-related activities aimed at wildfire prevention. These activities encompass designated area inspections, reforestation efforts, and the establishment of water retention barriers to augment forest moisture levels while concurrently enhancing local livelihoods.

The development of the community residents remains a top priority. In case of forest fires or tree mortality, there will be a reduction in the allocated budget. Conversely, healthy tree maintenance and additional tree planting initiatives will garner financial support. This approach motivates local residents to cultivate a deep affinity for the forest, perceiving it as an economic opportunity for the community.

The "**Carbon Credit Management for Sustainable Development**" initiative engages community members in utilizing funds for a cohesive set of strategies. These include establishing firebreaks, conducting fire inspections to prevent forest fires, and conducting surveys of designated areas. The initiative encompasses reforestation efforts, revitalizing carbon credit plots, constructing water retention barriers, and developing a nature-friendly pathway to a waterfall for tourism. Moreover, it aims to enrich and establish an educational forest trail, focusing on medicinal plants and incorporating informative signs for educational and directional purposes. Aligned with the BCG plan and objectives, the project emphasizes the conservation and restoration of the area, aiming for a lush, fertile landscape. Its goals encompass optimizing resources, reducing waste and pollution by one in four, and promoting sustainable resource utilization.

The income generated from this endeavor is equitably distributed through environmentally certified products and services, fostering a green economy. The initiative adheres to standard certifications and promotes its products and services by implementing effective marketing strategies.

The development initiative aims to create an environmentally friendly tourist destination that collaborates with shared resources. Its focus lies in establishing a low-carbon society, advocating sustainable lifestyles, and diminishing greenhouse gas emissions. The local community benefits from utilizing resources from the communal forest, gathering forest products for household use, and repurposing public forest areas for recreational activities among local residents and nearby communities. This initiative not only alleviates the adverse effects of forest fires and smoke but also serves as a catalyst for environmental conservation. Furthermore, it significantly contributes to the overall development of the community by fostering the production of local products.

Bio-Economy in Community

The community has taken proactive steps to foster tourism while prioritizing community ownership, aiming to decrease reliance on external investors and promote sustainable development that benefits all. Collaborative discussions with the Mae Na Sub-district Municipality ensued to explore ways to enhance tourism and capitalize on the region's biodiversity. A series of meetings were conducted, aligning activities with the Bio-Circular-Green Economy (BCG) principles, introducing a novel economic model to the local context and formulating community project plans.

The outcomes of the Community Bio-economic Development initiative have resulted in increased resilience, expanded networks, and financial support for project budgets. In 2022, funding was allocated for seven projects spanning seven communities, with an additional community receiving support in 2023. Moreover, the community has obtained certification for 19 bio-economy-endorsed products, primarily in the categories of organic food and beverages, as well as health supplement herbal products. Examples include organic rose tea, organic Chrysanthemum tea, roasted organic tiger peanuts, and raw organic sesame seeds.



Bio-Tourism

Biodiversity tourism represents a community-driven approach to managing tourism, emphasizing nature conservation and environmental preservation while generating value and income for the community. It showcases the unique qualities of communities in safeguarding natural resources and local knowledge. Using the Mae Na Sub-district community as a prime example, it illustrates the evolution of community-based tourism management across various stages, each offering valuable lessons. There's a noticeable shift toward more equitable and sustainable management practices. The Mae Na Sub-district Municipality has actively engaged in discussions to explore opportunities for enhancing and leveraging biodiversity in tourism. This initiative aims to enhance and establish tourism routes, leading to diverse tourist destinations and natural trails. Around 13 community-based models have been established, such as the tea and coffee cultivation community in Pang Ma-O Village, an agro-tourism and winter fruit processing community enterprise in Pa Lo Village, and the tourism community enterprise in Mae Mae Village. When communities generate income from local resources, it incentivizes reinvestment in conservation activities and sustainable resource management, ensuring long-term sustainability. This cycle fosters a harmonious balance between economic growth and environmental preservation within the community.



