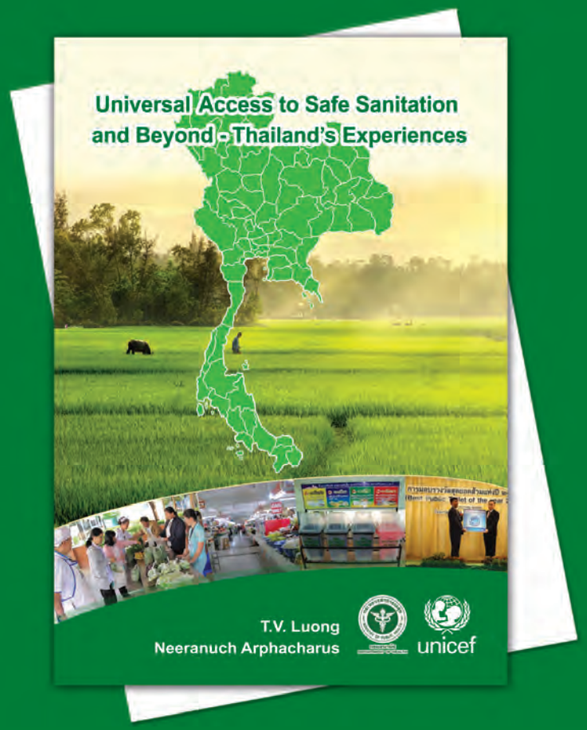

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Universal Access to Safe Sanitation and Beyond - Thailand's Experiences

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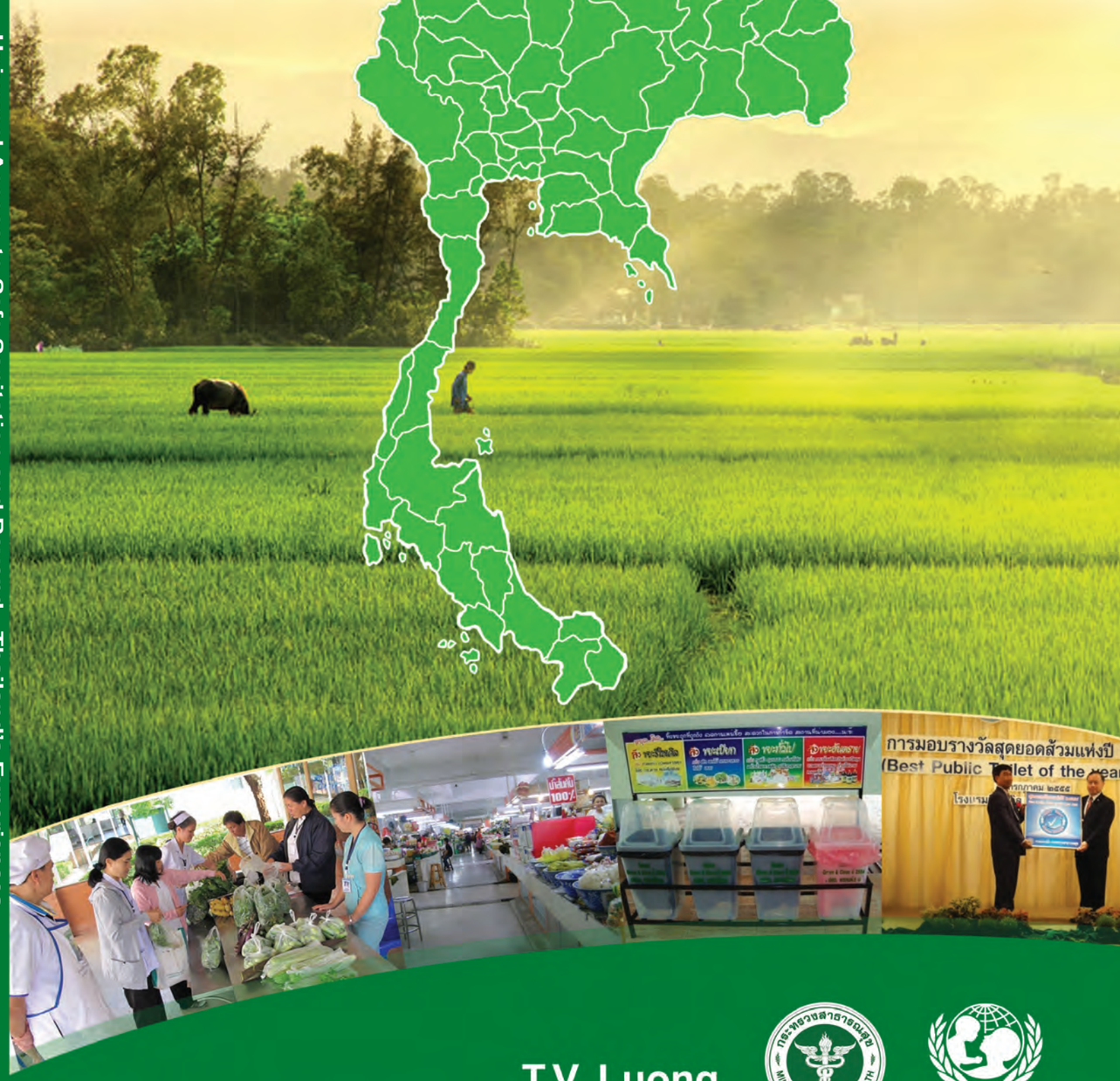

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Preface

For decades, the Government of Thailand renewed its commitment to sustainable sanitation for improving the health of all citizens. A Village Health and Sanitation Project initiated in 1960 led to the Rural Environmental Sanitation Programme, which was integrated into the successive Five-Year National Economic and Social Development Plans from the first to the eighth plans (1962–2001), with adequate budget allocation in each plan. The national policy has been backed by strong political commitment and support from all provincial governments.

This commitment led Thailand to achieve near-universal access to safe sanitation before the turn of the twenty-first century. It remains the only developing country to have reached the United Nations Millennium Development Goal targets for access to safe sanitation and a safe water supply.

The Ministry of Public Health is solely responsible for the national policy on sustainable sanitation countrywide and its implementation. This steadfast duty has protected the continuation, focal roles and responsibilities of officers at all levels.

After achieving its goals with safe household sanitation in 1999, the Government began promoting improved public health and hygienic standards through projects targeting public toilet construction, school toilet improvement, food hygiene and sanitation as well as sustainable and ecological sanitation.

This document summarizes the Government's successful experiences in promoting sustainable sanitation nationwide and achieving near-universal access to safe sanitation. The document is intended as reference for other developing countries to plan and carry out sustainable sanitation programmes to achieve United Nations Goal 6 within the Sustainable Development Agenda initiated in 2015 to ensure the availability and sustainable management of water and sanitation by 2030.

Dr Wachira Pengjuntr
Director General
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June 2016

Acknowledgements

The publication of this document was made possible by the tremendous support from the Bureau of Environmental Health in the Department of Health of the Ministry of Public Health.

We are grateful in particular to the substantial assistance of Pisanu Sanprasert and Pariyada Chokewinyoo, successive directors of the Bureau of Environmental Health, and their review of this document.

Warm thanks are also extended to Naiyana Chaitiemwong, Senior Public Health Officer in the Bureau of Food and Water Sanitation, for her assistance in verifying the information on the Clean Food Good Taste standards and Healthy Market standards and to Sawatsamon Srivacha, Bureau of Environmental Health Officer, for her assistance in preparing some of the graphs for this document.

The general support from the Bureau of Environmental Health staff is also immensely appreciated.

We also acknowledge the generous assistance from the Water, Sanitation and Hygiene Section in the UNICEF East Asia and Pacific Regional Office for editing the document.

T.V. Luong
Neeranuch Arphacharus
June 2016

Contents

Contents

Contents

Executive Summary

Thailand achieved near - universal access to safe sanitation and water supply in 1999 - the only developing country reaching the United Nations Millennium Development Goal targets for sustainable sanitation and safe water supply prior to the turn of the twenty-first century.

Historical Perspective

Promotion of sanitation in Thailand dates back to more than 100 years ago. The first sanitation law for Bangkok was promulgated in 1897, aimed at controlling the communicable diseases due to poor environmental sanitation. A hookworm eradication pilot project was initiated in 1918 and then extended to 44 provinces in 1928. Hookworm eradication promoted the construction and use of pit latrines, which helped accelerate the promotion of safe sanitation countrywide.

The Ministry of Public Health was established in 1942 in a merger of all health agencies in various departments. The Ministry took the lead to integrate the environmental sanitation goals in the country's overall health development.

A Village Health and Sanitation Project was initiated in 1960 to strengthen the promotion of sanitary latrines and was subsequently expanded nationwide. The project led to the development of the Rural Environmental Sanitation Programme as a component in the National Health Development Plan, which was incorporated into the successive Five-Year National Economic and Social Development Plans (from the first plan for 1962–1966 until the eighth plan for 1997–2001).

Status of Sanitation and Water Supply

The current sanitary latrine coverage in the country is 98.9 per cent. Of the 1.1 per cent households without sanitary latrines, 0.9 per cent families live in the remote highland rural areas, and 0.1 per cent of households still use the unhygienic pit latrine.

Almost all households in both urban and rural areas have access to safe water, of which 86 per cent is through a piped water supply and 14 per cent is from a non-piped source, such as rainwater collection and hand pumps pulling up groundwater.

Some 80 per cent of rural areas have a piped water supply that delivers safe drinking water through household taps. By 2009 (latest available data), 97.4 per cent of the rural population had a safe water supply for drinking and 97.2 per cent had a water supply for other domestic uses. The Government is working now to provide piped water to all rural areas.

Achievement of near - universal access to safe sanitation

The pour-flush water-sealed latrine (squatting type) was developed by a Thai civil servant (Sawadi Mahagayi, when he was governor of Sukhothai Province) and introduced in 1924. It remains popular due to its suitability to Thai lifestyles and habits and its affordability for rural households (without the need for government subsidy). It is also the only type of sanitary latrine promoted in Thailand. The Village Health and Sanitation Project promotes the water-sealed sanitary latrine over use of the pit latrine.

Through the Rural Environmental Sanitation Programme in each of the successive Five-Year National Economic and Social Development Plans, from 1962–1966 to 1997–2001,sanitary latrine coverage gradually increased, reaching 98.9 per cent of all households currently.

Success Factors and Lessons Learned

Success Factors

- Strong political commitment and the establishment of a coherent national policy on sanitation.

- Clear responsibility assigned to the Ministry of Public Health for the Rural Environmental Sanitation Programme, which ensured continuation, focal roles and responsibilities of officers at all levels, thus avoiding fragmentation of roles, duplication, complications on resource allocation and programme management.

- Effective interministerial coordination and collaboration with strong government leadership, coupled with adequate infrastructure and human resources at all levels.

- The Government's award scheme, the Golden Ring Award for 100% Sanitation Province, generated considerable momentum for competition between provinces, thus accelerating safe sanitation coverage.

- The Revolving Fund for Sanitary Latrines established in each village to loan money to households for building a sanitary latrine, which shifted the financial investment from the Government to households and resulted in fulfilling the demand for sanitary latrines while generating local employment.

Lessons Learned

- Adequate human resources are needed at all levels to ensure proper supervision and management as well as effective and systemic qualitative and quantitative monitoring of progress on latrine construction for sustainability.

- Technology, skills and know-how should be transferred to all levels within the government structure and to communities. In Thailand's experience, human resources were developed at all levels through trainings to build up the capacities of government functionaries and community leaders on project management, sanitation supervision and monitoring for sustainability.

- Intensive health education and social mobilization need to target all households and communities to promote behaviour change and active community participation.

- The promotion of rural sanitation needs to be integrated into the primary health care system. In Thailand's experience (with its unique health care system), well-trained village health volunteers, under the supervision of the subdistrict health officers, delivered health and hygiene messages that encouraged active participation in sanitation improvements and behaviour change across communities.

- Area-based rural development emphasis in national development planning helps to intensify interministerial collaboration, involve the private sector and non-government organizations and enable rural communities to identify their priorities for economic and social development through self-help, with government support.

Beyond Universal Sanitation

After achieving universal access to safe sanitation, the Government of Thailand turned its focus to the public health environment, with emphasis on strengthening good hygiene and sanitation through the following projects.

- **Public Toilets Promotion**

  The Department of Health launched a countrywide campaign in 2004, in collaboration with the private sector and local government agencies, to promote the installation of public toilets that meet the Government's Healthiness, Accessibility and Safety (HAS) standards.

- **School Toilet Improvement**

  For improvement of school toilets across the country, the Department of Health collaborated with the Office of the Basic Education Commission in 2007 to improve all school facilities, in accordance with the HAS standards. A model was initiated in Chumphon Province and gradually extended to all other provinces.

- **Food Sanitation and hygiene promotion**

  Food sanitation and hygiene is promoted through the Clean Food Good Taste and Healthy Market Projects, in line with government standards.

- **Sustainable and Ecological Sanitation programme**

  The programme was initiated in 2009 to cope with environmental pollution and climate change issues, aiming to help reduce the country's greenhouse gas emissions. The programme enables the recovery of most residual nutrients from faeces, urine and grey water for re-use in the agriculture sector and thus minimizes water pollution.

- **GREEN and CLEAN Hospital Project**

  Launched by the Department of Health in 2010, the project promotes sustainable and ecological sanitation by reducing greenhouse gas emissions from hospitals.

Tasks ahead

The Department of Health has set the following targets and time frames for new achievements.

- **Achieving improved sanitation for all**

  By 2016 and through intensive social mobilization, the Government is determined to motivate the remaining 1.1 per cent of households in the remote highland areas and near rivers and canals without sanitary latrines to build and use sanitary latrines.

- **Further promotion of public toilet improvements in compliance with the HAS standards**

  By 2016, 90 per cent of public toilets in the 12 categories of public places must meet the HAS standards, with all remaining public toilets achieving the HAS standards by 2020.

- **Improvement of school toilets nationwide**

  By 2020, the Chumphon Province model for 'clean and healthy school toilets' (in line with the HAS standards) must be adopted in all schools and in all provinces through a collaboration between the Department of Health and the Office of the Basic Education Commission. In addition, all public schools should establish a Clean Toilets Network within each province, which is to be extended to all other schools, temples, hospitals, health centres and public toilets to ensure cleanliness and proper maintenance of sanitation facilities. The Government will need to engage in more intensive efforts to improve school toilet facilities.

- **Intensive food sanitation and hygiene promotion**

  By 2021, the Clean Food Good Taste and Healthy Market projects should be promoted nationwide, involving all food markets, restaurants and food stalls.

- **Promotion of sustainable and ecological sanitation, in line with the sufficiency economy philosophy developed by the King of Thailand, His Majesty Bhumibol Adulyadej**

  By 2030 and with assistance from the Department of Health, in collaboration with the Ministry of Interior's Department of Local Administration Development, local authorities are to have improved

the quality of environmental health services (according to the Public Health Act of 1992) and achieved 70 per cent effective management and operation of treatment plants for human excreta, solid waste and wastewater. The sufficiency economy philosophy supports the concept of sustainable and ecological sanitation by promoting reuse of waste and human excreta as new resources, provided care is taken to remove any health hazard to humans and the environment.

- **Intensive promotion of the GREEN and CLEAN Hospital Project**
  By 2021, the GREEN and CLEAN Hospital Project should be adopted by all hospitals and health care centres.

- **Training and refresher training of all project personnel**
  Throughout the implementation of the sanitation and environment projects, the central and local governments are to organize trainings for newly recruited personnel. Refresher trainings should be conducted periodically for all project personnel to update their knowledge and thus strengthen their management capacity.

- **Improve the efficiency of monitoring systems**
  The Department of Health and the relevant implementing agency for each sanitation-related project are to improve the efficiency of the respective monitoring system to overcome constraints promptly and continue pushing the boundaries of progress.

Recommendations for achieving universal access to sanitation, based on Thailand's experiences

Thailand succeeded in achieving near-universal access to safe sanitation in 1999 and thus has accumulated four decades of rewarding experiences in the implementation of environmental sanitation to improve the health of rural people through construction and use of sanitary latrines.

The following recommendations are drawn from Thailand's experiences, to help other developing countries accelerate their implementation of environmental sanitation coverage to achieve Goal 6 of the United Nations Sustainable Development Agenda (initiated in 2015), which asks for the availability and sustainable management of water and sanitation for all by 2030.

Government Roles and Responsibilities

Essential issues

- Identify one ministry for the implementation of sustainable sanitation, merging all health agencies, if need be. This specific ministry needs to cooperate and collaborate with other ministries and local authorities at the national, provincial, district and subdistrict levels and with community leaders for effective implementation.
- Adopt sustainable sanitation as a national policy, backed by strong political commitment.
- Allocate adequate financial resources for the implementation of the sanitation programme at all levels nationwide.
- Provide adequate and qualified human resources within the infrastructure at all levels for the effective implementation and monitoring of the quality and quantity of achievements and overcoming constraints promptly.

