MISSION REPORT

Developing a National Strategy for Scaling Up
Household Water Treatment and Safe Storage in Lao PDR

June 2008

At the invitation of WHO/WPRO, I visited Lao PDR from 16-27 June 2008 to work with the government and national development partners on a strategy for scaling up household water treatment and safe storage (HWTS). In preparation for this mission, I reviewed relevant research, previous WHO mission reports and other documents on water supplies, water quality, water interventions and waterborne diseases in Lao PDR. I also reviewed international statistics and assessments of water coverage and environmental health in the country. Finally, I reviewed various laws, decrees, national plans, reports and surveys prepared by the Ministry of Health (MoH), international organizations, donors and non-profit associations (NPAs) working in the water sector in the country.

In the course of this field work, also met with and interviewed the following key informants representing the various stakeholders involved in household water treatment interventions:

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
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<tbody>
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<td>Dr. Dong-il Ahn</td>
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<td>Dr. Souapadith Pholsena</td>
<td>Deputy Chief of Organization Division, Department of Hygiene and Prevention, Ministry of Health</td>
</tr>
</tbody>
</table>

I also helped in planning and was a presenter in the National Workshop on Household Water Treatment and Safe Storage held in Vientiane on 25 June 2008. Attendees included more than 40 delegates from national and provincial governmental agencies, UN agencies, Non-Profit Associations (NPAs), technical advisors, academic and research institutions, and commercial companies that manufacture and sell HWTS products. They heard presentations on and discussed the state of water and waterborne disease in Lao PDR, research on the effectiveness and cost-effectiveness of HWTS, case studies involving the implementation of various approaches in the country, and recent successes and challenges in implementing HWTS in other countries.
Following the conclusion of the mission, I prepared the attached document: *Developing a National Strategy for Scaling Up Household Water Treatment.* The document summarizes the results of the literature review, key informant interviews and the workshop. It also contains recommendations and a list of possible action items for moving forward with household water treatment and storage in Lao PDR.

I wish to thank the WHO, and especially the Western Pacific Region, for their invitation and support to undertake this work. I also wish to thank the representatives of the government of Lao PDR, UN organizations, development banks, donors, NPAs and the private sector who generously and candidly shared their experience and thoughts about HWTS in Lao PDR.

3 July 2008

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Developing a National Strategy for Scaling Up Household Water Treatment and Safe Storage

June 2008

1. Background

1.1 Water and Waterborne Disease

Unsafe drinking water, along with poor sanitation and hygiene, are the main contributors to an estimated 4 billion cases of diarrheal disease annually, causing 1.8 million deaths, mostly among children under 5 years of age (WHO 2005). Because diarrheal diseases inhibit normal ingestion of foods and adsorption of nutrients, continued high morbidity also contributes to malnutrition, a separate cause of significant mortality; it also leads to impaired physical growth and cognitive function, reduced resistance to infection, and potentially long-term gastrointestinal disorders. Contaminated drinking water is also a major source of hepatitis, typhoid and opportunistic infections that attack the immuno-compromised.

In Lao PDR, diarrheal diseases are the third leading cause of death (after neonatal causes and pneumonia) in children under 5 years of age, representing 16% of all such deaths (WHO 2006). Among all age populations in Lao PDR, diarrheal diseases ranks fourth in mortality, accounting for 8% of deaths. While Lao PDR has made significant progress in surveillance and case management, endemic diarrhoea continues to represent a significant cause of morbidity and a major burden on the country’s health system. Outbreaks of suspected waterborne agents, such a December 2007 outbreak of acute watery diarrhoea (suspected cholera), add to the disease burden and require costly diversion of scarce health and other resources. Diseases associated with contaminated water also exact a heavy economic load in Lao PDR, both on the public health care system for treatment and on persons affected for transport to clinics, medicines, reduced school attendance and lost productivity.