Following the official establishment of community forest areas as per the Community Forest Act of 2019, local residents acknowledged the significance of these shared forests. Consequently, they commenced managing these areas, aiming to transform them into tourist attractions. Notably, the community forest areas of Ban Mae Mae and Ban Mae Sai actively engaged in the "Take Care of the Forest, We Take Care of You" project, in collaboration with the Mae Fah Luang Foundation and the Office of the Securities and Exchange Commission (SEC). This initiative aims to support communities in forest conservation while fostering the overall well-being of the people in a balanced and sustainable manner.

In this context, tourism management in community forest areas emerges as an alternative livelihood for these communities, complementing their primary occupations in agriculture and Miang tea forest cultivation. Both regions encounter the challenge of developing sustainable tourism practices that enable outsiders to learn about the community's lifestyle and the forest without adversely impacting the environment. Despite being in the early stages, interviews with community members indicate that their tourism management ideas align with the regulations established by the community forests. These regulations encompass obtaining permission to enter the forest, prohibiting the removal of resources from the area, and implementing effective waste management practices.



Mr. Somsak Kongstan
Village Headman, Village no. 11, Ban Mae Mae, Mae Na Sub-district



Air pollution Monitoring and Health Warning System

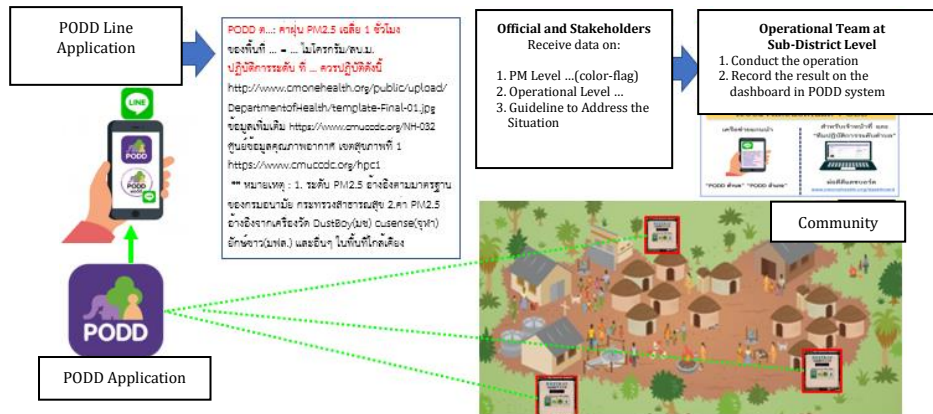
The funding for addressing the health impacts of air pollution in Mae Na Sub-district originates from diverse sources. The Mae Na Sub-district Municipality, Chiang Dao District Hospital, and Mae Na Health Promotion Hospital are pivotal in providing public health services. External organizations, notably the Department of Health in collaboration with Chiang Mai University through Regional Health Promotion Center 1, have jointly facilitated the installation of devices for monitoring particulate matter (PM2.5) with a particle diameter not exceeding 2.5 microns.

Moreover, these entities have developed a comprehensive notification system and data transmission protocol using various platforms such as the Line application, operating systems, and digital software like Participatory Onehealth Disease Detection (PODD). This multifaceted approach aids in the monitoring and management of diseases and disasters within the community, enhancing overall health surveillance and response mechanisms.



Preparedness. The Mae Na Sub-district Municipality has made preparedness for addressing public health concerns related to air pollution a top priority. Funding for such endeavors originates from multiple sources, including the municipality's own funds, the Provincial Administrative Organization, and support from the National Health Security Office (NHSO). These resources are utilized for implementing projects aimed at safeguarding public health during air pollution episodes, such as procuring N95 masks. Mae Na Sub-district stands as a model area for deploying an air pollution monitoring system and evaluating its health impacts. The Regional Health Promotion Center 1 actively engages in monitoring air quality using measurement tools, transmitting data, and disseminating risk assessments to the community through local authorities, administrative units, and public health agencies in the area. Additionally, plans are underway to enhance the capacity of Village Health Volunteers (VHVs) in monitoring and communicating health risks associated with air pollution, ensuring a robust network for public health preparedness and response.

The region's operational efforts to prioritize public health have involved proactive communication of air pollution information obtained from the monitoring system. To ensure widespread dissemination, the municipality utilizes online platforms like Line and Facebook applications. Moreover, they employ a Public Announcement System within the community, ensuring residents stay informed about air quality and health-related updates. As part of their community care initiatives, Village Health Volunteers (VHVs) undertake activities to distribute health masks, particularly focusing on vulnerable groups such as young children, the elderly, and individuals with underlying health conditions. This targeted approach aims to protect those most susceptible to the adverse effects of air pollution, emphasizing the community's commitment to safeguarding the health of its residents.