Technology transfer

- Promote sanitary latrines that are suitable to the national context yet affordable for rural households.
- Conduct trainings for government technical personnel and village masons for the construction of the selected sanitary latrines, thus transferring technical know-how to communities.

Building capacity for implementation

- Develop the capacities of the country's human resources through various types of training, including health education and social mobilization for national, provincial, district and subdistrict health officers, council officers, village leaders and village health volunteers to manage a sustainable sanitation programme.

Health education and social mobilisation

- Provide adequate mobile units with facility for health education to village communities, including capacity to show films presenting the benefits of improved sanitation and hygiene to encourage people to change their behaviours and build and use sanitary latrines.

- Implement a nationwide helminth eradication programme through a deworming project targeting all primary school children that also encourages a healthier environment by building and using sanitary latrines instead of open defecation practices.

- Organize a nationwide social mobilization campaign for strengthening communities' participation in local decision-making for the best use of locally available financial resources, such as setting up a village revolving fund to help households build a sanitary latrine.

Monitoring and supervision

- Develop reliable systems at the national and subnational levels for monitoring and supervising a sanitation programme's progress on quality and quantity achievements.

- Provide adequate vehicles at all levels to ensure the mobility of health officers for carrying out their tasks efficiently.

Sanitation data centres

- Set up data centres at the provincial and district levels to keep records on the sanitation status. These records should be used to follow up the progress of a sanitation programme and to provide appropriate incentives to officers, community leaders and village health volunteers with outstanding performance.

1. Introduction

"The function of sanitation is to maintain and control exits and entrances from and to the human body so that they may not be the sources of diseases and the transmission routes.... Several millions of baht were spent annually for the treatment of people suffering from gastro-intestinal diseases. With this amount of expenditure, human excreta can be systematically and successfully [brought] under control. When excreta are safely disposed, sickness incurred from these communicable diseases could eventually be halved...,"

His Royal Highness Prince Mahidol of Songkhla, a Harvard-educated medical doctor and father of the reigning King of Thailand, His Majesty Bhumibol Adulyadej, in 1924

Thailand has achieved remarkable success in rural households' access to safe drinking water and sanitary means of excreta disposal. By 1999, 91.9 per cent of the rural population had access to a safe drinking water supply and 98.2 cent of rural households had built and was using a sanitary latrine-after more than four decades of government initiatives. In the early years, the efforts were supported by the World Health Organization, the United Nations Children's Fund, the United Nations Development Programme and the United States Agency for International Development as well as the private sector. In the mid 1980s, the Government took full responsibility.

Currently, the sanitary latrine coverage in the country is 98.9 per cent. As of 2009 (latest available data), 97.4 per cent of rural population had an adequate safe water supply for drinking and 97.2 per cent had water supply for domestic use.

The success in providing safe drinking water and improved environmental sanitation is attributed to the farsightedness and determination of the Government of Thailand to the sustainable development of rural areas. Such an admirable success also stems from strong political will and unwavering commitment of government functionaries at all levels, with sufficient financial resource allocation to implement the rural water supply and environmental sanitation programmes. Intensive health education and social mobilization targeting behaviour change across communities rounded out the strategy.

Investment in proper sanitation promotion is not just a financial input. As Thailand discovered, good management and an effective monitoring system at all levels, together with adequate human resources, render considerable momentum for achieving universal access to safe sanitation.

This document presents the strategies and lessons learned in Thailand for achieving near-universal sanitation for all targets and the Government's actions to promote sustainable sanitation, hygiene and public health practices beyond the achievements of the United Nations Millennium Development Goal on safe water and basic sanitation.

The document also highlights how the Government of Thailand went beyond universal access to safe household sanitation and implemented public health projects targeting a clean environment overall and better health for all people. These projects include public toilet promotion, school toilet improvement, waste management and treatment, food safety promotion and sustainable and ecological sanitation to cope with environmental pollution.

2. Achievement of near - universal access to safe sanitation

2.1 Evolution of safe sanitation promotion in Thailand

The promotion of proper sanitation practices in Thailand date back to a little more than a century ago. Bangkok's first sanitation law was promulgated in 1897, aimed at curbing the communicable diseases caused by poor environmental sanitation. The campaigns centred upon garbage collection and the construction of pit latrines and public latrines.

A hookworm eradication project initiated in 1918 emphasized the use of household pit latrines. In 1926, the Ministry of Interior issued regulations that banned defecation into rivers and canals. All ramshackle latrines along the banks of rivers and canals were destroyed, while campaigns were launched to educate the public on improving their household sanitation by building a pit latrine and exercising scrupulous hygiene practices.

The establishment of the Ministry of Public Health in 1942 led to the integration of environmental sanitation into the overall health development of the country's population. The Village Health and Sanitation Project initiated in 1960 aimed at improving sanitation practices and further strengthening the construction and use of household sanitary latrines in rural areas, with a health development scheme to combat prevalent waterborne and filth borne diseases. The scale of this project was subsequently expanded nationwide.

With political support at the national level, a Health and Sanitation Development Conference was organized in 1962, attended by all departments in the Ministry of Public Health (and chaired by the then Premier Field Marshal Sarit Thanarat). A high-level Northern Health and Sanitation Development Conference followed in 1963 (chaired by the country's then Prime Minister Field Marshal Thanom Kittikhachorn).

Technical training courses were provided to local officers at the provincial, district and subdistrict levels on the objectives of the Village Health and Sanitation Project and methods for good management of its progress. Village leaders were trained on the ways and means to organize meetings with villagers to explain the benefits of safe environmental sanitation and to cooperate for the benefit of the community's overall good health.

All necessary supplies and equipment were provided to health officers to carry out health education responsibilities and promote proper sanitation; supplies included the moulds for making water-sealed sanitary latrine pans and squatting slabs. Mobile units outfitted with documentary films, projectors and amplifiers were deployed to help educate villagers on good hygiene behaviours as well as building and using sanitary latrines.

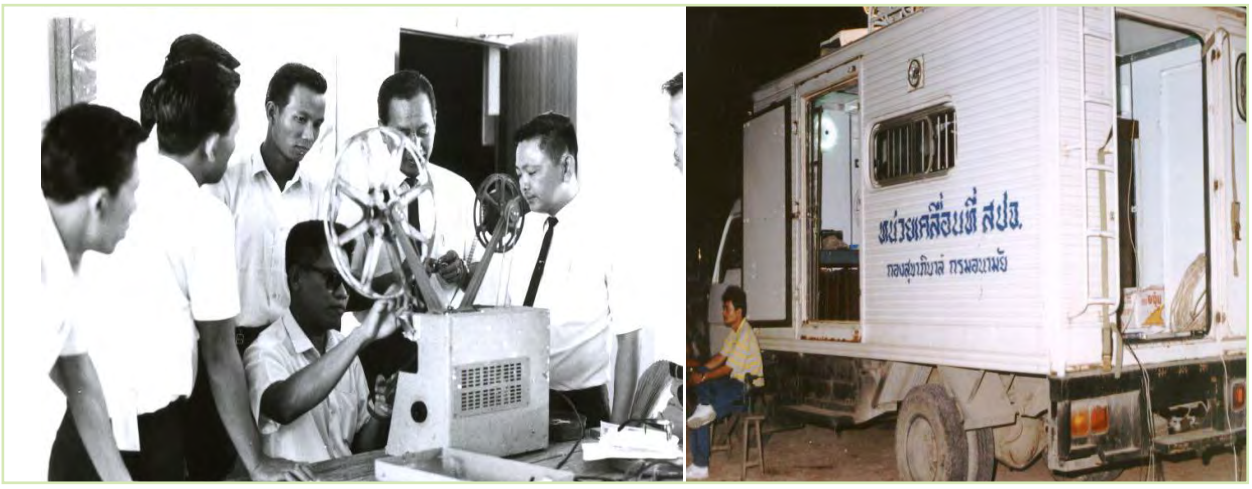


Photo 1 Health education mobile team, a part of the sanitation motivation and promotion unit of the 1960s

For the reliable monitoring of sanitation practices across the country, trucks and motorcycles were provided to health officers so they could better follow up the project's progress in all villages as well as transport the equipment for health education where it was most needed.

The monitoring officers were assigned to supervise activities in all 75 provinces. Part of their role was to help provincial officials ensure quantitative and qualitative achievements and to tackle constraints. Conferences were organized periodically for sanitarians, health officers and physicians in all provinces and for provincial, district and subdistrict officials to review the project's progress and setbacks. An annual conference was organized to review the year's progress. Most of the monitoring officials, who were graduates of the Faculty of Public Health at Mahidol University, were trained and worked closely with experienced health officers to acquaint themselves with the techniques of health work.

Reinforcement from hospital doctors (in particular, from the Faculty of Medicine at Siriraj Hospital, considered one of the best teaching hospitals in Thailand) on the promotion of sanitation (by explaining that good sanitation reduces illness and thus doctor visits) strengthened the progress of the Village Health and Sanitation Project.

The establishment of health centres at the district and subdistrict levels that began in 1961 brought tremendous changes to the health status of Thailand's population and helped ensure that the sanitation project reached village communities. The health workers from these centres were trained to familiarize themselves with the villagers and gain their trust. The health workers provided support to villagers to build and use sanitary latrines and improve their personal hygiene practices. Although it took years before these centres were established throughout the country, the strategy is considered a turning point in the Village Health and Sanitation Project. Now every district and subdistrict harbours a health centre (renamed as 'health promoting hospitals'), and they are regarded as important for promoting safe sanitation and improved hygiene.

Also in 1961, the Ministry of Public Health launched a strategy of village health volunteers who promote primary health care activities in their community, including the promotion of safe sanitation. Each health volunteer is selected by 10 households and undergoes an initial training programme, followed by refresher training to update their knowledge and thus respond to contemporary issues in their village. The health volunteers provide valuable assistance to the district and subdistrict health personnel in responding to basic and frequently found health problems in villages and in the promotion of sustainable health and sanitation behaviours.

From among the health volunteers, one person is selected per village to participate in a district team of village health volunteer leaders. The team leaders are further trained in management and leadership skills to oversee the work of the individual health volunteers.

As a component of the National Health Development Plan, the Rural Environmental Sanitation Programme was incorporated into the successive Five-Year National Economic and Social Development Plans, starting from the first plan, for 1962 - 1966 until the eighth plan for 1997 - 2001.

Table 1: Timeline of events in the promotion of safe sanitation to achieve near - universal coverage in Thailand

Year	Event	Remarks
1897	Promulgation of Bangkok's first sanitation law aims at curbing communicable diseases due to poor environmental sanitation. Public awareness campaigns on garbage disposal and construction of pit latrines are organized.	
1918	Introduction of pilot project to eradicate hookworm infection.	With support from the Rockefeller Foundation for two years.
1920	Hookworm eradication project continues.	Department of Public Protection in the Ministry of Interior transfers the hookworm eradication project to the Siam Red Cross Society.
1921-1923	Hookworm eradication project is expanded to cover 44 provinces.	Implementation of the hookworm eradication project is supported by the Siam Red Cross Society for three years, from 1921 to 1923. The project then transfers back to the Department of Public Protection in the Ministry of Interior.
1926	The Ministry of Interior issues regulations banning defecation into rivers and canals. Campaigns are launched to educate the general public on improving their sanitation and hygiene practices.	

Year	Event	Remarks
1928	Director general of the Department of Public Protection issues letters to every provincial Public Protection Office containing instruction to promote the building and use of a pit latrine within households.	
1942	Establishment of the Ministry of Public Health.	The Ministry of Public Health is formed by merging all health agencies in various departments (Office of the Secretary to the Minister, Office of the Permanent Secretary, Department of Medical Services, Department of Public Welfare, Department of University Medicine, Department of Medical Science and Department of Health). The Ministry of Public Health is assigned sole responsibility for the Environmental Sanitation Programme. The Ministry then integrates environmental sanitation as part of the overall health development plan for the country.
1960	Establishment of the Village Health and Sanitation Project in some districts.	Dr Mali Thainua becomes project director. Sanitation improvement is strengthened and subsequently expanded nationwide.

Year	Event	Remarks
1961	The Village Health and Sanitation Project leads to the development of the Rural Environmental Sanitation Programme as one component in the National Health Development Plan.	
1962-2001	Implementation of the Rural Environmental Sanitation Programme within the first to the eight Five-Year National Economic and Social Development Plans.	Thailand achieves near-universal access to safe sanitation in 1999, which includes achieving the United Nations Millennium Development Goal targets for safe sanitation and safe water supply. In 1999, Thailand achieves 98.2 per cent sanitary latrine coverage in rural areas, and 91.9 per cent of rural populations have access to safe drinking water.
1980	Countrywide soil-transmitted helminthiasis control programme begins, with a treatment strategy for all primary school children.	Countywide deworming of school children gives momentum for accelerating the promotion of safe sanitation and building and using sanitary latrines.
1982-2006	The helminthiasis control plan is included in the fifth to ninth Five-Year National Health Development Plans (from the 1982–1986 plan to the 2002–2006 plan).	Targets are set in 1982 for reducing the magnitude of intestinal helminth infection to a level that does not constitute a public health hazard.

2.2 From project approaches to national strategies

The Village Health and Sanitation Project laid the foundation for the subsequent Rural Environmental Sanitation Programme and the eventual achievement of near-universal access to safe sanitation in the country today. The project focused on the household construction of sanitary latrines, with the following approaches gradually adopted as national strategies for improved sanitation.

- **Strong political support and cooperation from government agencies -** Two successive prime ministers chaired the national Health and Sanitation Development Conferences in 1962 and 1963. Provincial governments all committed to improve the sanitation situation in their constituency. The approval of human resource recruitment and a budget for the Rural Environmental Sanitation Programme by the National Economic and Social Development Board enabled the Bureau of Budget and the Department of Technical and Economic Cooperation, as well as the Department of Health, to effectively implement the programme.

- **Strong leadership -** Supportive leadership at the national, provincial and community levels helped strengthen the commitment of villagers to behaviour change.

- **Sufficient budget support -** The Rural Environmental Sanitation Programme, one component of the National Health Development Plan, was incorporated into the successive Five-Year National Economic and Social Development Plans, based on the sanitation strategies for sustainability, starting from the first plan (for 1962–1966) until the eighth plan (for 1997–2001). The budget allocations for sanitation in each five-year plan accounted for about one third of each plan's budget (see Appendix I for the budget allocations for sanitation for each plan).

- **Capable front-line workers -** Intensive training was provided to the programme personnel and technical staff of the central and local governments, including village leaders and village health volunteers.

- **Far-reaching education -** Social mobilization and health education in communities by the village health volunteers were carried out, together with health officers and mobile teams.

- **Promotion of water-sealed latrines -** This latrine technology was found to suit the Thai culture and people's habits (and is the only type promoted in Thailand). The gooseneck water-sealed latrine was developed by Sawadi Mahagayi, governor of Sukhothai Province in 1924 and is now widely used in Thailand and other countries (see Appendix II for the technical standards for water-sealed latrine construction).

- **Provision of supplies, equipment and transportation -** The Government supplied adequate latrine pans and slabs and moulds for latrine construction as well as documentation films and slide projectors for health education. Appropriate transportation for programme implementation, follow-up actions and monitoring were adequately provided at all levels.

- **Household assistance -** The Government allocated a demonstration budget as a revolving fund for latrine construction. In the early years, the water-sealed latrines were given free of charge to families through the demonstration budget until it was found that most of the latrines were not used or properly maintained. To encourage use and proper care, Village Committees were encouraged to use the demonstration budget to set up a revolving fund in each village. The fund was initially managed by subdistrict health officers but was then transferred to the Village Committees. The demonstration budget as a revolving fund expedited the process to meet household demand for a latrine and at the same time generated financial resources from communities for sanitation improvement.

- **Systematic monitoring of the qualitative and quantitative progress -** The Government assigned adequate and qualified officers to support all provincial officials in the 75 provinces (excluding the Bangkok municipality) for regular monitoring of the programme's progress. Conferences were organized at the national and provincial levels among sanitarians, physicians and health officials to review the progress and constraints and agree on solutions for improvement.

- **Incentives -** Initiated in 1987, the Golden Ring for 100% Sanitation Province award scheme succeeded in encouraging competition among provinces and helped to accelerate safe sanitation coverage.