1.2 Special challenges in Water

Lao PDR presents particular challenges in for ensuring drinking water security. Rivers and mountains dominate the country’s topography. The largest river, the Mekong (Nam Khong), runs the entire length of the country, providing fertile flood plains for agriculture and forming the country's border with Thailand. It is also Laos' main transportation artery. Over 70% of the country consists of mountains and plateaus. Two-thirds of Laos is forested and only 10% of the country is considered suitable for agriculture. Most of the population is settled along fertile river valleys, although there are many small tribes living in the hills. There are more than 45 ethnic groups, each with its own language and culture. Eighty-five percent of the population is in rural areas. The largest population centres, Vientiane and Savannakhet, are both in the Mekong River Valley. Lao PDR is also one of the poorest countries in South East Asia. Its GDP per capita places the country among the least developed developing countries (LDDCs).

1.3 Legal Framework for Water

The legal framework for drinking water in Lao PDR arises from a number of laws, decrees and regulations. The Water and Water Resources Law (1996) was adopted with the aim of ensuring “water sufficient quantity and of sufficient quality to satisfy the national needs” (Art. 1) The Decree to Implement the Law on Water & Water Resources (2001) allocated responsibility for implementation of the Law to various ministries and agencies. Urban water supplies are allocated to the Ministry of Communication, Transportation, Post and Construction, while rural water supplies are the responsibility of the Ministry of Health (Art. 3). The Decree also provides that the Ministry of Health (MoH) is “responsible for determining water quality standards for drinking water and
wastewater, including methods of treatment of wastewater, related to health issues” (Art. 23). The Hygiene, Prevention and Health Promotion Law (2001) calls for the supply of clean water for drinking and daily use from improved sources. It also specifies that drinking water from other sources “should be boiled or filtered” (Art. 12).

The Decision on the Management of Quality Standards for Drinking Water and Household Water Supply (2005) established standards for drinking and household water supplied by third parties. The Decision defines “drinking water” as “water obtained from the water supply or other sources and cleaned through the process of boiling, filtering and disinfecting in accordance with the correct technical principles and standards” (Art. 2). The microbiological parameter for water quality conforms with the WHO Guidelines for Drinking Water Quality: zero faecal coliforms and zero total coliforms in 100ml samples.

The Decision on the Organization and Scope of Work of the National Center for Environmental Health and Water Supply (Nam Saat) (2004), a center of excellence under the MoH, establishes the duties of Nam Saat. It provides that Nam Saat, in coordination with the MoH Division of Hygiene and Prevention, is to develop and disseminate policies, strategies, decisions, regulations and standards relating to rural water supply and health; provide technical support, coordination and services in rural water supply; control the quality of drinking water in rural areas and remedy effects from sub-standard water sources; and contact and coordinate with the public and private sectors and international assistance agencies in the promotion of water supply in rural areas (Art. 4). The Decision also establishes the responsibilities of the various Nam Saat Divisions (Art. 7), which focus primarily on providing training and technical support, coordinating with implementing organizations, assisting in promotion and the development of IEC strategies and materials, water sampling and testing, and monitoring and evaluating projects.

In 2004, the MoH adopted a revised National Strategy for the Rural Water Supply and Environmental Health Sector (hereinafter, the “National Strategy”). The objective of the National Strategy is to improve access, use and sustainability of water supply and sanitation facilities in rural areas and maximize the health and socio-economic benefits from access to water supply and sanitation facilities (Sec 2.2). It confirms Nam Saat’s key role in providing guidance, technical assistance and support, especially in remote rural areas. Among other things, it recognizes the need for Nam Saat to develop demand through a coherent, targeted communications strategy and public awareness campaigns using mass media and focused presentation. For this purpose, the National Strategy provides that “‘demand’ is understood by Nam Saat to be lasting economic demand, the expressed willingness of a community to pay” (Sec. 4.3). The Strategy also focuses on the need for behavior change. It notes that “for maximum health benefit, people need to understand how to better protect the water source, draw water, transport it to their homes, treat it at the household level for drinking, and store it” (emphasis added) (Sec. 4.5).

1.4 Improving Water Supplies

Target 10 of Goal 7 of the Millennium Development Goals (MDGs) seeks to halve, by 2015, the portion of people without sustainable access to safe drinking water. Improving water supplies also advances the MDG targets for reducing poverty (goal 1), increasing primary education (goal 2), promoting gender equality (goal 3), reducing child mortality (goal 4), combating major diseases (goal 6) and ensuring environmental sustainability (goal 7).