Sop Pong, Pang Ma Pha District, Mae Hong Son

Sop Pong Sub-district is situated within the jurisdiction of the Pang Ma Pha District, Mae Hong Son Province. It is approximately 700 meters away from the Pang Ma Pha District Office and about 65 kilometers from the Mae Hong Son Municipal District. The terrain of the area is predominantly characterized by high plains interspersed with hills and flatlands nestled between valleys, with the presence of the flowing Lang River. The name "Sop Pong" is derived from the Tai Yai language, where "Sop" means "mouth" and "Pong" translates to "penetrate or meet." Therefore, "Sop Pong" signifies the point where two streams or rivers flow together, specifically referring to the confluence of the Mae Au stream with the Lang River. The Sop Pong Sub-district covers an estimated area of 250 square kilometers, accommodating a population of nearly 8,000 residents.

The population consists of indigenous Northern Thai ethnicities, combined with a blend of Tai Yai (Tai) and Central Thai ethnic groups. Initially, the Sop Pong region was an expanse of dense forests without residential structures, serving as a passageway or lodging area for travelers journeying from Pai District to Mae Hong Son Province. Subsequently, villagers from the Pai District ventured into this region for hunting and forest product exploration, discovering its suitability for cultivation and habitation due to its expansive plains and proximity to water sources. This discovery eventually led to the establishment of settlements.

The Sop Pong Sub-district has been under the jurisdiction of the Sop Pong Sub-district Administrative Organization since 1996, transitioning from a small to a medium-sized administrative organization in 2007. The area comprises six early childhood development centers, six primary schools, and one secondary school. Additionally, it hosts one district hospital and one sub-district health promotion hospital.





Lessons Learned from Environmental Management and Mitigating Health Impacts of

Air Pollution:: Sop Pong Sub-District, Pang Ma Pha District, Mae Hong Son



Input



Process and Activity
(Preparedness – Implementation –
Monitoring - Evaluation)



Output

Human Resources

- Community Leaders
- Village Health Volunteers (VHVs)
- Forest Fire Suppression Volunteers

Physical Resources

- Sop Pong Sub-District Administration Organization
- Sub-District Health Promotion Hospital

Financial and Support Resources

- Regional Health Promotion Center 1
- Municipality
- Donation

Information Resources

- Data on Air Pollution from Dustboy

Environment

- Burning Activities Management

Society and Public Health

- Air Pollution Risk Monitoring and Communication System
- Health Literacy
- Clean Air Room

- raising awareness and knowledge,
- promoting behaviors geared toward pollution reduction and proactive self-healthcare
- reducing air pollution-related illnesses
- improving environmental quality by curtailing community burning practices
- fostering networks and engaging community leaders
- generating positive economic impacts like increased income
- formulating community or sub-district policies highlighting environmental and health concerns
- ensuring accessible community health services tailored to local needs.

Environment



Burning Activities Management



In preparation for forest fire management, Sop Pong Sub-district has developed a prevention and mitigation plan in line with national policies. This approach involves coordinated efforts between the District Quality of Life Development Committee (DQLDC) and the Sub-district Quality of Life Development Committee (SQLDC), spanning various sectors. Communication occurs through sectional leaders and staff meetings, enabling effective dissemination of information to the public regarding health issues linked to airborne particles. Initiatives also include establishing dust-free rooms, crafting collaborative policies with local agencies, and active engagement with village health volunteers (VHVs) and the forest fire and smoke haze committee. To fortify these endeavors, the sub-district has established a Public Health Emergency Operations Center (PHEOC) in collaboration with municipal and community leadership networks, involving village heads from each community. Its responsibilities encompass assessing area data for identifying forest entry and exit points, monitoring forest burning, implementing fire prevention and control measures, and issuing directives to minimize open burning in designated areas.