- **Conditionalities -** The Ministry of Interior issued letters to all provinces in 1989 requesting the cooperation of all local administrations to advise households to build a sanitary latrine prior to their application for a house number (the house number was necessary to register as a resident in that community). Each provincial electricity authority was given permission to only connect electricity to those households that had a registered house number and was using a sanitary latrine.

- **Research and development (R&D) -** The central and provincial governments provided funds for R&D on strengthening technology and techniques and skills for health education, communication and social mobilization.

2.3 National safe sanitation strategies and framework

The following six strategies were formulated in 1961 to strengthen the sustainability and effective implementation of the national sanitation programme.

1. **Adoption of environmental sanitation as a national policy.**
   - Strong political commitment from all provincial governments provided the needed back-up support.

2. **Creating partnerships and community participation**
   - Multisector collaboration and cooperation between the Ministry of Public Health, the Ministry of Education, the Ministry of Agriculture and the Ministry of Interior was established. The Ministry of Public Health has remained in charge of the Environmental Sanitation Programme.

   - Technology transfer through community participation helped the wider promotion of household construction of sanitary latrines and rainwater collection tanks and jars.

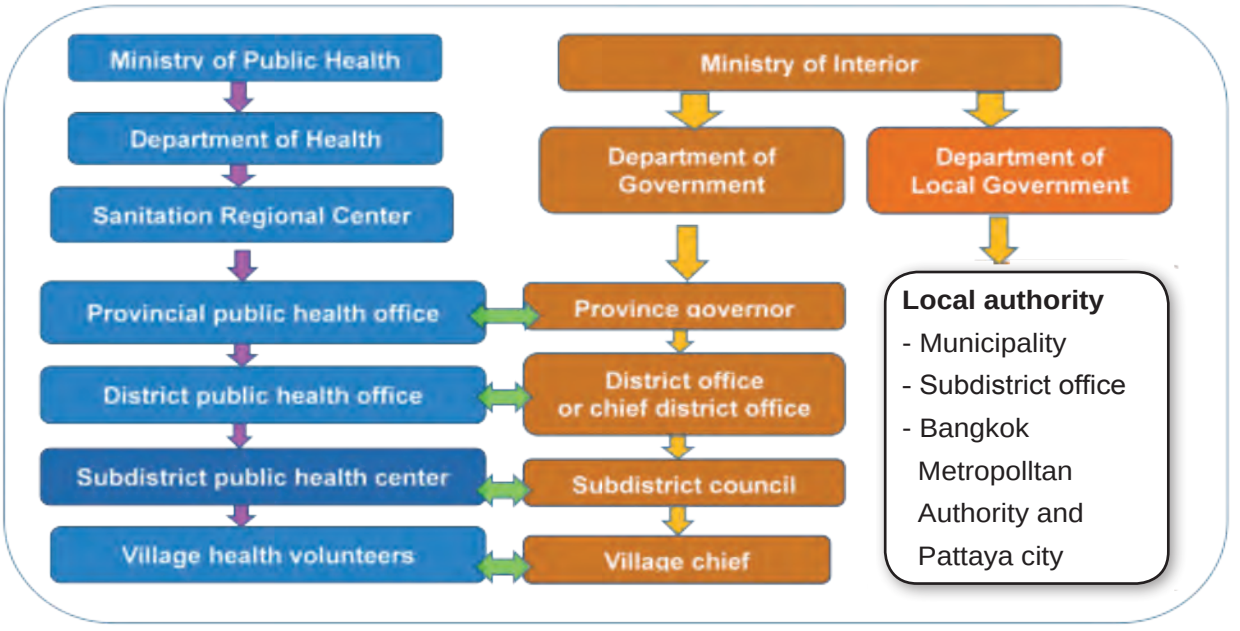
   - Village health volunteers and Village Committees were set up.

   - District and subdistrict health officers and village health volunteers, with help from mobile teams, provided health education in communities.

3. Organization of and coordination for management of the sanitation programme

- As illustrated in Figure 1, the Ministry of Public Health and the Ministry of Interior coordinate the management of the sanitation programme.

Figure 1: Organization of command and coordination for sanitation management



4. Building capacity

- Human resources received training to better manage the sanitation-related activities:
  - o Subdistrict health officers were trained to provide support and advice to communities in setting up a village Health Development Committee, and management of the revolving fund.
  - o Subdistrict council officers were trained to understand the importance of safe sanitation so that they might include sanitation activities in their development plans and allocate a budget for improvements and promoting good practices.
  - o Villagers were trained to be sanitary craftsmen who could help and advise other villagers on the construction of sanitary latrines and rainwater collection containers for households.
  - o Village health volunteers were trained to motivate and support households to build and use sanitary latrines and improve their hygiene practices.

- Committees
  - A community organization was set up as a Health Development Committee in each subdistrict, which was composed of the subdistrict chief, village headmen, abbots and villager representatives. All members were trained to manage their own resources (such as human resources and funds), including the village revolving fund.

- Funds
  - The Government allocated financing for the construction of demonstration sanitary latrines. The budget for demonstration latrines was used to set up the revolving fund to loan money to households for building a sanitary latrine. The Government provided support and advice in the establishment and management of the fund.

5. Investment for sanitation

- The Government allocated a budget for sanitation in each five-year development plan for the promotion of improved village sanitation. The budgets were also used to build up the capacity of the project personnel and to monitor the sanitation activities.

- To encourage household ownership and involvement, Health Development Committees were advised to use the demonstration budget to set up a revolving fund in each village. The fund was first managed by health officers but later transferred to Village Committees.

6. Monitoring and supervision

- Field visits were undertaken by provincial health officers, with technical support to health personnel at all levels for follow-up and monitoring of the sanitation-related activities. Regular consultation meetings were organized to exchange experiences among the officers at the national and provincial levels.

- A supervision system was developed to consistently manage the programme's operation, especially among field officers, members of subdistrict councils and Village Committees.

- Data centres were set up at the provincial and district levels to keep records on sanitation progress. These records were also used for providing appropriate rewards to officers, village leaders and village health volunteers with outstanding performance.

2.4 Legacy of the Village Health and Sanitation Project

The responsibility for implementation of the Village Health and Sanitation Project was transferred in 1966 to the then Sanitation Division of the Department of Health. Renamed the Environmental Sanitation Programme, the project received an annual budget allocation from the Government. In 1996, the Sanitation Division was merged with the Environmental Health Division to form the Environmental Health Bureau.

Since its inception, the sanitation project provided opportunity for building up the capacity of academic institutions. One such institution is the Faculty of Public Health at Mahidol University. Over the years, Mahidol University has educated a large number of public health personnel to manage the country's development needs.

The project also changed the attitudes and perspective of medical institutions and public health officers towards the promotion of sanitary latrines to strengthen environmental sanitation and rural health outcomes.

As previously noted, support to the project from hospital doctors (such as Siriraj Hospital) accelerated the nationwide improvement of rural people's health. The sanitation project energized the Government to intensify health education and community participation through the involvement of regional and provincial health officers, research centres and village health volunteers, which led to its adoption as a primary health care strategy (which is still in use).

2.5 Rural Environmental Sanitation Programme

As part of the National Rural Development Programme, the Rural Environmental Sanitation Programme promotes seven components as a package: water supply, human excreta disposal, solid waste and garbage disposal, food sanitation, household sanitation, vector control and wastewater disposal.

To transfer low-cost technologies to communities and build up the capacity of private producers, government technical personnel and village masons have been trained to construct water-sealed latrines and large cement water jars and tanks for households to collect and store rainwater.

To implement the programme, the central Government and local governments each contribute a certain amount of the budget, with some financial resources generated within the communities and the private sector.

Photo 2 Training villagers to be local sanitary craftsmen to construct sanitary latrines and to make household rainwater collection and storage jars

Photo 3 Collection of rainwater in a rural household

The construction quality of sanitary latrines in rural households has improved over the years, from when the project was initiated in the 1960s to the present time, as Photo 4 illustrates.

Photo 4 Sanitary latrines with thatch superstructure of the 1960s have been converted to more 'modern' concrete brick superstructures

In rural areas these days, most sanitary latrines are located inside the house, typically complemented with ceramic tiles, as Photo 5 illustrates.

Photo 5 Latrines inside rural households

When planning Rural Environmental Sanitation Programme activities, each village was surveyed according to the Government's basic minimum needs criteria. An implementation plan was developed by each village, based on outcomes of the survey. The village plans were then incorporated into each Provincial Rural Development Plan. These plans consisted of (i) demonstration activities, (ii) training of village leaders, village health volunteers and other officials, (iii) demonstration budgets allocated by the central and provincial governments for latrine construction, (iv) intensive health education in village communities and (v) research and development. The strategies adopted by the Department of Health were intended to encourage all village committees to set up a revolving fund with the balance to be raised by villagers.

2.6 Success factors and lessons learned

The following summarizes the success factors and lessons learned in Thailand's more than four decades of efforts to achieve universal access to safe sanitation.

Success factors

- Strong political commitment and the establishment of a coherent national policy on sanitation.

- Clear responsibility assigned to the Ministry of Public Health for the Rural Sanitation Programme, which ensured continuation, focal roles and

responsibilities of officers at all levels, thus avoiding fragmentation of roles, duplication, complications on resource allocation and programme management.

- Effective interministerial coordination and collaboration with strong government leadership, coupled with adequate infrastructure and human resources at all levels.

- An award scheme (the Golden Ring Award for 100% Sanitation Province), which generated considerable momentum for competition between provinces, thus accelerating safe sanitation coverage.

- A revolving fund established in each village to loan money to households for building a sanitary latrine, which shifted the financial investment from the Government to households and resulted in fulfilling the demand for sanitary latrines while generating local employment.

Lessons Learned

- Adequate human resources are needed at all levels to ensure proper supervision and management as well as effective and systemic qualitative and quantitative monitoring of progress on latrine construction for sustainability.

- Technology, skills and know-how should be transferred to all levels within the government structure and to communities. In Thailand's experience, human resources were developed at all levels through trainings to build up the capacities of government functionaries and community leaders on project management, sanitation supervision and monitoring for sustainability.

- Intensive health education and social mobilization need to target all households and communities to promote behaviour change and active community participation.

- The promotion of rural sanitation needs to be integrated into the primary health care system. In Thailand's experience (with its unique health care system), well-trained village health volunteers, under the supervision of the subdistrict

health officers, delivered health and hygiene messages that encouraged active participation in sanitation improvements and behaviour change across communities.

- Area-based rural development emphasis in national development planning helps to intensify interministerial collaboration, involve the private sector and non-government organizations and enable rural communities to identify their priorities for economic and social development through self-help, with government support.

2.7 Accessing safe water

Almost all households in urban and rural areas in Thailand currently have access to safe water, of which 86 per cent is provided as piped water. The remaining 14 per cent use either collected rainwater or groundwater extracted by a hand pump (Ministry of Public Health and Ministry of Natural Resources and Environment, 2012). As of 2009 (latest available data), 97.4 per cent of the rural population had access to safe drinking water and 97.2 per cent had a water supply for domestic (Ministry of Interior, 2009). The majority of rural households and some urban households have been harvesting rainwater for drinking and domestic purposes for decades. Piped water coverage to household taps in rural areas is currently at 80.2 per cent. The Government is working to provide piped water to all rural areas (Ministry of Public Health and Ministry of Natural Resources and Environment, 2012).

As noted, local masons in rural areas were trained on making cement rain jars and tanks for commercial sale. Photo 6 illustrates rainwater harvesting at households in urban and rural areas, while Photo 7 depicts the transporting of cement rainwater jars on the Chao Phraya River.

Photo 6 Rainwater harvesting in jars in urban and rural households

Photo 7 Selling and transporting 2-cubic metre cement rain jars on the Chao Phraya River

The Thai technique for making rainwater cement jars and tanks has been transferred to Viet Nam and Tanzania through a South-South technology exchange (Luong, 2002).

2.8 Human sludge management and treatment

The pour-flush toilet model promoted for use across Thailand for decades is the latrine pit with a leaching bottom constructed under the water-sealed squatting bowl. The excrement was flushed directly into a pit after use. In 1967, the latrine pit with a leaching bottom was built outside the superstructure to facilitate easy removal of the sludge.

In 1977, a two-pit model was built. The first pit had a sealed bottom for storage of the sludge and the second pit had a seepage bottom to receive the overflow effluent from the first pit and allow it to seep into the ground. It thus prolonged the time required for sludge removal (see Appendix II for the technical standards for water-sealed latrine construction).

2.8.1 Sludge management and treatment

The management of human waste in communities is handled by the Local Government Organizations (LGOs), as per the 1992 Public Health Act.

When a household latrine pit and septic tank are full, the owner calls for the suction truck to empty the pit and septic tank at a cost set by a ministerial regulation. The sludge sucked out from the latrine pit and septic tank is already partially digested. When the suction truck is full, the sludge is then carried to a treatment plant to be disposed or is drained into government-designated sludge ponds. However, some sludge truck drivers have been known to discharge the sludge into canals, water bodies and agricultural areas, such as rice fields or other farmland.

In 2009, the Department of Health conducted a situation analysis of the sludge management by LGOs, including metropolitan, city and subdistrict municipal authorities and subdistrict or tambon administrative organizations. The study revealed that 86.5 per cent of LGOs provided human waste suction services for households and office buildings, and 95 per cent of the surveyed LGOs could cover their entire designated areas. However, 53.8 per cent of the LGOs lacked a system for controlling the sludge suction truck workers who did not consistently drain their loads into public sewers or designated land. And 49.6 per cent of the LGOs had no sludge treatment plant to properly dispose of the sludge collected. Of all the treatment plants, only 20.5 per cent actually functioned, with 21.4 per cent not functioning at all. An estimated 17.3 million cubic metres of partially digested sludge, containing disease agents, is discharged into the environment each year.

The Department of Health recognizes the importance of proper sludge treatment and has adopted an ecological sanitation policy.

Many LGOs are interested in building a treatment plant to treat the sludge collected by their suction trucks. But some of them lack adequate financial capacity and technically skilled personnel to operate such a plant. The Department of Health could allocate financial support to those LGOs that are keen to build a sludge treatment plant and provide intensive training for their technical personnel. Study visits could be organized for the technical personnel to learn from the country's effectively functioning sludge treatment plants. For instance, well-run sludge treatment plants generate biogas for power generation and the dried sludge as organic fertilizer for farmers, thus reducing the quantity of chemical fertilizers to be used and helping to increase farm production.

2.8.2 Sludge treatment plants

Of the effectively managed sludge treatment plants, the one in Nonthaburi municipality (Nonthaburi Province) is a particularly good model to highlight (Photo 8).

- The treatment plant area is 38.9 square kilometres for treating sludge from 119,304 households (representing a population of 257,854).
- Capacity of the plant is 40 tonnes per day.
- The sludge treatment process consists of:

    - **Digesters**: There are 31 digesters (at 2.5 metres high, 4 metres in width and 5 metres in length). The digesters were built in two rows and elevated above the ground. The sand-drying beds were built below the digesters. Each digester has its own sand-drying bed. The sludge from a truck is discharged into a digester. When a digester is full, the sludge is kept for about 30 days for full digestion (breaking down the organic materials). When fully digested, the sludge is emptied into the sand drying bed below. The emptied digester will then be reused again. Each sludge digester has an inlet for the truck to discharge the sludge into it and a pipe outlet to vent away the fermented gases (methane and hydrogen sulphite). Once thought to have commercial potential, the quantity of methane gas produced from the digested sludge has been found to be too little to have any economic value. [1]

[1] The production of methane gas from digesters and its possible use has been studied by the Asian Institute of Technology in Bangkok, where researchers concluded it does not generate any economic value

Photo 8 Overview of the sludge treatment plant in Nonthaburi municipality

- **Sand-drying beds:** The fully digested sludge from the digester is discharged into its own sand-drying bed below. The filtered effluent from the drying bed flows to a channel that connects all drying beds and then is discharged into a wastewater pond nearby. The sludge on top of the sand beds is left to dry for about two to four weeks, depending on weather conditions (in the dry season it will take two weeks to dry, while in the rainy season it needs four weeks). The moisture content in the dried sludge should be kept below 10 per cent. The dried sludge is then packed into bags and sold to farmers as organic fertilizer at $90 per tonne (2013 prices).

Photo 9 Sludge in sand-drying beds

- **Wastewater pond:** The filtered effluents from all sand-drying beds are stored in a wastewater pond. Due to the high biochemical oxygen demand (BOD) content (524 ppm) in the filtered effluents, the wastewater in the pond undergoes a facultative and anaerobic process. Thus, the BOD concentration in the pond is gradually reduced to 73.5 ppm, which is still much higher than the World Health Organization's effluent BOD standard of 20 ppm and it cannot be discharged into any water body. Instead, the pond water is pumped out from time to time for watering plants, flowers and fruit trees in the treatment plant compound.