The Government of Lao PDR has made improved water supplies a major objective. While estimates of water coverage vary, the most recent Multi-Indicator Cluster Survey for Lao—which was conducted in 2006 but is still in draft—reports that 52% of the population uses an improved source of drinking water, up from 42% in 2002. Like most other low-income countries, however, coverage is not homogeneous throughout the country. While 69.3% of the population in urban settings enjoys improved water supplies, the rate is 50.0% in rural settings with road access and just 35.6% in rural settings without road access areas. Across regions, coverage ranges from 57.1% of the North region
to 46.7% of the Central region. More than 70% of households in the richest quintile use an improved source of water, while only about 40% of those in the poorest quintile do.

According to the draft MICS report, the most common improved sources of water are bottled water (17.1%), tubewell/borehole (12.1%) and public tap/standpipe (9.6%). The most common unimproved sources of water are unprotected wells (21.4%), surface water (14.5%) and unprotected spring water (5.9%). In the Central region, more than one fourth of the sources of drinking water are unprotected wells. In the South region, more than one fourth of the drinking water source is surface water. Of the reported 17.1% of the population that drink bottled water, 11.1% use improved source of water for other purposes, and 6.0% use unimproved source of water for non-drinking purposes.

1.5 Improving Water Quality

With support from international partners, the Government of Lao PDR has also taken steps to improve water quality. A major initiative funded by Australian Aid for International Development (AusAid) and supported by Unicef was designed to strengthen local-level capacity to effectively implement water quality control and surveillance measures, creating awareness amongst the targeted population on the hazards of using contaminated water, promoting community water quality testing of their water sources, ensuring the availability of safe drinking water and providing alternative water supply sources to the affected populations in high risk areas. As noted above, the Decision on the Management of Quality Standards for Drinking Water and Household Water Supply defines the principles, rules and standards for water in households and other service areas, and establishes responsibilities for surveillance, monitoring and control of quality in drinking water.

While improved water sources are more likely to be microbiologically safe than unimproved sources, recent results from the WHO’s six-country Rapid Assessment of Drinking Water Quality (RADWQ) make clear that they do not ensure potability. Among the 1600 samples collected in each country, only 43% of samples from protected dug wells were free of thermotolerant coliforms (a well-accepted indicator of faecal contamination) as required by WHO guideline values. Rates of compliance were higher, but still sub-optimal, for protected wells (63%), boreholes (69%) and utility piped water supplies (89%). No sampling was done at the household level, and no other reports have been identified to shed light on the extent to which stored drinking water in the home was contaminated. There is a large body of evidence worldwide, however, that even drinking water which is safe at the source is subject to frequent and extensive faecal contamination during collection, storage and use in the home (Wright 2004). In Lao PDR, a water quality survey of 3000 sources by Nam Saat found that 60% of sources do not comply with national water quality standards.

2. Household Water Treatment and Safe Storage

2.1 Background

Providing safe, reliable, piped in water to every household is an essential goal, yielding optimal health gains while contributing to the MDG targets for poverty reduction, nutrition, childhood survival, school attendance, gender equity and environmental sustainability. While committed strongly to this goal, and to incremental improvements in water supplies wherever possible, the WHO and others have called for interim approaches that will accelerate the health gains associated with safe drinking water for those whose water supplies are unsafe.

Interventions to treat and maintain the microbial quality of water at the household level are among the most promising of these approaches. This is particularly true in settings, like much of the

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1 Under the WHO/UNICEF Joint Monitoring Programme, bottled water is considered an “improved source” of drinking water only when there is a secondary source of improved water for other uses such as personal hygiene and cooking.
Lao PDR, where populations have access to sufficient quantities of water, but where the water is microbiologically unsafe. In many settings, both rural and urban, people have access to sufficient quantities of water, but that water is unsafe. Effective point-of-use interventions—if used correctly and consistently—can significantly improve the microbiological integrity of the water at the point of ingestion, and thus deliver some of the health benefits of improved water supplies. The WHO-sponsored International Network to Promote Household Water Treatment and Safe Storage (HWTS) coordinates the efforts of all stakeholders to advance HWTS (www.who.int/household_water).