The village's wildfire prevention and resolution practices involve a systematic assessment of occurring wildfires. When the community can independently manage the situation, they utilize supported equipment provided by government agencies such as blowers and water spray containers from local authorities, the Forest Protection and Forest Fire Control Office, the Provincial Office of Natural Resources and Environment, and the Provincial Office of Disaster Prevention and Mitigation for fire extinguishment.

In cases where the wildfire surpasses local control, coordination with relevant agencies is initiated to request additional manpower and equipment. Prior to engaging in wildfire suppression, the wildfire prevention and resolution team undergoes training and receives personal protective gear to ensure safety, aiming to prevent accidents like smoke inhalation during firefighting activities.

Furthermore, public health officials in the area conduct health assessments before and after firefighting operations to evaluate overall well-being, emphasizing a proactive approach to ensure the health and safety of those involved in firefighting efforts.





Air Quality Monitoring and Warning System

The communication, monitoring, and health warning regarding air quality involve the assessment of particulate matter levels and vigilance against airborne particles, facilitated through applications like the "PODD" system. Particulate matter data is collected from district service centers equipped with Dust Boy sensor systems, measuring fine particulate matter in the air. Results are regularly displayed at 8 AM, 12 PM, and 3 PM in sub-district health promotion hospitals, general hospitals, and sub-district administrative organizations.

Data dissemination occurs through village leader announcements via Line groups. Village health volunteers then relay this information to the public, offering guidance on appropriate actions based on color-coded levels. Furthermore, community leaders communicate essential information, including burning prohibitions, through various channels such as community meetings, weekly public announcement systems, Line, and Facebook groups.

Assistant village leaders utilize warning flags placed at community halls and informative boards to convey the meaning and recommended actions for each color-coded level. These measures ensure a comprehensive understanding of directives for different situations within the community.





The training of public health officials and village health volunteers (VHVs) is pivotal in disseminating information and enhancing public awareness in their respective communities. Sessions, organized and conducted by the Provincial Public Health Office (PHO), cover diverse topics such as understanding particulate matter, monitoring its levels, interpreting color-coded alerts, self-protection measures, and effective public communication strategies. The PHO ensures the transmission of crucial information about particulate matter hazards, quantity levels, and standards. Color-coded infographics aid in guiding appropriate actions. Additionally, the Public Health Emergency Operations Center (PHEOC), operated by the Ministry of Public Health at the sub-district level, manages operations related to smoke. This involves establishing notification systems, vigilance measures, public relations, communication strategies, particulate matter monitoring, and protocols at various alert levels. Community leaders are trained, and ongoing communication is maintained to ensure effective public understanding.

During high particulate matter periods, VHVs conduct door-to-door visits to distribute information on correct mask usage, convey burning prohibitions, and encourage the utilization of mobile applications for monitoring particulate matter levels. Furthermore, educational efforts include teaching residents how to create their own face masks.



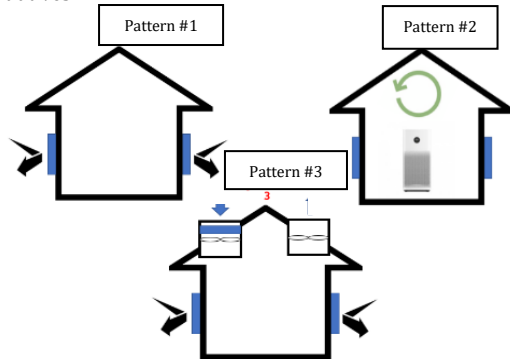
In addition, Efforts have been focused on raising awareness about PM2.5 through educational video spots available in seven languages: Lisu, Lahu, Mong, Tai Yai, Karen, Thai, and English. Additionally, practical training sessions have been conducted for community leaders and VHVs to facilitate effective risk communication and care for vulnerable groups impacted by health issues in the community.

The success of these efforts heavily relies on factors within operational areas, particularly collaboration among stakeholders. Leaders from diverse sectors prioritize collaborative problem-solving, ensuring readiness for emergencies. Teams remain consistently prepared for various scenarios, equipped for monitoring, prevention, and effective risk communication. Consequently, the community has embraced measures like open burning prohibition, resulting in heightened public awareness and a decline in burning activities.