Photo 10 Filtered effluent from the sand-drying beds is discharged into a treatment pond

2.8.3 Green approach adopted by the sludge treatment plant to generate electricity from solar energy

The management of the Nonthaburi treatment plant has installed solar panels on top of the sludge digesters to convert solar energy to electricity (Photo 11). An average of 150 kilowatt (in the dry seasons and rainy seasons) is generated daily. The amount of electricity is more than enough for use within the plant for operations and lighting, and the surplus is sold to the municipal electricity company, generating income for the treatment plant.

Photo 11 Solar panels installed on top of the Nonthaburi sludge digesters

2.9 Health impacts through hookworm eradication and improved sanitation and hygiene

Initiated in1918, a hookworm eradication project promoted use of pit latrines, with support from the Rockefeller Foundation for two years in its initial phase. In April 1920, the Department of Public Protection in the Ministry of Interior transferred the hookworm eradication project to the Siam Red Cross Society. In 1921, the scale of the project was expanded to cover 44 provinces. After more than three years under the Siam Red Cross Society, the project transferred back to the Department of Public Protection in 1923.

In 1928 and to reinforce the hookworm eradication project, the director-general of the Department of Public Protection issued letters to every provincial Public Protection Office with instruction to encourage households to build and use pit latrines.

The Government initiated a soil-transmitted helminthiasis control programme in 1980 that targeted all children in primary schools. Since 1982, the helminthiasis control programme was included in the fifth to ninth Five-Year National Health Development Plans (from the 1982–1986 plan until the 2002–2006 plan), with targets for reducing the magnitude of intestinal helminth infections to a level that did not constitute a public health hazard.

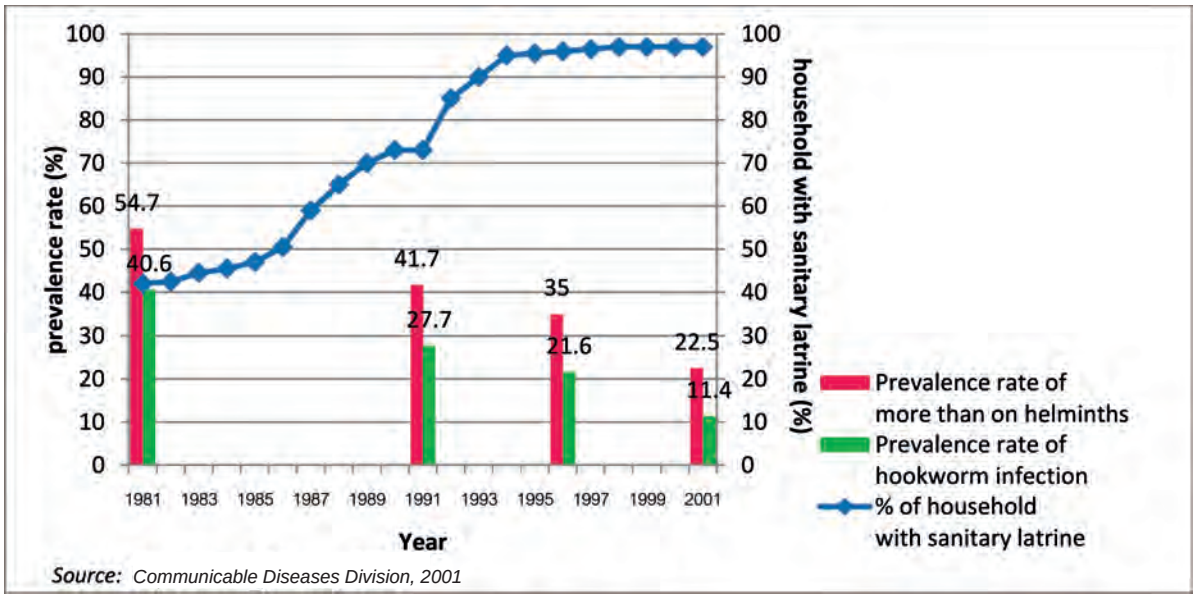
The control programme's activities included stool examination, deworming of school children and improvement of environmental sanitation through the construction and use of sanitary latrines and health education among school children and the public on behaviour change.

The programme was implemented by provincial health facilities, with technical and some logistical support from the Department of Communicable Disease Control in the Ministry of Public Health. The management system for surveillance, prevention and control was strengthened, including networking and intersector coordination as crucial elements.

A systematic countrywide survey conducted over a four-decade period revealed a declining trend of intestinal parasite infections, from 62.9 per cent in 1957 to 41.7 per cent in 1991 to 35 per cent in 1996. By region, hookworm in southern Thailand was the most prevalent helminth, compared with the other regions. Hookworm infection in southern Thailand decreased from 75.9 per cent in 1981 to 49.2 per cent in 1991 and then to 34.1 per cent in 1996 (Rugpao, 1999).

Figure 2 illustrates the decrease of intestinal helminth infections and the increase of sanitary latrines from 1981 to 2001.

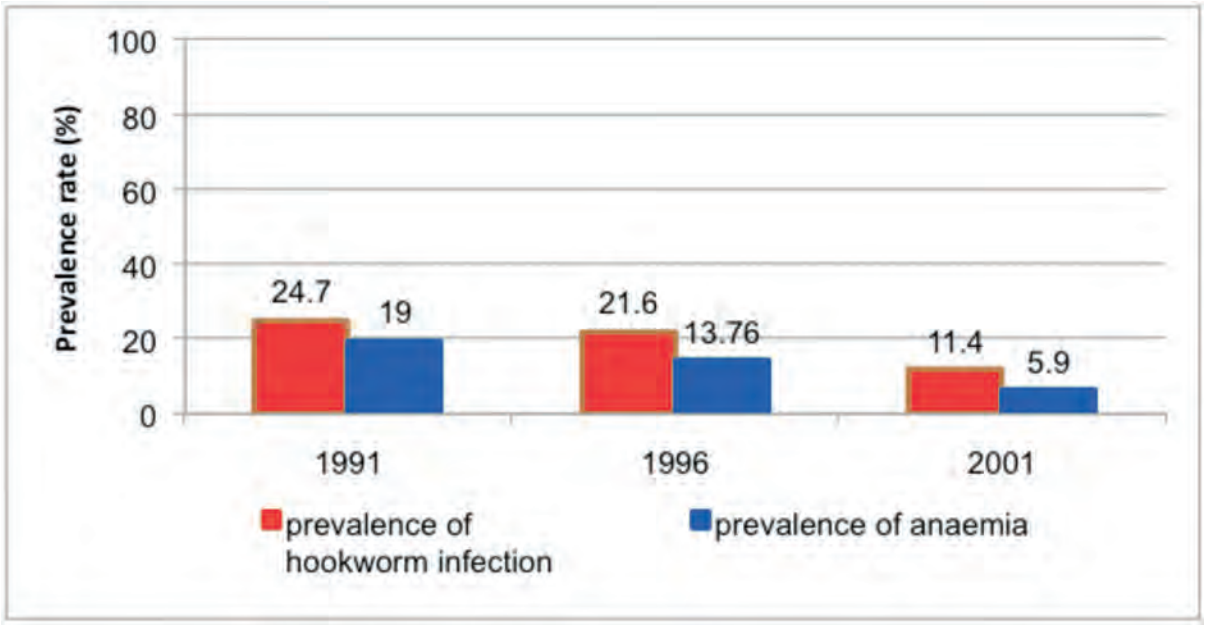
Figure 2: Reduction of intestinal parasites infection and the increase of sanitary latrine coverage



Source: *Communicable Diseases Division, 2001*

The health impact from hookworm eradication is demonstrated by the reduction of anaemia in pupils aged 6–14 years in primary schools throughout the country. As Figure 3 illustrates, anaemia prevalence decreased from 19 per cent in 1991 to 13.8 per cent in 1996 and then to 5.9 per cent in 2001, while hookworm infection, which was the major cause of anaemia, dropped from 24.7 per cent in 1991 to 21.6 per cent in 1996 before reaching 11.4 per cent in 2001.

Figure 3: Reduction in the prevalence of anaemia and hookworm infections among students aged 6–14 years



Source: Communicable Diseases Division, 2001.

The hookworm and intestinal parasitic disease eradication project laid the foundation of systematic public health operations and encouraged the construction and use of sanitary latrines as well as improved hygiene and behaviour change among communities nationwide.

2.10 From rural environmental sanitation to clean environments for healthy living

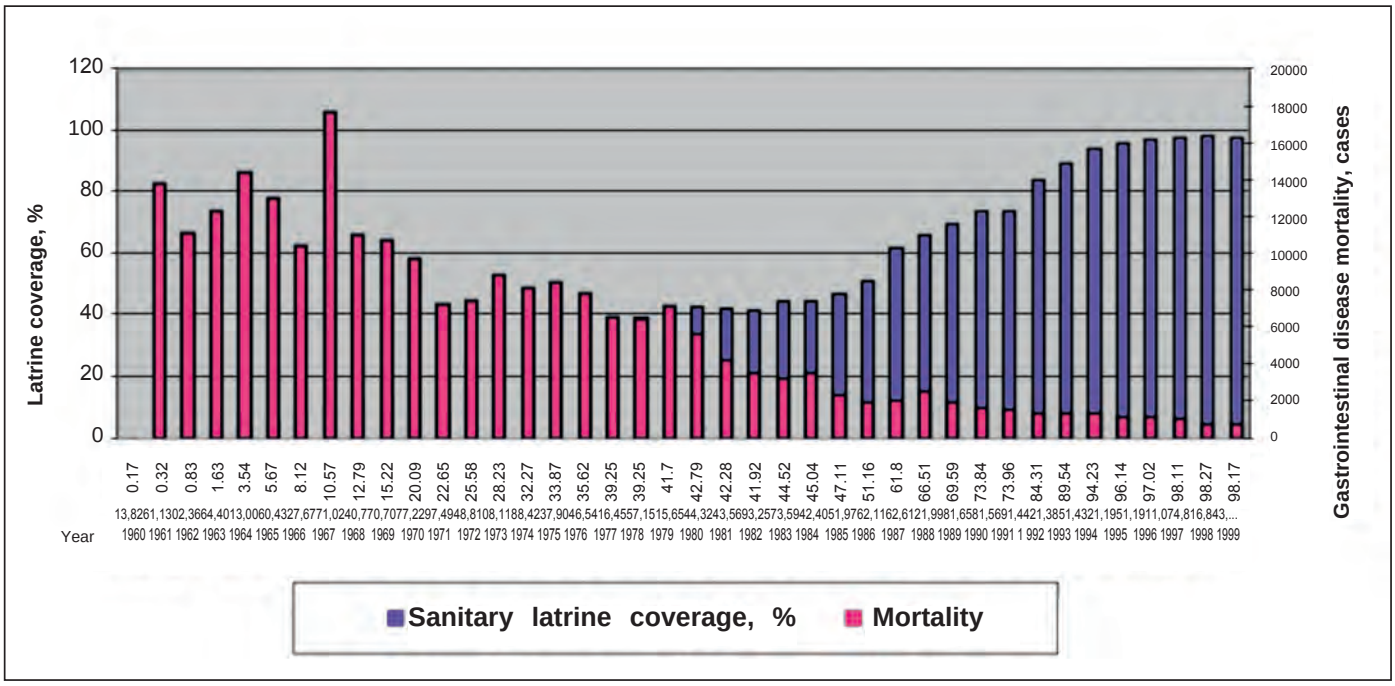
Thailand has already achieved near-universal access to safe drinking water and sanitation - with pockets of remote villages in the highlands and some households near river banks still unreached and where government support for building sanitary latrines continues.

The Government is working to improve the quality of all piped water, including in all rural areas, so that the country's piped supply is safe to drink directly from a tap. And as previously noted, the Government is also now focusing more heavily on a cleaner or more hygienic environment in general. The Clean Environment Programme, which started in 1996, promotes healthy living, healthy schools and healthy cities, covering food hygiene, healthy workplaces and cleanliness in household and village environments. The programme also targets clean and healthy environments as necessary to protect (or increase) both domestic and international tourism, with the aim of stimulating local economic growth without exploitation of the local environment (Ministry of Public Health, 1997).

2.11 Good health for all

Thailand's substantial endeavours to achieve universal access to safe sanitation, coupled with the provision of a safe water supply, has led to remarkable health benefits and a substantial reduction in mortality due to gastrointestinal diseases. As illustrated in Figure 4, a sixteen-fold reduction in gastrointestinal diseases mortality was achieved from 1960 to 1999, while the sanitary latrine coverage increased from 0.2 per cent to 98.2 per cent over the same period (Ministry of Public Health, 1999).

Figure 4: Latrine coverage and gastrointestinal disease mortality, 1960–1999



Source: Department of Health, 1999.

3. Beyond universal access to safe sanitation and sustainable sanitation for all

In its focus on clean and healthy environments generally, the Government has initiated four projects to strengthen community and private sector action to sustain the sanitation improvements and reach new levels of good hygiene practices.

Public toilet improvement - The Department of Health launched a nationwide campaign, in collaboration with the private sector and local government agencies in 2004, to promote access to public toilets that meet the Government's HAS standards.

School toilet improvement - The Department of Health collaborated in 2007 with the Office of the Basic Education Commission (OBEC) in the Ministry of Education to improve all existing school toilet facilities, bringing them in accordance with the HAS standards. Improvement of school toilets was initiated in Chumphon Province as a demonstration model and gradually extended to all provinces.

Food sanitation and hygiene promotion - Quality of life in communities related to water supply and sanitation is defined by three factors: household access to sufficient safe drinking water; use of sanitary latrines; and good public food sanitation and hygiene practices. To promote improved and healthy practices in the public setting, the Government initiated Clean Food Good Taste and Healthy Market projects.

Sustainable and Ecological Sanitation Programme - To cope with environmental pollution and climate change issues (and thus work towards the reduction of greenhouse gases), the Department of Health initiated in 2009 the Sustainable and Ecological Sanitation Programme to promote the recovery of most nutrients from faeces, urine and grey water in a way that benefits agriculture production and minimizes the pollution of the water supply. These activities aim to promote the sparing use of water by reusing it to the greatest possible extent, particularly for irrigation purposes.

Thailand's policy on decreasing its greenhouse gas emissions includes the following directions:

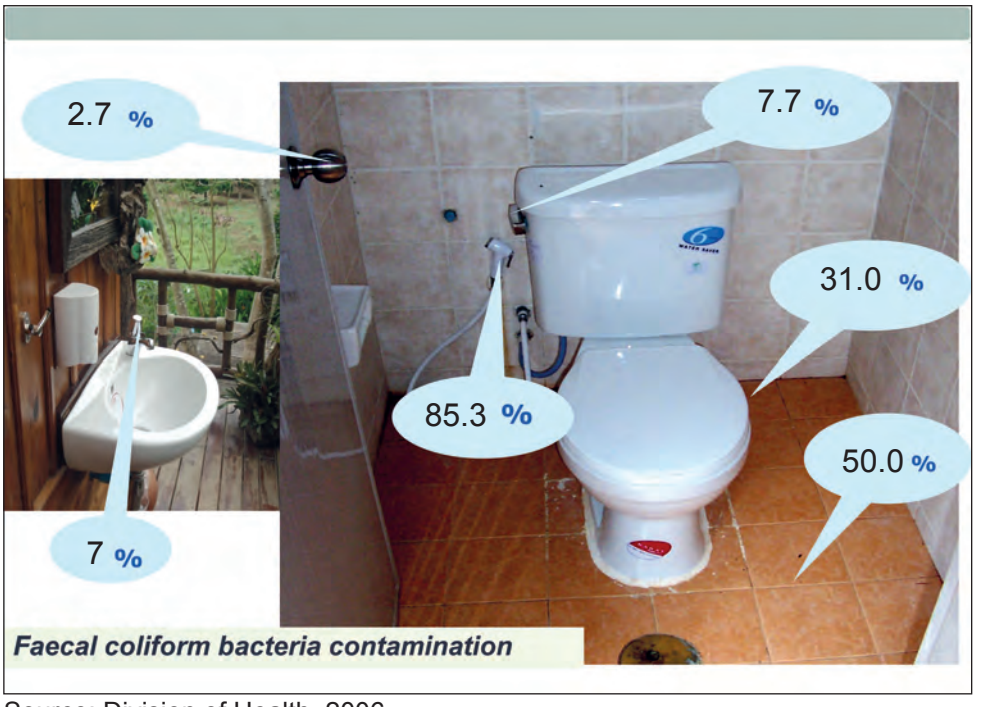
- increase effective energy consumption in industries, transportation and utilization of alternative energy;
- promote the reuse and recycling of solid organic waste and the effective management of domestic and industry wastewater; and
- promote the use of organic fertilizer to reduce the use of chemical fertilizers in agriculture and promote efficient water use, storage and distribution.