2.2 Selected Approaches to Household Water Treatment

A study commissioned by the WHO identified 37 different products, technologies and approaches used in the microbiological treatment of drinking water in the home (Sobsey 2002). Only a few of these approaches have been rigorously assessed for the microbiological performance and health impact and have been shown to be cost-effective. These proven approaches are summarized below.

a. Chemical Disinfection. Chemical disinfection is the most widely-practised means of treating water at the community level; apart from boiling, it is also the method used most broadly in the home (Rosa 2008). While a wide range of oxidants are used in treating water, most household-based interventions employ hypochlorous acid derived from liquid sodium hypochlorite, solid calcium hypochlorite or high test hypochlorite (HTH) which are frequently available and affordable. Tablets formed from dichloroisocyanurate (e.g., NaDCC), a leading emergency treatment of drinking water, and novel systems for on-site generation of oxidants such as chlorine dioxide, also have a role in household water treatment. At doses of a few mg/l and contact time of about 30 minutes, free chlorine inactivates more than 99.99% of enteric pathogens, the notable exceptions being Cryptosporidium and Mycobacterium species. Its impact in reducing diarrhoeal diseases has been documented (Arnold 2006). The “Safe Water System (SWS)” is a programmatic chlorination intervention developed by the US Centers for Disease Control and Prevention in response to a cholera outbreak in Latin America. It combines bottles of dilute sodium hypochlorite with safe storage and behaviour change techniques (www.cdc.gov/safewater).

b. Filtration. Household filters potentially present certain advantages over other technologies. They operate under a variety of conditions (temperature, pH, turbidity), introduce no chemicals into the water that may affect use due to objections about taste and odour, are easy to use, and improve the water aesthetically, thus potentially encouraging routine use without extensive intervention to promote behavioural change. At the same time, they have a higher up-front cost. Higher quality ceramic filters treated with bacteriostatic silver have been shown effective in the lab at reducing waterborne protozoa by more than 99.9% and bacteria by more than 99,9999%, and their potential usefulness as a public health intervention has been shown in development and emergency settings (Clasen 2004; 2006). The improving quality of locally-fabricated silver coated ceramics is particularly promising as a sustainable and low-cost alternative (Brown 2007). Slow-sand filters, which remove suspended solids and microbes by means of a slime layer (schmutzdecke) that develops within the top few centimetres of sand, are capable of removing 99% or more of enteric pathogens if properly constructed, operated and maintained (Hijnen 2004). A simpler but more advanced version, known as the “biosand” filter, was specifically designed for intermittent use and is more suitable for household applications. It has been tested both in the laboratory and the field (Stauber 2006) and is being deployed widely in development settings by the Centre for Affordable Water and Sanitation Technology (www.cawst.org).

c. Thermal (Boiling) and Solar Disinfection. Boiling or heat treatment of water with fuel is effective against the full range of microbial pathogens and can be employed regardless of the turbidity or dissolved constituents of water. Although a Nam Saat flip chart on HWTS options notes that water must be boiled for 5-10 minutes, the WHO and others recommend bringing water to a rolling boil for just one minute (WHO 2004). This is mainly intended as a visual indication that a high temperature has been achieved; even heating to pasteurization temperatures (60º C) for a few minutes will kill or
deactivate most microbial pathogens. However, the cost and time used in procuring fuel, the potential aggravation of indoor air quality and associated respiratory infections, the increased risk of burns, and questions about the environmental sustainability of boiling have led to other alternatives. Solar disinfection, which combines thermal and UV radiation, has been repeatedly shown to be effective for eliminating microbial pathogens and reducing diarrheal morbidity (Hobbins 2004) including epidemic cholera (Conroy 2001). Among the most practical and economical is the “Sodis” system, developed and promoted by the Swiss Federal Institute for Environmental Science and Technology (http://www.sodis.ch). It consists of placing lower turbidity (<30NTU) water in clear plastic bottles (normally 1.5-2.0L PET beverage bottles) after aerating it to increase oxygenation and exposing the bottles to the sun, usually by placing them on roofs. Exposure times vary from 6 to 48 hours depending on the intensity of sunlight. Like filters, thermal and solar disinfection do not provide residual protection against recontamination. Accordingly, householders must have a sufficient number of bottles to allow them to cool and maintain treated water in the bottles until it is actually consumed.