Clean Air Rooms

The primary focus is on establishing clean air rooms to prioritize the care and support of vulnerable groups, enabling better surveillance, management, and appropriate referrals. Steps are taken to foster connections between community leaders and the sub-district health promotion hospital. Specifically, dust-free rooms have been set up in early childhood development centers, and initiatives are underway to encourage their creation in other potential areas like coffee shops and restaurants.

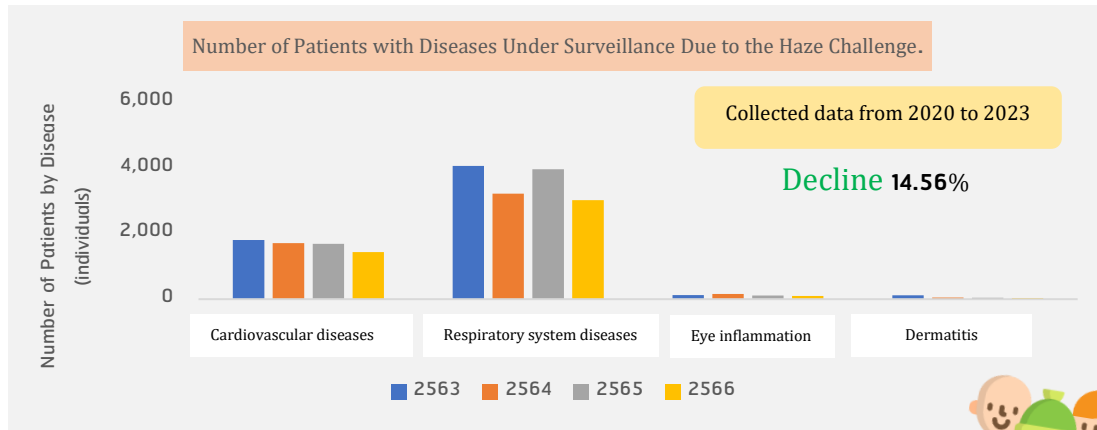
Government agencies are actively involved in sharing expertise and advocating for local budget allocations to support the establishment of these clean air rooms. The scope of these efforts extends to households, especially those belonging to high-risk groups. Moreover, there's a push for the transformation of clean air rooms into an integral part of public policy through advocacy initiatives.



Results

From the conducted activities, a notable decline of 14.56% in cases related to exposure to fine particulate matter PM2.5 was observed among patients in the Pang Ma Pha District, Mae Hong Son Province, spanning four disease groups: respiratory system diseases, cardiovascular diseases, dermatitis, and eye inflammation, from 2020 to 2023, as depicted in the diagram.

Additionally, the public has gained significant knowledge and understanding regarding self-protection against the impacts of PM2.5 and has become adept at implementing preventive measures. High-risk individuals and patients, including the elderly, young children, and pregnant women, now have access to fundamental self-protection measures. They receive guidance on utilizing N95 masks and recommendations on establishing dust-free rooms in their households for added protection.



Remark: The data for the year 2023 covers the period starting from January 1st to April 30th.



Conclusion

Building resilient communities to manage and prevent the health effects of air pollution in Thailand stands as a vital strategy in tackling this issue and lessening its impact on public health. Community initiatives encompass both the reduction of air pollutant emissions (mitigation) and adapting to the existing air pollution scenario. Reflecting on experiences from three specific areas, it's clear that a resilient community adept at managing and averting the health impacts of air pollution necessitates robust community assets in terms of human, physical, financial, and informational resources.

Human Resource encompass community leaders who exhibit resilience and possess the capacity to coordinate, manage, direct, and serve as central figures for the community. Moreover, influential figures within the community, spanning business sectors, governmental bodies, and specialized groups with unique capabilities — such as motorcycle clubs adept at swift responses in forest fire suppression — play crucial roles in shaping significant activities within the locality.



Physical Resource involve organizations or entities that provide essential support in managing and preventing the health impacts of air pollution within the community. These entities encompass sub-district administrative organizations, municipalities, hospitals, and external organizations like the Royal Project Foundations and independent entities that actively promote related activities.



Financial Resource for managing and preventing the health impacts of air pollution in the community encompass more than just support from local authorities like sub-district administrative organizations and municipalities. They also include contributions from various sources, such as community-initiated activities as self-funding sources, as well as assistance or donations from entities like the National Health Security Office (NHSO), foundations, and private businesses or independent organizations.