GREEN and CLEAN Hospital Project - In 2010, the Department of Health launched a GREEN and CLEAN Hospital Project to contribute towards the reduction of greenhouse gases through sustainable and ecological sanitation practices. The project promotes collaborative efforts among provincial health care centres, institutes and hospitals to increase the awareness of health personnel of the health impacts from climate change and how sustainable sanitation practices could help mitigate those impacts. The collaboration of health facilities was intended as a role model for other agencies, including local authorities and communities.

3.1 Public toilet improvement

A survey in 2004 by the Department of Health on public toilets found that most public toilet facilities were unhygienic, with foul smells and wet floors. Accessible toilets for people with disabilities, elderly persons and pregnant women were lacking. A Department of Health study in Bangkok found faecal coliform bacteria contamination in many public toilets, especially on the hand-held rinsing spray, the floors and toilet seats, as Figure 5 illustrates. The study also found that women's toilets were more contaminated than men's toilets.

Figure 5: Faecal coliform bacteria contamination in public toilets in Bangkok



Source: Division of Health, 2006.

Table 2 Location of faecal coliform bacteria contamination in public toilets in Bangkok

Fixture or areas in the public toilets	Faecal coliform bacteria contamination, %
• Hand-held rinsing spay	85.3
• Toilet room floor	50.0
• Toilet seats	31.0
• Faucets at the flush valves	7.7
• Faucets at the wash basin	7.0
• Door bolt or knob	2.7

Source: Division of Health, 2006.

In 2004, the Department of Health issued a regulation requiring all public toilets comply with the Healthiness, Accessibility and Safety (HAS) standards (see Appendix III for details of the public toilet standards).

Healthiness: Clean and hygienic condition of the toilet rooms without foul smell. Adequate facilities, including water for cleaning, soap for hand washing and toilet paper, are to be provided, and the septic tank should be in good condition.

Accessibility: Adequate toilet rooms are to be available at all times for all users, including people with disabilities, elderly persons and pregnant women.

Safety: Separate toilet rooms for males and females should be provided, each with adequate lighting and ventilation. The toilet facility must not be located in isolated areas.

Figure 6: HAS standards certificate for posting outside public toilets

The objectives of the public toilets improvement project are:

- improve public toilets as per the HAS standards;
- promote good hygiene behaviours in communities; and
- encourage local authorities to dispose of human excreta in a safe and sustainable manner.

The numbers of domestic and international tourists in Thailand have been increasing tremendously over the years. Given this phenomenon, clean public toilets are considered a necessity for the protection of public health standards. The Department of Health has launched a campaign to promote the HAS standards for public toilets, with the following strategies:

- intensive social mobilization to enhance public communication;
- engage all stakeholders to participate in public toilet improvement and networking;
- initiate and enhance public-private partnership cooperation;

- enforce related laws and legislation; and
- manage and share knowledge and lessons learned.

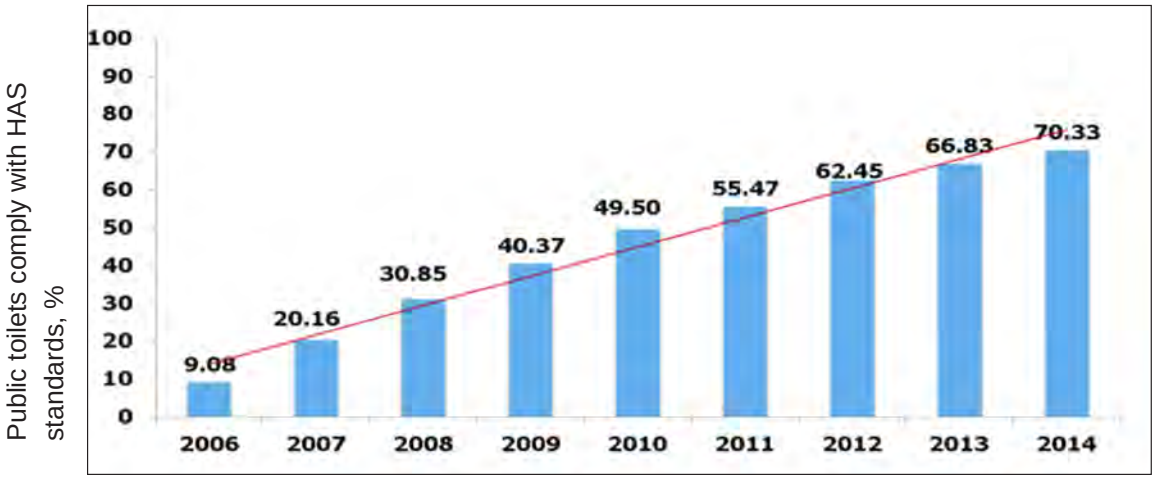
The Government is recommended to have public toilets built or improved in 12 locations:

- gas and petrol stations
- restaurants
- fresh food markets
- schools, colleges and universities
- hospitals
- government offices
- mass transportation terminals
- public parks
- religious places
- roadside toilets
- supermarkets and department stores
- scenic spots and tourist destinations.

The Government has targeted achieving 90 per cent of all public toilets complying with the HAS standards by 2016. As shown in Figure 7, 70.3 per cent of all public toilets in the country currently comply with the HAS standards (Department of Health, 2014).

Public toilets are inspected every two years by the Department of Health. The toilet facilities that comply with the HAS standards are awarded the HAS certificate. If a previously awarded toilet facility is found not up to the standards, the certificate is revoked. Those that failed to comply with the HAS standards receive no award.

Figure 7: Percentage of public toilets that comply with the HAS standards in 12 types of public locations, 2006–2014



Source: Bureau of Environmental Health, 2014.

Economic gains with public toilet improvements

The public toilet improvement project includes an annual competition that has been running for seven years and recognizes business owners for maintaining hygienic facilities. The scheme publicizes the recognition as a public relations incentive. Recognized business owners are awarded the HAS certificate to be displayed in front of the public toilet facility. Winners have used the award to help promote their business, such as Nai Dam Garden, recipient of the Best Public Toilet of the Year award in 2006 in the tourist site category. According to its proprietor, the award became a selling point that helped increase income by 50 per cent. [2]

To forge public-private and public-public partnership cooperation, memoranda of understanding have been signed by the Department of Health and seven large market-share petrol station companies in which they agreed to improve their public toilet facilities, in line with the HAS standards.PTT Public Company Ltd [3] has the largest market share of petrol stations in Thailand and has made it a policy to use 'clean toilets' as a selling point to attract more customers. The company reported that its Best Public Toilet of the Year award in 2005 in the petrol station category increased earnings by 20 per cent. [4]

Photos 12–25 highlight various public toilet facilities that have been awarded the HAS certificate.

Photo 12 A public toilet facility in a petrol station awarded the HAS standards certificate, located near shops selling foods and household items

[2] Personal communication with Nai Dam Garden owner on economic gains with public toilet improvement, 2007.

[3] PTT Public Company Ltd, Thailand engages in gas and petroleum businesses and was formerly known as Petroleum Authority of Thailand.

[4] Personal communication with PTT officer on economic gains in petrol stations with public toilets improvement, 2006.

Photo 13 Male public toilets in a petrol station awarded the HAS certificate

Photo 14 Female public toilets in a petrol station awarded the HAS certificate

Photo 15 Inside the facility pictured in Photo 14 in which one row of toilet is the squatting type and the other row is the sitting type (the male and female facilities are the same)

Photo 16 A petrol station's squatting and sitting types of toilets

Photo 17 A petrol station's HAS standard-public toilet facilities for people with disabilities, elderly persons and pregnant women

Photo 18 Inside a petrol station's HAS-certified public toilet facilities for people with disabilities, elderly persons and pregnant women, as shown in previous photo

Photo 19 Public toilets at a petrol station that comply with the HAS standards

Photo 20 A restaurant with the HAS standards certificate for its toilet facilities that accommodate male and female patrons, people with disabilities, elderly persons and pregnant women

Photo 21 HAS-certified male toilet for outpatients in a subdistrict health promoting hospital (the female toilets have the same design)

Photo 22 HAS standard-toilet for people with disabilities, elderly persons and pregnant outpatients in a subdistrict health promoting hospital

Photo 23 Rehabilitated toilets that comply with the HAS standards for outpatient and inpatient facilities in Thapsakae Community Hospital, Prachaubkirikan Province and make good use of natural light for reducing energy consumption

Photo 24 Rehabilitated toilet facility for outpatients with disabilities in Thapsakae Community Hospital, Prachaubkirikan Province

Photo 25 The toilet facilities in Thapsakae Community Hospital were awarded Best Public Toilet in Prachaubkirikan Province from 2006 to 2010

3.2 School toilet improvement

Encouraged by the achievements of the public toilet improvement project, policy-makers in the Ministry of Education agreed to work with the Department of Health to improve school toilet facilities. The Department began with a survey that found that students actually prioritize having clean toilet facilities. This finding was consistent with a 2006 OBEC survey that indicated students' priorities in terms of needs were computers and clean school toilets. Given the consistent information, the Department of Health met with OBEC policy-makers in 2007 to discuss their commitment to improving all school facilities in accordance with the HAS standards. In early 2008, OBEC allocated a budget for renovating the toilets in all primary schools under its responsibility in Chumphorn Province. As previously noted, the project began in Chumphorn Province as a demonstration model and gradually extended to all 75 provinces.

Schools in Chumphon Province took up the government request to improve their toilet facilities. The primary school in Baan Bangjag village, in Pathio District, not only improved its toilet facilities but went further and launched campaigns on Healthy Environment, Safe Food and good oral hygiene for healthy teeth. In 2011, Baan Bangjag Primary School won Best School Toilet of the Year.

To follow through on renovations and launch the campaigns, the Baan Bangjag Primary School administrator supplemented the funding from the Ministry of Education with additional assistance from Chum Kho municipality and community contributions.

Photo 26 Baan Bangjag Primary School latrines before renovation

Photo 27 After renovation, Baan Bangjag Primary School toilets comply with the HAS standards

Photo 28 Awarding Baan Bangjag Primary School the Best School Toilet of the Year in 2011

3.2.1 Clean school toilet activities in Baan Bangjag Primary School

In addition to its toilet renovations, the primary school in Baan Bangjag village, with assistance from the Pathio District Department of Education, organized student contribution in maintaining the healthy standards. School toilets are cleaned every day by students, with classes taking turns. Selected student leaders in each class mobilize their classmates for cleaning and maintenance tasks. As well, teachers and students have planted a school garden with trees, flowers and herbs donated from the community.

Photo 29 Students in Baan Bangjag Primary School help to grow herbs, trees and flowers in their new school garden

3.2.2 Baan Bangjag Primary School network expansion

Baan Bangjag Primary School established a Loving Toilet Club, through which students spread information on good hygiene practices and correct use and maintenance of toilets to their parents and other community members.

The school also set up a Learning Centre for Clean Toilets and Environment. Other schools and community members who are interested are welcome to the centre to learn and gain experiences from the teachers and students about what the Baan Bangjag Primary School has achieved by improving its toilet facilities and growing a school garden. The school has expanded its Clean Toilets Network to other schools, temples, hospitals, health centres and public toilets to promote clean toilets facilities and practise good hygiene habits.

Photo 30 Map of the Baan Bangjag Primary School's Clean Toilet Network within Chumphorn Province

Photo 31 Activities of the Clean Toilet Network in a temple supervised by a senior monk

3.2.3 Achievement of Chumphorn Province on school toilet improvement

Based on the assessment and supervisory visits by Department of Health officials, all OBEC school toilets in Chumphorn Province were found in compliance with the HAS standards with their renovations. Such an achievement was presented for other provinces to learn from through study visits. The Department of Health helped OBEC request 700 million baht from the parliament's Budget Scrutiny Commission in 2009 for the improvement of all public school toilets nationwide.

3.2.4 School toilet improvement in Nong Chaeng Noi Primary School, Nakhon Ratchasrima Province

Following the intensive promotion of improved school toilets in Chumphorn Province, schools in other provinces initiated actions to improve their facilities. Nong Chaeng Noi Primary School, with120 students, was particularly inspired because the school's toilets had been damaged by flood waters in 2013. A new location was chosen to build the improved school latrines for boys, girls and teachers. Money and materials were donated by community members. The new toilet facilities not only followed the HAS standards but adopted an environment-friendly design that enabled the reusing of the hand-washing grey water for watering plants. The students take turns cleaning the toilets daily.

Photo 32 The new school toilets for boys, girls and teachers in Nong Chaeng Noi Primary School, Nakhon Ratchasrima Province

Photo 33 The new school toilets in Nong Chaeng Noi Primary School (front view)

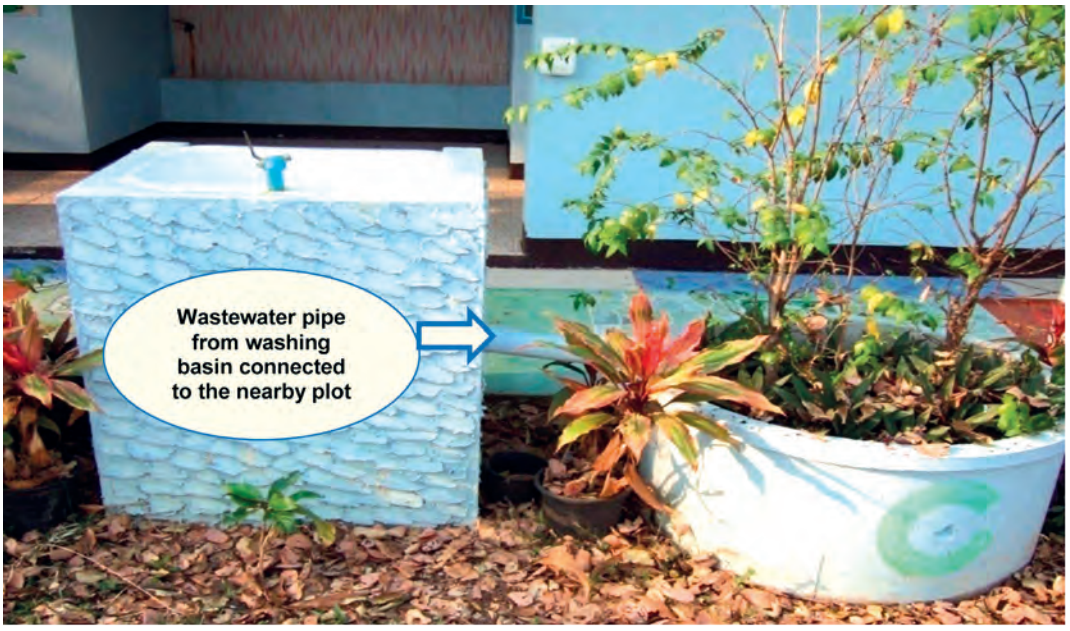


Photo 34 A hand washing basin in front of school toilets for students after using the toilet; wastewater from the basin is connected to a nearby plant pot, thus making use of the waste water to water the plants and prevent the wastewater flowing everywhere on the ground

3.3 Food sanitation and hygiene promotion

In 1972, the promotion of proper food sanitation in public establishments became a formal project, with an allocated budget by the fourth Five-Year National Social and Economic Development Plan (1977–1981). In 1979, the newly promulgated Food Act required quality standards and regulation of food production and food establishments. The quality standards specify proportions of ingredients by category, production methods, tools and equipment used and the storage process to prevent food contamination.

The Division of Food Sanitation was established in the Department of Health in 1990 to monitor compliance with the regulations. A set of indicators for proper food sanitation and hygiene was established in 1992, with an initial target of 85 per cent food production businesses and food establishments countrywide complying with the required standards by 2015 (with 100 per cent compliance by 2021).

The Clean Food Good Taste Project was initiated in 1999 to enforce compliance with the standards for the physical and biological conditions of food production (see Appendix IV for details of the Clean Food Good Taste standards). The project targeted ready-to-eat food sold in restaurants and food stalls:

- Physical conditions cover cleanliness of production and food establishment premises, food, utensils, pests and food handlers.
- Bacteriological conditions deal with testing for coliform bacteria contamination in food, utensils and cooks' hands. The criteria require that 90 per cent of the samples tested must be negative.

The Healthy Market Project was launched in 2002 to improve food sanitation in fresh food markets, in line with the national policy of 'Amazing Thailand' at that time. The standards for Healthy Market certification include:

- environmental sanitation - safe market structure and facilities;
- food safety - no chemical contaminants, such as borax, salicylic acid, formalin, and sodium hydrosulphite, are to be detected; and
- consumer protection and satisfaction - regular testing for chemical contaminants to be carried out.