2.3 Evidence on Health and Economic Impact

This section summarizes research on the health and economic implications of household water treatment. That research suggests that (i) household-based water treatment can deliver significant health gains over conventional source-based interventions, (ii) the up-front cost of providing low-cost household water treatment is about half that of conventional source-based interventions, (iii) most or all of that cost can be borne directly by the beneficiary, not the public sector, and (iv) the public sector will nevertheless recover more than the full cost of implementation from reduced health costs for disease treatment.

a. Effectiveness against diarrhoeal diseases. Because it prevents recontamination of water in the home, treating water at the household level is more effective than conventional improvements in water supplies in ensuring the microbiological quality of drinking water at the point of consumption (Sobsey 2002). This translates into improved health outcomes. In a systematic review of 15 intervention studies for the World Bank, Fewtrell and colleagues (2005) reported that household-based water treatment and safe storage was associated with a 35% reduction in diarrhoeal disease compared to a statistically insignificant 11% for conventional source-based interventions. A more recent and comprehensive Cochrane review covering 38 randomized, controlled trials and 53,000 people in 19 countries found that household-based interventions were about twice as effective in preventing diarrhoeal disease (47% reduction) as improved wells, boreholes and communal stand pipes (27%) (Clasen 2006).

b. Cost. The cost of implementing water quality interventions varies, from a low of US$0.63 per person per year (solar disinfection) and US$0.66 (chlorination) to US$3.03 (ceramic filters) and US$4.95 (combined flocculation/disinfection). This compares to an average US$2.61 per person per year for installing and maintaining wells, boreholes and communal tap stands in Asia (Clasen 2007). The cost of treating water by boiling has not been rigorously investigated in Lao PDR, but has been calculated in other settings in Asia using a variety of fuels. The estimated cost of fuel for boiling water in Vietnam (where, like Lao PDR, most people collect or purchase wood for cooking) is $0.272/household/month for wood collectors and US$1.68/household/month for wood purchasers (Clasen 2008). In Vietnam, this appeared to be affordable, as it represented just 0.48% and 1.04% of household monthly income, respectively.

c. Cost-Effectiveness and Cost-Benefit Analyses. The combination of lower cost and higher effectiveness renders household-based chlorination the most cost-effective of water quality interventions to prevent diarrhoea, with a cost effectiveness ratio in Wpr-B (the WHO epidemiological subregion that includes Lao PDR) of US$521 per disability-adjusted life year (DALY) averted, compared to US$1077 for conventional source-based interventions (Clasen 2007). When health cost savings are included in the analysis, implementing low-cost HWTS interventions such as home-based chlorination and solar disinfection actually results in net savings to the public
sector; in other words, the intervention more than pays for itself. A recent WHO-sponsored analysis also concluded that household-based chlorination was among the most cost-beneficial of the various options for pursuing the MDG water and sanitation targets, yielding high returns on every dollar invested mainly from lower health care costs but also increased productivity and the value of school attendance (Hutton 2007).

d. Willingness to Pay. Finally, there is considerable evidence that the target population is willing and able to pay for some or all of the cost of household-based water treatment products, leveraging public sector and donor funding and allowing it to be more focused on the base of the economic pyramid (Ashraf 2006). According to the 2006 MICS draft, 17.1% of the Lao population uses bottled water as their main source for drinking. At a cost of Kip 3000 (but ranging up to Kip 5000) per 20L bottle and assuming consumption of 2L/person/day, the cost of bottled water is approximately Kip 110,000 (US$12.58) per person per year. This compares to US$0.66/person/year for a sodium hypochlorite intervention (hardware plus programmatic costs) and US$3.03 for a ceramic filter programme. It is also believed that a considerable portion of the Lao population boils their water, incurring the costs described above. As noted previously, the National Strategy expressly contemplates that householders demonstrate their demand by contributing to the cost of water treatment solutions (Art. 4.3).