Informational Resource are crucial for operations aimed at managing and preventing health impacts caused by air pollution within the community. These encompass data regarding air pollution status, community fuel management, pertinent personnel information, and health impact monitoring. Such data plays a pivotal role in formulating community plans or policies aimed at effectively managing and preventing health issues arising from air pollution.



A community equipped with comprehensive resources can effectively manage and prevent health impacts stemming from air pollution. This is achieved through a process that encompasses preparedness, planning, implementation, monitoring, evaluation, and development toward sustainability, all aimed at enhancing community activities.

The planning phase. In the planning phase, analysis of situational data and empirical evidence is conducted to assess the risks associated with air pollution and its health impacts. Responsibilities are assigned, and preparations are made for the required tools, equipment, technologies, and budget. Workgroups may be established, and meetings organized to develop and finalize the plan.

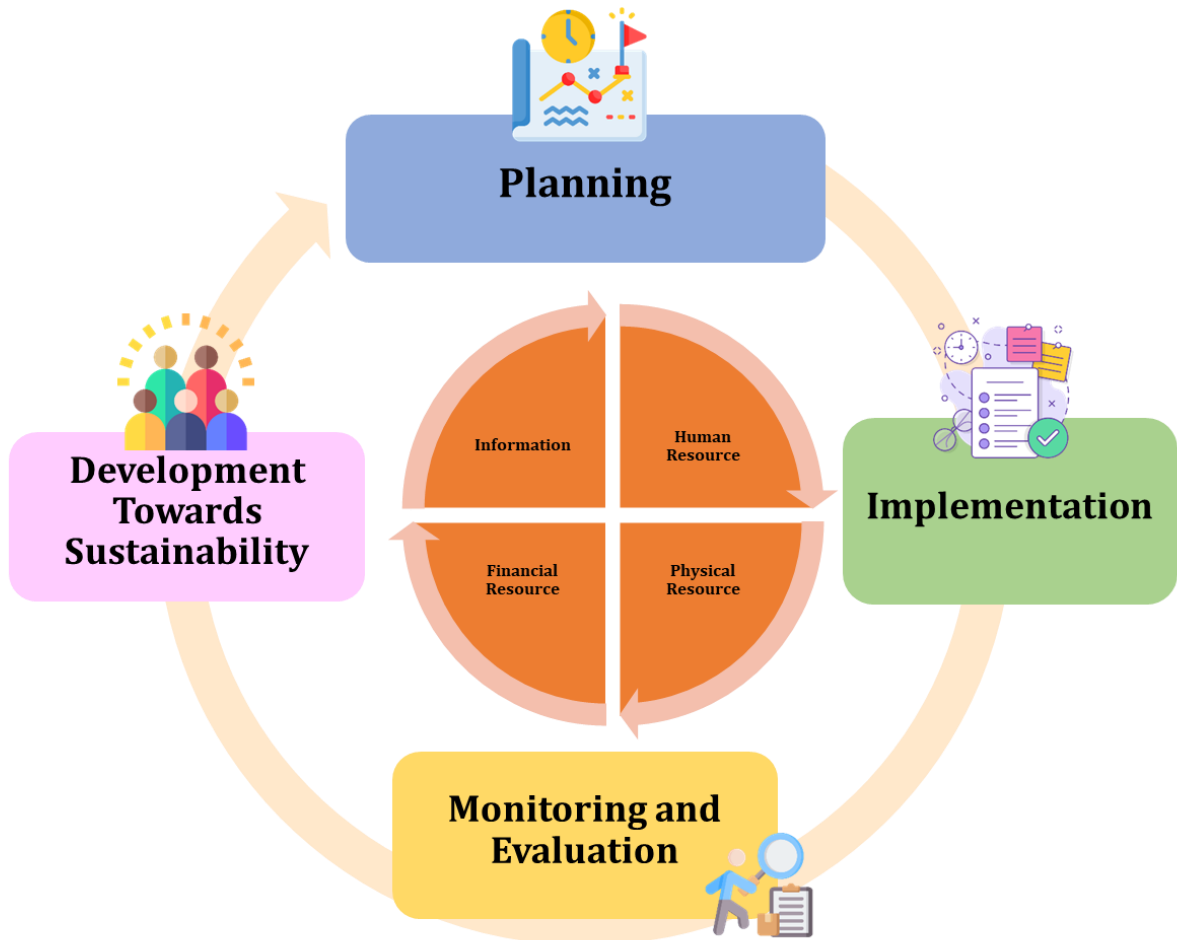
Implementation adheres to the predetermined plan, encompassing environmental management activities targeting sources of air pollution like fuel management, early burning control, and extinguishment. Moreover, health-related initiatives involve utilizing air pollution monitoring and health impact assessment systems, deploying alert systems, and disseminating risk communication within the community. Allocating equipment or technologies to prevent exposure to air pollutants, such as N95 masks and establishing dust-free areas, is also integral to this approach. Additionally, health literacy initiatives are conducted to equip the population with skills in effective communication and utilizing health information for self-care and community well-being.