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Food sanitation and hygiene promotion was boosted by the WHO-sponsored Campaign for Clean Food Shops in1982 and the Improvement of Rural Food Sanitation Project that UNICEF supported. Food sanitation and hygiene promotion were included in the fifth Five-Year National Social and Economic Development Plan (1982–1986).

According to epidemiological data, the morbidity rate in Thailand due to acute diarrhoea is high and associated with food contaminated with microorganisms (Department of Health, 2016b), particularly in Thailand's north eastern region. However, trends for other gastrointestinal diseases, such as dysentery, enteric fevers and helminths, are decreasing.

In a 2011 Department of Health survey (DOH, 2016), food contamination was found in 10.5 per cent of the surveyed food markets, while 89.5 per cent of the markets followed the government standards (see Appendix V for details of the Healthy Market standards).

Clean Food Good Taste Project

Non-hygienic practices during the production and sale of cooked foodstuffs increase the risk of contamination with microorganisms, helminth larva, heavy metals and antibiotics. Such contaminations are incurred during cooking, distribution, transportation and at the point of sale. To counter this potential public health hazard, the Clean Food Good Taste Project promotes food sanitation and good hygiene in restaurants, cafeterias and roadside food stalls.

The project targets 100 per cent of ready-to-eat food service places (restaurants, cafeterias and street food stalls) in the country comply with the government standards by 2021.

In 2015, the Ministry of Public Health established a system to monitor the cooked food sold in schools, roadside stalls, cafeterias and restaurants to ensure it meets the Clean Food Good Taste standards.

The Department of Health's Research Laboratory developed a simplified microbiological test kit in 1985 to test the contamination of drinking water, ready-to-eat food, food utensils and food handlers' hands. These test kits are used by district and subdistrict health officers (once they have been properly trained). The kits test for:

- coliform bacteria contamination in drinking water (DOH 11 Medium);
- faecal contamination of Salmonella in drinking water (DOH 12 Medium);

- coliform bacteria contamination in food, utensils and food handlers' hands (DOH 13 Medium);
- Staphylococcus aureus contamination in food, utensils and food handlers' hands (DOH 14 Medium); and
- Vibrio species contamination in food, water and toilets (DOH 15-V Medium).

Figure 8: Microbiological field test kits developed by the Department of Health's Research Laboratory

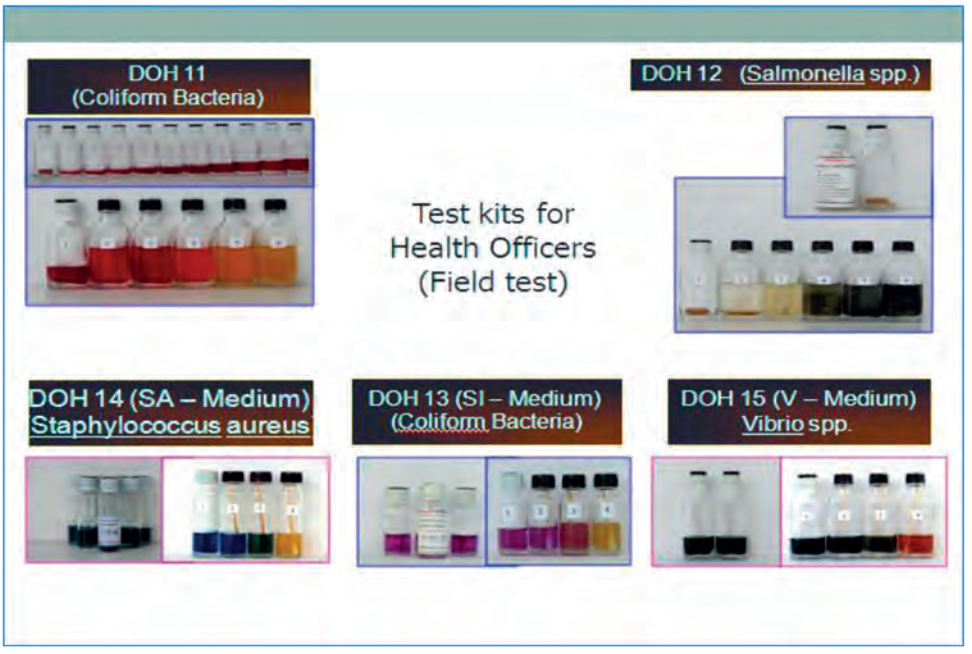


Figure 9: Clean Food Good Taste certificate

The initial progress of the Clean Food Good Taste Project has been slow. In 1999, a Department of Health survey of 38,964 food shops found that only 29.4 per cent complied with the health standards, and only 18 per cent of institutional cafeterias complied with the standards.

Through intensive promotion of the Clean Food Good Taste standards and their impact on the domestic and international tourism industry, more restaurants and street food stalls have improved their food sanitation and hygiene over the years. A 2014 survey by the Department of Health found that about 86 per cent of surveyed restaurants and street food stalls were complying with the standards. Each was awarded the Clean Food Good Taste certificate.

Table 3: Restaurants and street food stalls awarded the Clean Food Good Taste certificate, 2014

Food Services	Total shops surveyed	Number receiving certification	%
Restaurants	43,031	37,361	86.8
Street Food stalls	87,797	75,508	86.0

Source: Department of Health, 2014

Photo 35 Food court stalls awarded the Clean Food Good Taste certificate

Photo 36 A restaurant in southern Thailand awarded Clean Food Good Taste certificate

Healthy Market Project

The Ministry of Public Health is mandated to protect consumers from harmful chemical contamination of fruits and vegetables. The Department of Medical Sciences in the Ministry of Public Health has developed an easy-to-use test kit to check for chemicals and pesticides on fruits and vegetables. In a 2015 Ministry of Public Health test of 60,000 fruits and vegetables, up to 9 per cent was found unsafe to eat.

The Food and Drug Administration is required to update its safety limits of pesticide residue on fruits and vegetables, in accordance with the actual use of chemicals and pesticides in farms.

The Healthy Market Project aims to improve and upgrade the fresh food markets' sanitation conditions, similar to standards for supermarkets (see Appendix V for details on the Healthy Market standards).

The Healthy Market Project works to help fresh food markets improve their conditions and practices and to thus comply with the government standards. Markets found in compliance are awarded the Healthy Market certificate and a good market certificate of 3 stars or 5 stars, depending on the degree of their compliance with the standards.

Figure 10: Healthy Market certificate

Photo 37 Healthy markets in Thailand

3.4 Sustainable and ecological sanitation Programme

Introduced in 2009, the Sustainable and Ecological Sanitation Programme addresses environmental pollution issues, with the aim of contributing towards the country's reduction of greenhouse gases. The programme promotes the reuse of waste and human excreta after proper treatment as a viable and useful resource. The recovery of most nutrients from faeces, urine and grey water can benefit agriculture and help to minimize water pollution. The reuse and recycle nature of the programme was established to follow the sufficiency economy philosophy developed by the King of Thailand, His Majesty Bhumibol Adulyade. The GREEN and CLEAN Hospital Project evolved as a component of the programme, focusing on the reuse of waste from hospitals and health care centres. For the wider promotion of sustainable and ecological sanitation, the Department of Health needs to cooperate and collaborate with other ministries, such as the Ministry of Agriculture and Cooperatives, the Ministry of Natural Resources and Environment, the Ministry of Interior and the Ministry of Industry, to formulate appropriate projects.

3.5 GREEN and CLEAN hospital project

The Department of Health launched the Green and Clean Hospital Project in 2010 to contribute towards Thailand's commitment to reduce its greenhouse gas emissions, by focusing on hospitals through the promotion of sustainable and ecological sanitation. The project promotes collaborative efforts among provincial healthcare centres, institutes and hospitals. The project includes awareness training for health personnel on the health impacts of climate change and the reduction of greenhouse gas emissions through sustainable and ecological sanitation management. More than 4,000 hospitals in Thailand have taken on the GREEN and CLEAN Hospital Project.

Project objectives

The GREEN and CLEAN Hospital Project works to:

- promote the status of healthcare facilities under the Ministry of Public Health to implement the GREEN activities with the CLEAN strategies;
- promote good practice models of GREEN and CLEAN Hospitals to serve as role models for others; and
- raise the awareness of health personnel on reducing greenhouse gas emissions through sustainable safe sanitation and on the health impacts of climate change.

Project activities and strategies

GREEN is a group of activities covering garbage, restrooms, energy, the environment and nutrition.

G – Garbage or solid waste management and disposal. Many types of waste produced from hospital activities, including infectious waste, must be handled on an environmentally safe basis. For solid waste, the 3Rs principle is implemented for 'reuse, reduction and recycling', while the infectious waste is managed and disposed in strict accordance with the Ministry of Public Health's Regulation on Infectious Waste Management.

R – Restroom improvement, especially public toilets in hospitals. Hospitals should improve their toilet facilities in compliance with the HAS standards. Hospitals also need to raise public awareness of the importance of saving water, using toilet paper and reducing the unnecessary use of chemicals for toilet cleaning.

E – Energy saving. The participation of everyone in the hospital is needed to reduce energy consumption and create alternative and/or renewable energy, such as biogas and solar cell power.

E – Environmental improvements and healthy workplaces. Hospitals should promote a clean and tidy environment among staff members by applying the **5Ss** (**sort** - clearing up, **stabilize** - organizing, **shine** - cleaning, **standardized** - standardizing, and **sustain** - training and discipline). Environmental improvement covers reducing energy consumption, using natural light and planting more trees in the hospital compound.

N – Nutrition promotion and food safety. The use of organic food for patients and the purchase of safe and organic products and vegetables from neighbouring communities are encouraged. Campaigning for green markets in the area of hospitals creates public awareness on the consumption of organic foods, thus reducing the use of chemical fertilizers and lowering the cost for food production and transportation.

CLEAN are the project strategies, comprising:

- **C -** Communication for creating good understanding and awareness.
- **L -** Leadership for starting a prototype project and solving the constraints and problems encountered.
- **E -** Effectiveness for enhancing the achievement of targets.
- **A -** Activities for creating and strengthening cooperation.
- **N -** Networking for all hospitals to work together and to exchange experiences to learn among themselves.

GREEN activities in hospitals

Through the application of the CLEAN strategies, GREEN activities were promoted, as Photos 38–43 illustrate.

Photo 38 Garbage and solid waste management using the 3R principles of reuse, reduce and recycle

Photo 39 Organic and food waste from a hospital are collected and composted into organic fertilizer to be used for producing biogas and liquid organic fertilizer

Photo 40 Composting organic hospital waste for fertilizer and using the composted organic waste to grow worms

Photo 41 Reduction of energy consumption and promotion of alternative energy in a hopital

Photo 42 Nutrition promotion focusing on the use of organic fertilizer produced by a hospital for food safety; the use of organic foods for patients produced from neighbouring communities helps reduce the use of chemical fertilizers and saves energy needed for food transportation

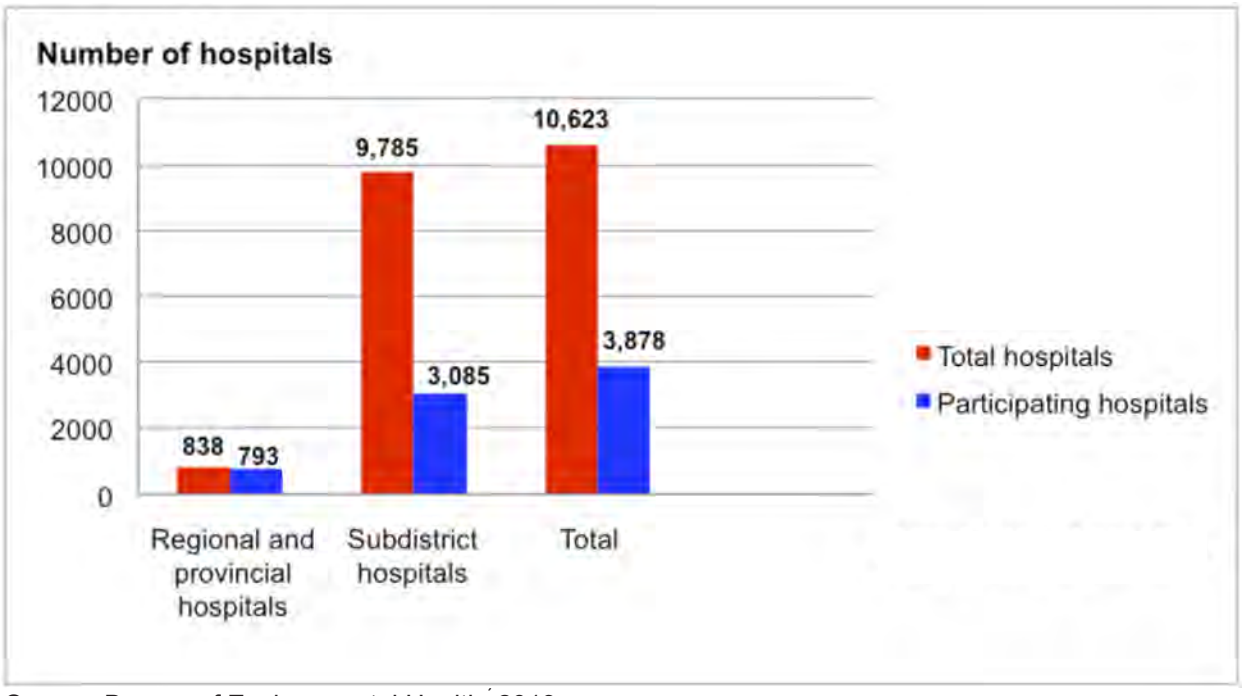
Photo 43. Environmental improvements and healthy workplace promotion in hospitals

Figure 11: GREEN and CLEAN Hospital certificate

Project Achievements

- The guidelines and technical documents on Green and Clean Hospital Project have been developed and disseminated to participating hospitals.
- The training courses have been conducted for building up the capacity of the responsible personnel at regional and provincial levels as well as other participating hospitals.
- The Carbon Footprint Calculating Programme was developed and introduced to the participating hospitals to be used as the tool for evaluating the effectiveness of the activities.
- An annual seminar was organized to promote the collaboration among GREEN and CLEAN Hospitals, to exchange experiences and knowledge and to reward the best practice models.
- Nearly 4,000 hospitals throughout Thailand have been implementing the GREEN and CLEAN Hospital Project. Figure 12 depicts the progress on the implementation of the GREEN and CLEAN Hospitals Project in regional, provincial and subdistrict hospitals.
- Several good models of GREEN and CLEAN Hospitals in 49 provinces in the country are ready to share their experiences and success factors for achieving the GREEN and CLEAN Hospitals.

Figure 12: Progress through the GREEN and CLEAN Hospital Project in regional, provincial and subdistrict hospitals, 2013



Source: Bureau of Environmental Health, 2013.

Lessons learned

Several lessons have emerged from the years of experience with the GREEN and CLEAN Hospital Project:

- The healthcare sector is well positioned to lead by example.
- The approaches of the GREEN and CLEAN Hospital Project should be strongly linked with sustainable and ecological sanitation and climate change issues.
- The role of the health sector in sustainable and ecological sanitation management through the GREEN and CLEAN Hospital Project can contribute to the long-term goals associated with greenhouse gas emission reductions.
- The knowledge and capacity of health personnel on the health impacts of climate change need building up continuously.
- Health personnel in the participating hospitals need to be encouraged to fully participate in the GREEN activities in their routine work.
- The GREEN activities and CLEAN strategies should be applied and promoted in collaboration with other sectors.

Further actions to enhance the GREEN and CLEAN Hospital Project implementation

- Extend the GREEN and CLEAN Hospital Project to all hospitals in the country and involve other sectors.
- Develop a monitoring system for generating feedback information on the project and constraints encountered, to respond promptly for further improvement.
- Develop an evaluation method for assessing the links between the GREEN activities and their effectiveness on reducing greenhouse gas emissions, to help encourage participating hospitals embrace the project with confidence.
- Create and strengthen a GREEN and CLEAN Hospital Network at the provincial, regional and national levels.
- Develop innovative and appropriate technologies in managing sustainable and ecological sanitation for use in the GREEN and CLEAN Hospital Project.

4. Tasks Ahead

The following outlines the major priorities, targets and time frames for the Department of Health to continue promoting sustainable and ecological sanitation throughout Thailand.

Achieving improved sanitation for all

After achieving 98.9 per cent safe sanitation practice in the country, the Department of Health targeted 2016 for achieving the use of sanitary latrines by the remaining 0.9 per cent of households in the remote highland rural areas and by the 0.1 per cent of households using unhygienic pit latrines. Progress has been slow since 2000. Intensive social mobilization and health education are needed to motivate households to change their behaviours.