2.4. Epidemics and Emergencies

Outbreaks of infectious diseases and other emergencies occasioned by flooding and drought impose a heavy health burden in Lao PDR and divert scarce health and economic resources away from continued national and regional development strategies. Because of its potential for rapid and targeted deployment, household-based water treatment can be an effective intervention in response to such epidemics and emergencies. Point-of-use chlorination, solar disinfection and sachets combining flocculation/disinfection have been shown effective in reducing transmission of cholera and other diarrhoeal disease in outbreaks and emergencies (Conroy 2001; Doocy 2006). There is also evidence that such epidemics and emergencies provide an opportunity for increased adoption and long-term use by the target population (Ram 2007; Clasen 2006).

While boiling is promoted in Lao PDR and elsewhere in response to outbreaks of suspected water borne diseases and other emergencies involving interruption of water supplies, there is evidence that it may not be completely protective in actual practice. In random sampling of 400 households in Indonesia following the 2005 tsunami where people were encouraged to boil, 47.5% of samples from the households were positive for *E. coli*, with 13.3% >101 CFU/100ml (high risk) and 18.0% <10>100 CFU/100ml (intermediate risk) (Handzel 2005). Another study of water samples from 1027 households in post-tsunami Indonesia found that neither adequate boiling (maintaining a rolling boil for at least one minute) nor adequate boiling combined with water storage in a narrow mouthed container were associated with a decreased risk of stored water contamination (Gupta 2005). This contrasts with results in Vietnam where, in a 12-week longitudinal study not involving an emergency or displaced population, boiling was associated with a 97% reduction in faecal contamination of stored drinking water in the home compared to source water (Clasen 2008).

3. Household Water Treatment in Lao PDR

3.1 Lao PDR Household Chlorination Programme

The Government of Lao PDR was one of the first to initiate a HWTS programme for routine treatment of drinking water. Nam Saat started a household-based chlorination programme using sodium hypochlorite in 1999. Belgian Technical Cooperation supported the project with a donation of an Aquachlor AC 25 solar powered on-site generator to produce a 0.6% solution of sodium hypochlorite (NaOCl). This equipment was installed in Sekong Province in June 2000, and 15 rural villages were designated to receive solution produced by the Aquachlor. In 2001, two additional hypochlorite generators were installed in Vientiane City and Vientiane Province. In 2002 Nam Saat
and the WHO conducted a careful evaluation of hypochlorite production, shelf-life, and dosing. Field testing of chlorination of stored water in urban and rural communities had the following results:

- the smell and taste of chlorine were better accepted by urban than rural populations
- stored water with free chlorine residuals of ≤1 ppm were acceptable to most people
- 71% of households with at least a trace of free chlorine in stored water had no detectable TTC in sampled water
- 95% of households with no free chlorine residuals were positive for TTC
- study participants found the hypochlorite solution useful for treating water consumed while working in their fields
- the solution was also convenient for water treatment in the home or for treatment of large quantities of water at village ceremonies or working parties

In 2003, hypochlorite generators were procured and installed in Luang Prabang, Huaphan, and Savannakhet Provinces.

In 2005, the WHO commissioned Dr. Robert Quick of the US Centers for Disease Control and Prevention to evaluate the household-based chlorination programme and make recommendations for improving and scaling up operations. His report identified a number of strengths, including political support, past budgetary support from external agencies and donors, the establishment of trained local staff (89 in six provinces), and opportunities for expansion. It also identified a number of challenges, including vastly inadequate funding, technological problems, poor quality control, excessively complex dosing, insufficient training of staff and community partners, inadequate product promotion, irregular product distribution, little or no cost recovery, little monitoring and evaluation and poor programme planning. The report explored two options for project development: (i) improving the current project, provided sufficient funding and staff could be committed to it, or (ii) partnering with Population Services International (PSI), the world leader in social marketed water treatment products, to initiate a complimentary chlorination programme.