Monitoring and evaluation are crucial once activities are completed. The community or relevant stakeholders must monitor the outcomes resulting from the implemented initiatives. These outcomes can be assessed at the individual level, such as heightened health awareness and improved self-care behaviors among the population, leading to a reduction in illnesses related to air pollution. At the community level, indicators include the establishment of strong networks or groups actively participating in various activities, improvement in the physical environment, and increased economic well-being. On the organizational level, entities should have plans, policies, agreements, or constitutions related to air pollution and its health impacts, or possess appropriate health service systems for the community.

In the pursuit of sustainability, communities have the capacity to develop plans, agreements, social measures, or public health policies tailored to their needs. This strategic development may involve continuous improvement, and the expansion of operational outcomes, both within and beyond the community.





Bibliography

IARC. 2013. Outdoor Air Pollution: IARC Monographs on the Evaluation of Carcinogenic Risks to Humans Volume 109. Lyon, France.

WHO. 2023. Ambient (outdoor) air pollution. Retrieved 20 October 2023, from <https://www.who.int/news-room/fact-sheets/detail>.

Srimachaya, W. (2011). Seminar Document: "Global Warming Crisis, Haze Pollution, Imminent Disaster" by the Committee on Natural Resources and Environment. February 11, 2011, Chiang Mai Province. (in Thai)

Tiptanatoranin, A. (2015). Strategies for Addressing Haze Pollution in Chiang Mai Province. **Journal of Public Administration and Political Science**, 4(1), 72-105. (in Thai)

Yodchomphu, A. (2013). Presentation Document: "Prototype District for Monitoring and Communicating PM2.5 Smoke Risks in the Pai District, Mae Hong Son Province." July 21, 2016, Mae Hong Son Province. (in Thai)



Project Management Team

Advisors:

Dr. Achara Niti-Apinyasakul
Dr. Atthaphon Kaewsamrit
Ms. Naiyana Chaitiamwong
Ms. Benjawan Tawatsupha

Director-General, Department of Health
Deputy Director-General, Department of Health
Director of Health Impact Assessment Division
Director of Health Forecasting Division

Project Team:

Ms. Kornwipha Punnasiri
Assoc. Prof. Dr. Waraporn Boonchieng
Assoc. Prof. Dr. Warangkana Naksen
Assoc. Prof. Dr. Wan Wiriya
Ms. Kulsatri Chatchavalkitkul
Ms. Soraya Choosri
Ms. Thipkamol Pumipan
Ms. Anchana Pandee
Ms. Supawan Chaowichit
Mr. Kittikan Tumthaisong
Ms. Sunisa Senawan

Public Health Technical Officer, Senior Professional Level
Associate Professor
Assistant Professor
Assistant Professor
Public Health Technical Officer, Professional Level
Public Health Technical Officer, Professional Level
Public Health Technical Officer, Professional Level
Public Health Technical Officer, Professional Level
Public Health Technical Officer, Professional Level
Operational Staff
Proactive Researcher





World Health
Organization

Thailand



Health Impact Assessment Division: Department of Health

88/22 Moo 4 Tiwanon Road, Talat Khwan sub district, Mueang Nonthaburi
district, Nonthaburi 11000

Tel. 02-590-4362, 02-590-4962

<http://www.facebook.com/anamaihia/>

<http://hia.anamai.moph.go.th>