Further promotion of public toilet improvements in compliance with the HAS standards

By 2016, 90 per cent of public toilets in the 12 categories of public places must comply with the HAS standards, with all remaining public toilets complying with the HAS standards by 2020.

Improvement of school toilets nationwide

By 2020, the Chumphon Province model for 'clean and healthy school toilets' and in line with the HAS standards must be adopted in all schools and in all provinces through a collaboration between the Department of Health and OBEC. In addition, all public schools should establish a Clean Toilets Network within each province, which is to be extended to all other schools, temples, hospitals, health centres and public toilets to ensure cleanliness and proper maintenance for sustainability of the achievements. Additionally, students should pass on their health knowledge to parents and community members on the correct use and maintenance of toilets and good hygiene practices. The Government will need to engage in more intensive efforts to improve school toilet facilities.

Intensive food sanitation and hygiene promotion

The Department of Health, in collaboration with the local governments and the tourism industry, is intensively promoting food sanitation and hygiene, aiming at motivating all

food markets, restaurants and food stalls to comply with the government standards by 2021. Safe food sanitation and hygiene can enhance public health in communities and help boost the domestic and international tourism industry.

Promoting sustainable and ecological sanitation following the sufficiency economy philosophy developed by the King of Thailand, His Majesty Bhumibol Adulyadej

By 2021 and with assistance from the Department of Health, in collaboration with the Ministry of Interior's Department of Local Administration Development, local authorities are to have improved the quality of environmental health services (as per the Public Health Act of 1992) and achieved 70 per cent effective management and operation of treatment plants for human excreta, solid waste and wastewater. The sufficiency economy philosophy supports the concept of sustainable and ecological sanitation by promoting reuse of waste and human excreta as new resources, provided care is taken to remove any health hazard to humans and the environment.

Intensive promotion of the GREEN and CLEAN Hospital Project

The Ministry of Public Health is moving to implement the Green and Clean Hospital Project in all hospitals and health care centres throughout the country by 2021, as part of the Third National Environmental Health Strategic Plan (2017–2021). The project is integrated into the Government's Strategic Plan on Climate Change Mitigation.

Training and refreshing training of all project personnel

Throughout the implementation of the sanitation projects, the central and local governments are to organize trainings for newly recruited personnel. Refresher trainings should be conducted periodically for all project personnel to update their knowledge and thus strengthen their management capacity.

Improve the efficiency of monitoring systems

The Department of Health and the relevant implementing agency for each sanitation-related project are to improve the efficiency of the respective monitoring system to overcome constraints promptly and continue pushing the boundaries of progress.

5. Recommendations for sustainable safe sanitation for all, based on Thailand's experiences

The United Nations initiated a set of 17 Sustainable Development Goals in 2015 to end poverty, protect the planet and ensure prosperity for all as part of a new Sustainable Development Agenda. Each goal has specific targets to be achieved over the next 15 years.

Goal 6 centres on clean water and sanitation, with a target to ensure availability and sustainable management of water and sanitation by 2030.

Thailand succeeded in achieving near-universal access to safe sanitation in 1999 and thus has accumulated four decades of rewarding experiences in the implementation of environmental sanitation to improve the health of rural people through the construction and use of sanitary latrines.

The following recommendations are drawn from Thailand's experiences. They are offered as suggestion to help other developing countries accelerate their implementation of environmental sanitation coverage to achieve Goal 6 of the Sustainable Development Agenda (initiated in 2015).

Government roles and responsibilities

Essential issues

- Identify one ministry for the implementation of sustainable sanitation, merging all health agencies, if need be. This specific ministry needs to cooperate and collaborate with other ministries and local authorities at the national, provincial, district and subdistrict levels and with community leaders for effective implementation.

- Adopt sustainable sanitation as a national policy, backed by strong political commitment.

- Allocate adequate financial resources for the implementation of a sanitation programme at all levels nationwide.

- Provide adequate and qualified human resources within the infrastructure at all levels for the effective implementation and monitoring of the quality and quantity of achievements and overcoming constraints promptly.

Technology transfer

- Promote sanitary latrines that are suitable to the national context yet affordable for rural households.

- Conduct trainings for government technical personnel and village masons for the construction of the selected sanitary latrines, thus transferring technical know-how to communities.

Building capacity for implementation

- Develop the capacities of the country's human resources through various types of training, including health education and social mobilization for national, provincial, district and subdistrict health officers, council officers, village leaders and village health volunteers to manage a sustainable sanitation programme.

Health education and social mobilization

- Provide adequate mobile units with facility for health education to village communities, including capacity to show films presenting the benefits of improved sanitation and hygiene to encourage people to change their behaviours and build and use sanitary latrines.

- Implement a nationwide helminth eradication campaign through a deworming programme targeting all primary school children that also encourages a healthier environment by building and using sanitary latrines instead of open defecation practices.

- Organize a nationwide social mobilization campaign for strengthening communities' participation in local decision-making for the best use of locally available financial resources, such as setting up a village revolving fund to help households build a sanitary latrine.

Monitoring and Supervision

- Develop reliable systems at the national and subnational levels for monitoring and supervising a sanitation programme's progress on quality and quantity achievements.

- Provide adequate vehicles at all levels to ensure the mobility of health officers for carrying out their tasks efficiently.

Sanitation data centres

- Set up data centres at the provincial and district levels to keep records on the sanitation status. These records should be used to follow up the progress of a sanitation programme and to provide appropriate incentives to officers, community leaders and village health volunteers with outstanding performance.

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Appendices

Appendix I
Successive budgets for sanitation in the Five-Year National Economic and Social Development Plans

	Year	National Budget, million Baht	Sanitation Budget, million Baht
First 5-year plan	1962	5,906,800	1,949,244
	1963	6,838,012	2,256,543
	1964	7,948,070	2,622,863
	1965	10,357,750	3,418,057
	1966	12,702,580	4,191,851
Second 5-year plan	1967	14,516,940	4,790,590
	1968	16,491,000	5,442,030
	1969	21,149,850	6,979,170
	1970	27,141,060	8,956,549
	1971	28,303,420	9,340,128
Third 5-year plan	1972	29,222,900	9,643,557
	1973	27,358,560	9,028,324
	1974	24,500,000	8,085,000
	1975	34,685,000	11,446,050
	1976	40,261,000	13,286,138
Fourth 5-year plan	1977	42,742,000	14,104,860
	1978	45,048,000	14,865,840
	1979	46,685,000	15,406,050
	1980	51,859,000	17,113,470
	1981	61,319,000	20,235,270
Fifth 5-year plan	1982	72,066,000	23,781,780
	1983	62,384,000	20,586,720
	1984	64,350,000	21,235,500
	1985	61,948,000	20,442,840
	1986	62,465,000	20,613,450
Sixth 5-year plan	1987	No data	No data
	1988	No data	No data
	1989	No data	No data
	1990	335,000,000	47,500,000
	1991	387,500,000	34,000,000
Seventh 5-year plan	1992	460,400,000	47,500,000
	1993	560,000,000	84,000,000
	1994	625,000,000	74,600,000
	1995	715,000,000	152,900,000
	1996	843,299,000	152,900,000
Eighth 5-year plan	1997	984,000,000	110,000,000
	1998	982,000,000	94,000,000
	1999	825,000,000	400,000
	2000	No data	No data
	2001	No data	No data

Appendix II
Technical standards for water-sealed latrine construction

The water-sealed latrine bowl or pan is made of concrete and/or ceramic materials. When the latrine bowl or pan is flushed with water, a small amount of water remains inside the S-shaped gooseneck, which forms a water seal that prevents the escape of bad odours from the latrine pit.

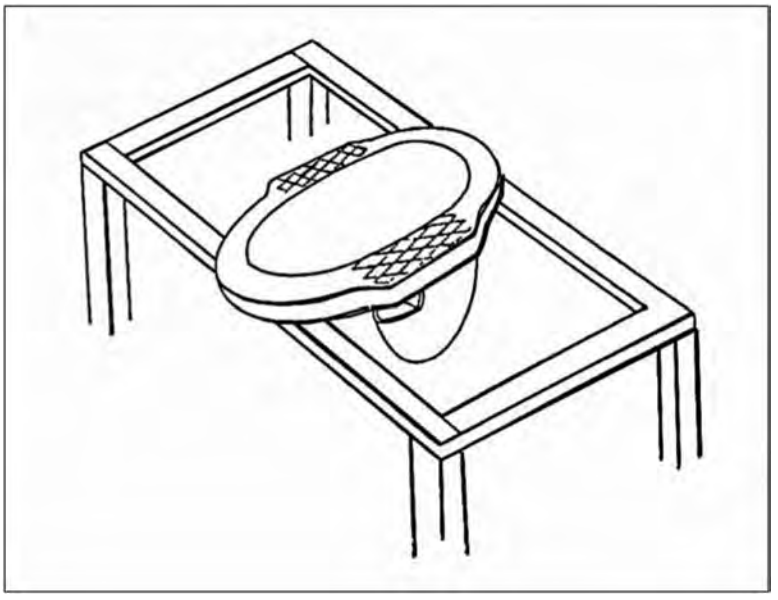

Diagram A1. Full view of the water-sealed latrine bowl or pan

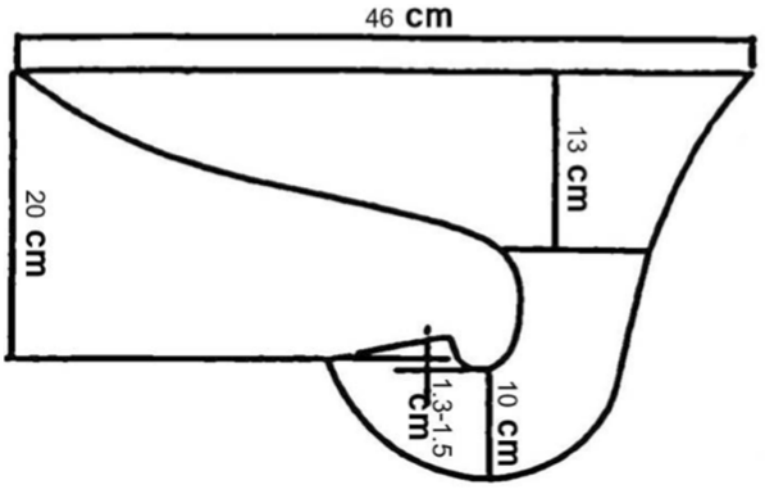

Diagram A2. Side view of the water-sealed latrine bowl or pan

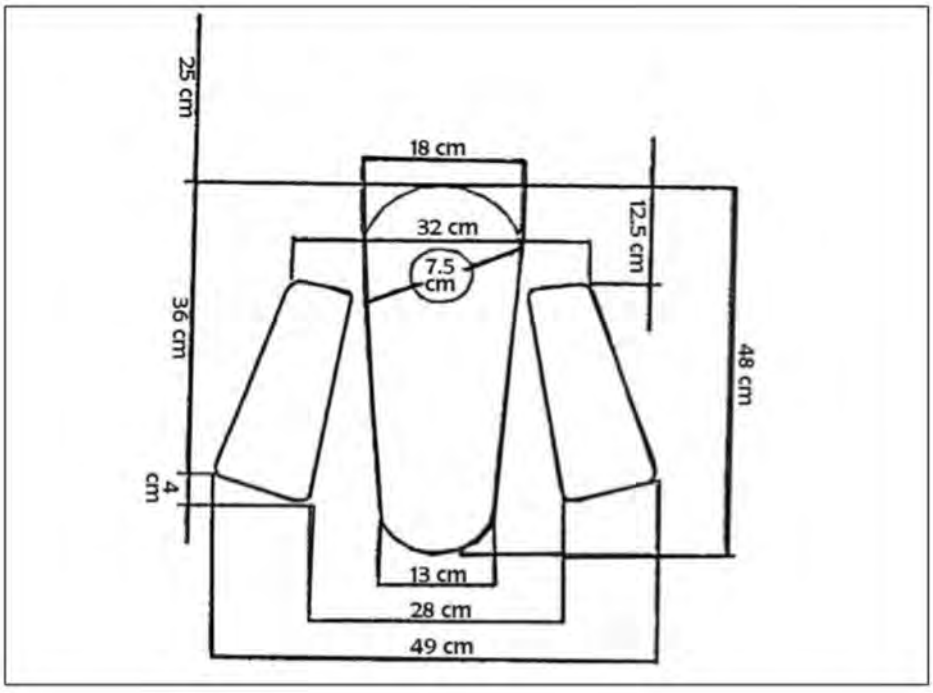

Diagram A3. Top view of the water-sealed latrine bowl or pan and foot steps

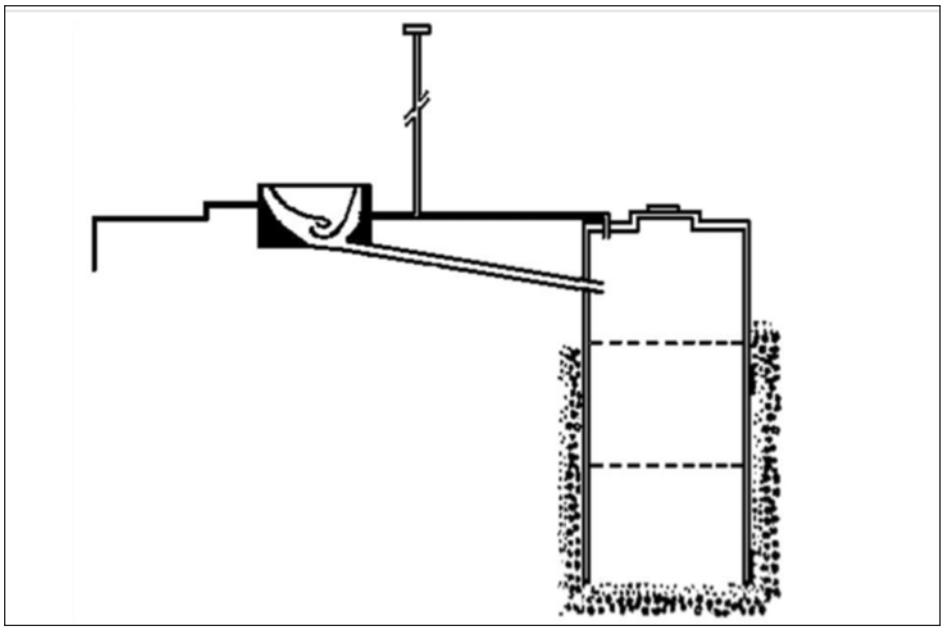

Diagram A4. Single-pit water-sealed sanitary latrine. The pit is a seepage pit, which is built outside the superstructure of the water-sealed latrine. When the pit is full, sludge is removed from the pit by a suction truck. The sludge collected by suction trucks must be disposed in a sludge treatment plant. It is recommended that the pit be located at least 30 metres from any water source

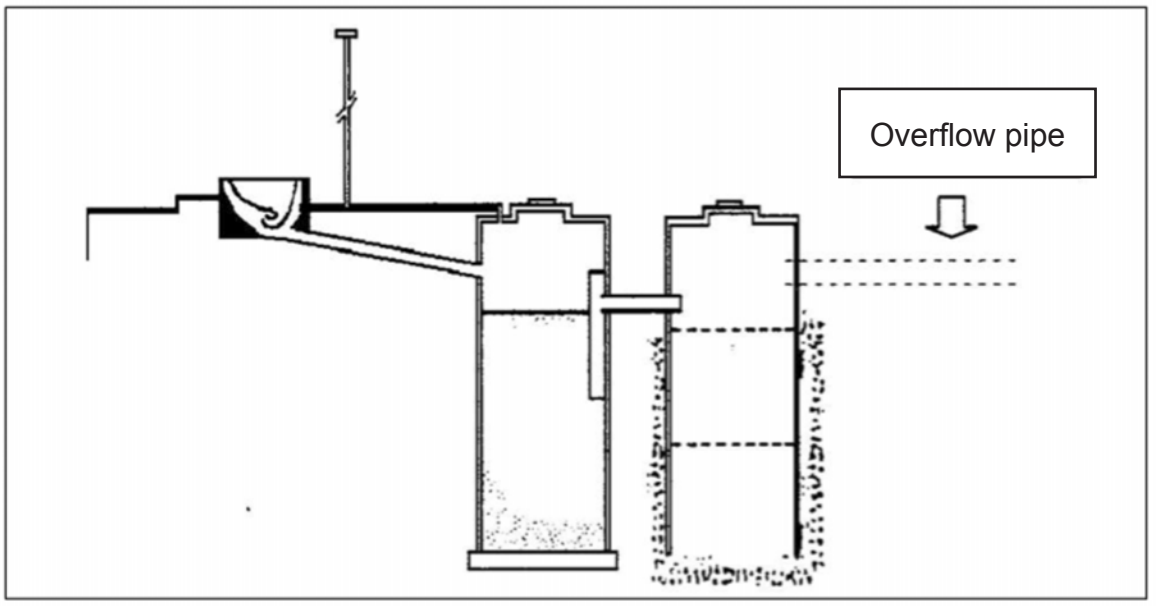

Diagram A5. Double-pit water-sealed sanitary latrine (side view). The first pit, with a sealed bottom, is for storage of sludge. The second pit is a seepage pit, which stores the overflow from the first pit. There should be an overflow pipe on the second pit for the wastewater to flow to the nearby sewerage system for houses in a city or to nearby farmland, for houses in rural areas. Double-pit water-sealed sanitary latrine can prolong the period of removing the sludge from the first pit