One of Dr. Quick’s recommendations was that an evaluation be conducted of the continuity, sustainability and scalability of the chlorination programme. With funding from WHO, Nam Saat carried out an evaluation in July 2006 in all six provinces in which the programme was being conducted. The following table contains data from the report:

<table>
<thead>
<tr>
<th>Location</th>
<th>Houaphanh</th>
<th>Xiengkhuang</th>
<th>Louangphrabang</th>
<th>Vientiane</th>
<th>Savannakhet</th>
<th>Sekong</th>
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<tbody>
<tr>
<td>Production capacity</td>
<td>16L/4 h</td>
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<tr>
<td>Volume produced to date</td>
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<td>230 L</td>
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<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Villages reached</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>6</td>
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<tr>
<td>Households reached</td>
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<td>100</td>
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<td>Persons</td>
<td>2123</td>
<td>626</td>
<td>1227</td>
<td>1191</td>
<td>No data</td>
<td>No data</td>
</tr>
</tbody>
</table>

Among the findings of that evaluation are the following:

- As of 2006, the programme covered just 18 villages. While data on the number of households and people reached are not complete, extrapolations from the data provided results in estimated coverage of 1616 households or 10,334 persons.
- Except for Houaphanh, which reported monitoring of water quality parameters 3-5 times, no other provincial programme reported monitoring more than once since inception. This was apparently due to a lack of testing apparatus and reagents and a lack of funding and staff capacity/training.
• In four of six provinces, householders could not say how long they needed to wait before drinking water after adding chlorine.
• In all cases, it was recommended that provincial staff receive additional training and technical support, and that householders receive IEC materials.
• Householders surveyed indicated that they both boil and chlorinate their water at home. They also reported taking chlorine with them for use while working in the field.

The comparatively small scale of the chlorination programme raises questions about whether this may be attributable to limitations in supply or in demand. Assuming an average dosing of 7 drops/litre (the midpoint of Nam Saat’s recommendations for clear and turbid water), and an estimated 20 drops per millilitre, 1L of the 0.6% chlorine produced by the programme could treat 2,857L of water. Assuming two batches of 16L are produced five days per week for 50 weeks/year, each province could produce 8000L of chlorine per year, or enough to treat 22,856,000L of drinking water. Then assuming each person requires a minimum of 2L of treated drinking water/day (a conservative estimate), current production from each province is enough for more than 31,300 persons per year, or more than 18 times the current average number of persons reached per province of 1,722 persons. Even if each person needed 4L or even 8L of treated water per day, current production capacity would meet the need. It seems clear, therefore, that the limitation of the current programme is demand; there is more than enough capacity to meet current demand.

In December 2007, an outbreak of acute watery diarrhoea (with confirmed cases of cholera) was reported in Sekong district. Cholera is endemic in Lao PDR, and outbreaks have occurred periodically, with transmission particularly significant among populations relying on untreated rivers and streams. The Sekong outbreak resulted in an estimated 400 cases and 3 deaths. The response was managed by the MoH Department of Laboratory and Epidemiology, with support from the WHO, and consisted of surveillance and active case finding, case management, and prevention through improved water, sanitation and hygiene. While responders endeavoured to use locally produced NaOCl as part of the response, it could not ramp up production quickly enough. Orders were placed for Aquatabs (dichloroisocyanurate), a chlorine tablet that is widely used in emergency and routine drinking water treatment, but the imported product was subject to delays in transportation from Bangkok. With assistance from WHO, calcium hypochlorite was procured from the provincial Nam Papa in order to produce and bottle a stock chlorine solution.