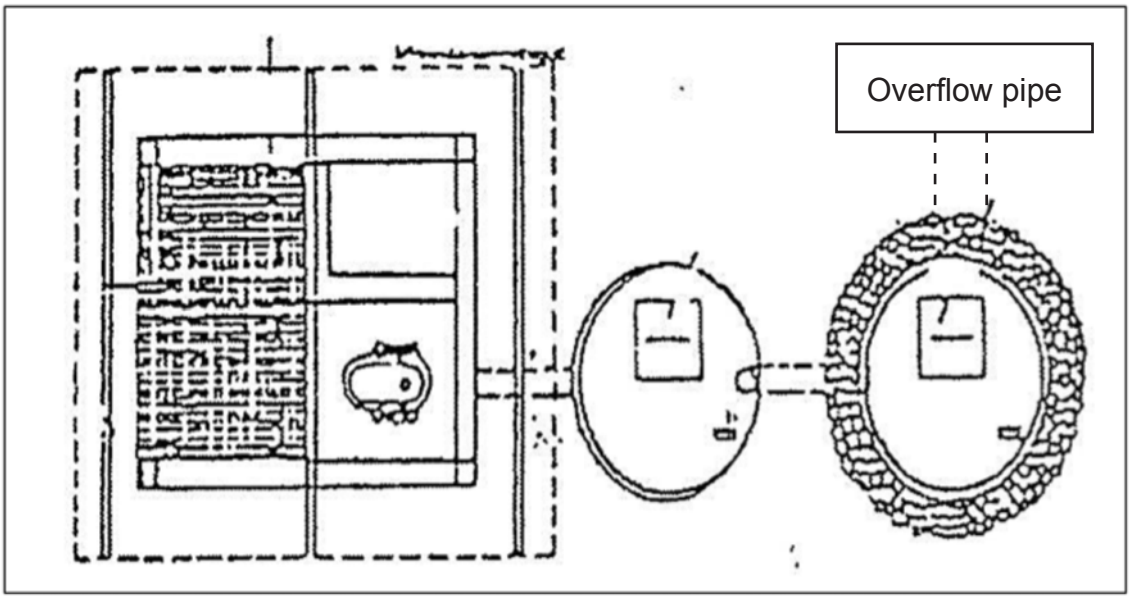

Diagram A6. Top view of the double-pit water -sealed sanitary latrine

Appendix III
Public Toilet standards - Healthiness, Accessibility and Safety standards - issued by the Department of Health

The improvement of public toilets to meet the Healthiness, Accessibility and Safety (HAS) standards has been launched to reduce sources of communicable diseases for the protected health of the public, including local Thai and foreign tourists. There are three major requirements for public toilet standards. These are healthiness, accessibility and safety, which are commonly known as the public toilet HAS standards.

- **Healthiness** is defined as a clean and hygienic condition of the public toilets - the toilet rooms should have no foul smell. Toilet facilities should be provided, such as clean water for flushing, soap for hand washing, toilet paper and toilet waste containers with cover. Septic tanks for the toilets should be kept in good condition.
- **Accessibility** is defined as the adequacy of toilets for male and female users as well as for people with disabilities, elderly persons and pregnant women. All toilet rooms should be available for users at all times.
- **Safety** is defined as safety for toilet users. For example, toilet facilities should not be located in isolated areas; male and female toilets should be separated, and adequate lighting and ventilation should be provided.

Healthiness

1. Toilet floors, toilet bowls and urinals should be clean. Flushing buttons for urinals and toilet bowls should be clean and kept in good condition.
2. Adequate clean water inside the toilets should be available at all times.
3. Adequate toilet paper should be available for users (either for sale or distribution free of charge).
4. Hand-wash basins, faucets and mirrors should be provided and kept in good and clean condition.
5. Bar soap or liquid soap for hand washing should be available at all times.

6. Trash bins with covers should be provided inside the toilets near the hand-wash basins and should be kept in clean and good condition, without leakage.
7. Good ventilation inside the toilets should be ensured and no foul smell should permeate.
8. Septic tanks of the toilets and the sewer connected to it should be kept in good condition, with no leakage.
9. Regular clean-up service of the toilets should be provided by assigned cleaners. A monitoring system to gauge the toilets' cleanliness and use should be established.

Accessibility

1. One special toilet (seating type) should be provided for people with disabilities, elderly persons and pregnant women.
2. Toilets are to be made available for use at all times.

Safety

1. Toilets should not be located in isolated areas.
2. Separate toilets for males and females should be provided and clearly marked outside.
3. Toilet doors and their holders and locks should be clean and in good condition.
4. Floors in the toilet facilities should be kept dry.
5. Adequate light inside the toilets should be provided.

Appendix IV
Clean Food Good Taste standards, issued by the Department of Health

Food sanitation standards for restaurants

- Places for eating, food preparation and cooking should be kept clean, tidy and separated from each other.
- Food must NOT be prepared on the floor, and in front of or inside the toilet. It must be prepared on a table at least 60 centimetres above the floor.
- Food additives must be officially approved and labelled with official food certification mark, such as the food serial number and the industrial standards (TIS) mark.
- Food must be washed before cooking or storing, and stored separately for different types. Raw meat must be stored at temperatures below 5°C.
- Cooked foods must be stored in a clean and covered food container and placed at least 60 centimetres above the floor.
- Edible ice must be fresh and kept in a clean and covered container for selling purpose and placed at least 60 centimetres above the floor. A long-handled spoon or tong is to be used to scoop the ice out.
- Food containers should be washed with dishwashing liquid and then rinsed with clean tap water twice or under running tap water. The wash sinks and adjacent facilities must be located at least 60 centimetres above the floor.
- Cutting boards and knives must be in good condition and used separately for cooked food, raw meat, vegetables and fruits.
- Spoons, forks and chopsticks must be stored with the handle up or placed neatly in clean and clear-covered containers and kept at least at a height of 60 centimetres above the floor.
- All types of solid waste and wastewater must be disposed of in sanitary conditions.
- Toilets for food consumers and food handlers must be clean. The basins inside the toilet should be available and hand-washing soap must be provided at all times.
- Food handlers must wear clean clothes, long sleeve shirts, clean aprons and kitchen cap. And they must form healthy habits, with their fingernails clipped short, no smoking during work hours, and they are not to handle the cooked food with bare hands.

- Food handlers must wash their hands before they prepare, cook and sell food every time, and using big spoons to pick up cooked food of any kind.
- Food handlers, with wounds on their hands, must cover the wounds entirely and securely to avoid any contamination of the food being prepared.
- Food handlers who suffer from or may be carriers of any disease that can be transmitted through water and food must not handle food until completely recovered.

Food sanitation standards for food stalls

- Stalls should be constructed using smooth, durable and easily cleanable materials and tidily located at least 60 centimetres above the floor.
- Cooked foods must be covered to guard against contamination by animals and insects.
- Food additives must be declared with food serial number.
- Drinking water must be clean. The water containers must be equipped with taps or spouts and be covered properly.
- Beverages should be stored in a clean and covered container with a water tap or spout.
- Edible ice must be fresh and kept in a clean container with a cover for selling purposes and placed at least 60 centimetres above the floor. A long-handled spoon or tong is to be used to scoop the ice out.
- Food containers should be washed with dishwashing liquid, then rinsed with clean water twice or under running water. The wash sink must be located at least 60 centimetres above the floor.
- Spoons, forks and chopsticks must be stored in clean and clear-covered containers with handles and kept at least 60 centimetres above the floor.
- General and food waste must be collected for disposal.
- Food handlers must wear clean clothes, long-sleeve shirts, clean aprons and kitchen caps. They must form healthy habits, with their fingernails clipped short. They are not tosmoke during work hours and are not to handle cooked foods with their bare hands.
- Cooked food must be picked up using a clean long-handled spoon.
- Food handlers with a wound on their hand must cover the wound entirely.

Food sanitation standards for canteens

- ***Eating and general areas***
  - The area must be clean and tidy.
  - Tables and chairs must be strong, clean and tidy.
  - The area must be well-ventilated.

- ***Food preparation and cooking areas***
  - The floor should be constructed using smooth, durable and easily cleanable materials that are maintained in good condition.
  - The eating areas should be wellventilated with effective kitchen chimneys or ventilator fans.
  - Foods must NOT be prepared and cooked on the floor.
  - Tables for preparing foods and cooking stoves must be made of easy-to-clean materials, such as stainless steel and ceramic title, and should be in good condition. The tables must be at least 60 centimetres above the floor.

- ***Food, water, ice and beverage***
  - Foods should be stored inside tightly closed containers and placed at least 60 centimetres above the floor.
  - Fresh food (meat, vegetables, fruits and dried foodstuffs) must be of highquality and stored separately, at least at a height of 60 centimetres above the floor or kept in a refrigerator. If kept in cold storage, they should be placedat least 30 centimetres above the floor; fresh foodstuffs must be washed and made clean before cooking.
  - Cooked foods should be kept in clean and covered containers and placed at least 60 centimetres above the floor.
  - There must be food cupboards for keeping cooked foods.
  - Drinking water, beverages and juice must be put in respective containers with clean covers. The containers should have a water tap or spout and should be placed on a table top that is at least 60 centimetres above the floor.
  - Edible ice must be fresh and kept in clean and covered containers and placed at least 60 centimetres above the floor. A particular handled scoop or tong is to be used to scoop out the ice.

- ***Food containers and utensils***
  - Food containers and utensils, such as dishes, bowls, spoons and forks, should be made of harmless materials (stainless steel, white-coated ceramic, glass, aluminium and white or light-coloured melamine). Chopsticks should be made of wood or white plastic.

- Containers for liquid condiments must be made of glass or white-coated ceramic with lids, equipped with white coated ceramic or stainless steel spoons. Easy-to-clean lidded containers are to be used for all types of condiments.
- Food containers and utensils must be washed with dishwashing liquid and then rinsed again with clean tap water twice or under running tap water. Washing facilities must be fixed at least 60 centimetres above the floor.
- At least two washing sinks for food containers and utensils are to be provided. The sinks should have proper drain pipes.
- Clean dishes, bowls, cups, glasses and trays must be kept inverted in the containers or racks or stands and place at least 60 centimetres above the floor. The containers should be clean and kept covered.
- Spoons, forks and chopsticks must be stored with handles up or placed neatly in clean and covered containers and kept at least at a height of 60 centimetres above the floor.
- Cutting boards must be in good condition, without cracks and grooves. For cooked foods and raw foods, separate cutting boards should be used. When not in use, the cutting boards should be covered with a cone-shaped cover to keep flies away.

Collecting solid waste and wastewater

- Waste bins must be covered with lids and maintained to prevent leakage.
- Wastewater drain pipes or gutters must be in good condition, without cracks. The wastewater should be well drained from kitchens to the sewer or wastewater treatment plant and should not drain directly to water sources, such as rivers and cannels.
- Grease traps or interceptors must be provided and should be in good condition.

- ***Toilets***
  - Toilets must be clean, without a bad smell. Hand-wash basins, soap and adequate water should be available in the toilets.
  - Toilets must be separated from the cooking areas. Toilet doors should not open on to the areas for preparing and cooking food or the storage areas of food containers and utensils.

- **Food handlers**
  - Food handlers must wear clean clothes and long-sleeve shirts, white aprons, cook uniforms and caps or hairnets.
  - Food handlers must be in good health, without transmittable and skin diseases. They must undergo an annual medical check-up, with medical reports to determine their good health.
  - They must form healthy habits, with their fingernails clipped short. They are not to smoke during work hours, and they are not to handle cooked food with their bare hands.

Appendix V
Healthy Market standards, issued by the Department of Health

The Healthy Market standards cover requirements for certification, as the following explains.

Requirements for Healthy Market

Healthy Market covers three requirements: environmental health, food safety and consumer protection.

- ### Environmental health requirements

  - Market places should be well ventilated.
  - Stalls, pathways and the outside garbage storage areas should all be kept clean.
  - Floors in all market areas and proximity should be constructed with slope to facilitate proper drainage.
  - Drains around the markets should be covered with screen metal plates for easy cleaning.
  - Adequate numbers of separate toilets for male and female users should be provided. Wash sinks and soap should be available inside toilet facilities in easily accessible locations. The toilet facilities should be well ventilated and free of obnoxious odour.
  - A caretaker should be on duty for cleaning the toilets at least twice a day.
  - Containers with a cover for waste toilet paper should be durable and leak-proof.
  - Septic tanks of the toilets should be kept in sanitary condition.
  - Proper routine cleaning of the marketplaces should be done at the end of every day.
  - Tap water in the marketplaces should be available at all times.
  - All goods, utensils and equipment used in marketplaces should be kept properly in such a way that they do not obstruct the pathways.
  - Food and foodstuffs for sale should be displayed at least 60 centimetres above the floor.
  - Sanitary cleaning of the markets should be carried out at least once a month.
  - Public garbage containers should be available in adequate numbers and in sanitary condition and be emptied out regularly.

- Trash screeners and grease traps should be properly cleaned prior to discharging the wastewater to the public sewage system.
- Infrastructure of the marketplaces should be strong and durable. Floors should be constructed with smooth and durable materials to facilitate cleaning.
- Persons responsible for managing the marketplaces should take action for cleanliness and ensure its safety.
- Light at the stalls should be at least 200 Lux.
- Stalls should be constructed with smooth and durable materials for easy cleaning, with a height of at least of 60 centimetres above the floor.
- Each stall should be numbered, with the name of the owner displayed properly.
- Each stall should have adequate garbage containers, which should be cleaned regularly and maintained in sanitary condition.
- Garbage containers should be provided in adequate numbers and they should be always kept clean.
- Water-storage containers should be provided in adequate numbers for daily use.
- Goods and products for sale should be well categorized and tidy.
- Fire extinguishers should be provided in adequate numbers and placed in proper locations for easy access.
- The marketplaces should be well maintained in good and hygienic condition.
- Roads and pedestrian walkways around the market should be available.
- Stall owners and their assistants who sell goods in the market should have good hygienic practice, both in the process of cooking and distributing foods.
- A designated place or office should be available for comments or suggestions from the public.
- Walkways inside the marketplace should have a width of at least 2 metres.
- General trash should be separated from garbage.
- An association of market owners, stall owners, assistants and consumers should be established for promoting and strengthening their cooperation.
- Environmental sanitary training courses should be organized periodically for stall owners and their assistants who sell goods.
- Markets bigger than 2,500 square metres should have a standard wastewater treatment system.

- **Pest and animal control**
  - Pest control of the marketplaces should be conducted at least twice a year.
  - Animals and insects should not be found in the market area.

- **Food safety requirements**

  All foodstuffs for sale in the market must be:
  - Free from five chemical contaminants (borax, formalin, salicylic acid, sodium hydrosulphite, beta agonist)/
  - Pesticide residue on foods should be lower than the standards set by the Ministry of Public Health.
  - Fresh meat (pork) should be free from beta-agonist substance.

- **Consumer protection requirements**
  - Information and bulletin boards regarding food sanitation, food safety, nutrition and sanitary markets should be provided for consumers.
  - An officer in charge of contamination screening should be assigned to the designated area.
  - The central weighing scale for use by consumers should be made available.

Certifications for a healthy market

- ***Good-level market***

  Markets that have achieved 17 criteria under the environmental health requirements, food safety requirements and consumer protection equirements will be awarded Healthy Market certificate and a 3-star good-level certification.

- ***Very good-level market***

  Markets that have achieved more than 35 criteria of the environmental health requirements, food safety requirements and consumer protection requirements will be awarded a Healthy Market certificate and a 5-star very good-level certification.

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ISBN 978-616-11-2926-2

Date of publication June 2016

Number of copies 500

Place of publication Samcharoen Panich Co., Ltd.

Welcome to Thailand

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