There are now a total of seven Aquachlor hypochlorite generators in service, with different size capacities ranging from 25L to 50L in 2 to 8 hours. Despite nine years of history, however, the project is only estimated to have reached 3000 households in 2007. Few of the recommendations contained in Dr. Quick’s report have been implemented, perhaps because of continued funding limitations. Further discussions with programme staff revealed a number of continuing challenges:

• Production is centralized at the provincial Nam Saat facility in each of seven provinces, each with a single generator that leaves it vulnerable for production failures. Only minimal quality control is exercised.
• The product is distributed in at least 4 different sized bottles (1000ml, 500ml, 120ml, 30ml), each with a different sized cap, minimizing some opportunities for more standardized production and distribution. The larger bottles are intended for use in treating large storage vessels, such as barrels and rainwater collection jars, while the smaller bottle is designed to encourage householders to take the product with them and use it in the field.
• Nam Saat staff visit communities and offer the product to householders after presentations that include a flip chart showing the risks of waterborne disease, transmission pathways, water treatment options (including boiling and biosand filtration), and hygiene and sanitation interventions to prevent transmission. No other IEC materials are available and no campaigns or mass media are used to raise awareness or create demand for the product.
• Distribution is free, and thus there is no cost recovery. The absence of programme revenue limits donor enthusiasm as there is no prospect for sustainability. The resulting lack of funding severely limits the ability to scale up the intervention, since there in no funding to increase supply or demand.

• Detailed instructions on dosing specify the number of drops/L required for borehole (5), shallow well (7), rivers and ponds (9), or gravity systems (10), thus assuming a consistent level of turbidity (despite significant seasonal variations) and ability to estimate a litre.

• Users who want to procure additional product would have to travel often significant distances to the provincial capital to obtain additional supplies, as the product is not available through any other supply channels. Neither can they obtain it in village shops or kiosks despite the fact that such outlets who routinely sell compatible products such as soap and washing powder.

• Apart from the 2003 evaluation discussed above, no field studies have been conducted to assess awareness of the product by the most vulnerable populations, correct and consistent use especially by young children, sustained use, or the impact of the project on health and reduction of health care expenditures.

3.2 Boiling

As noted above, thermal treatment—boiling—is one of the most effective ways of disinfecting drinking water. It is also the most common, being practiced by more than 300 million people worldwide (Rosa 2008). While there are no published estimates of the portion of the Lao population that boils, it is believed to be high: DHS surveys from Vietnam report 90.1% of the population usually boils their water before drinking it; the figure for Cambodia is 59.7%. If so, there is already a considerable base of boilers in Lao PDR on which to build. This would also imply considerable acceptance and uptake of the intervention, a challenge in introducing any new household water treatment method. It is not clear, however, whether the method is practiced consistently or is accompanied by safe storage to prevent recontamination.

Results from recent boiling studies in Vietnam and India also suggest that as actually practiced in the home by vulnerable populations, boiling is effective. In a three month study among 50 households in rural Vietnam who reported “always or almost always” boiling their water before drinking it, the practice was associated with a 97% reduction in faecal bacteria, from 141 TTC/100ml in source water to 4.2 TTC/100ml in drinking water (Clasen 2008). In a five-month study among 218 families in three communities in peri-urban India, boiling was associated with a 99% reduction in geometric mean E. coli, from 612.8 CFU/100ml in source water to 5.8 CFU/100ml in drinking water (Clasen 2008a). While it may be useful to confirm that the practice of boiling in Lao PDR is similarly effective, there is reason to believe that results would be similar.

It would appear that most families in Lao PDR already possess everything they would need to practice the method, namely a pot and fuel. Fuel would appear to be readily available. According to the draft 2006 MICS for Lao PDR, 97.5% of the population of the Lao PDR are using solid fuels for cooking. In the North region, 95.5 percent of households use firewood, while about 65 percent do so in the Central and the South regions. According to the MICS survey, nearly 90% of Laotians cook on open stoves or fires, in many cases located in doors. This suggests that boiling would contribute to indoor air pollution, a potential contributor to respiratory infection. To date, however, there is no evidence of a direct link.

Boiling is one of the household water treatment options affirmed by Nam Saat. A flip chart used in connection with its chlorination programme pictures boiling as one of the effective ways of treating water in the home. In fact, however, the flip chart does not actually promote boiling. While recognizing its effectiveness against all pathogens, the flip chart observes that boiling takes time and may not be suitable for preparing enough water for large families. Boiling does, of course, take time,
but it typically is not time devoted 100% to boiling; the studies in Vietnam and India suggest that women multi-task when they boil. Moreover, the “5-10 minute which the flip chart says is necessary to disinfect water by boiling exceeds the WHO recommendation of a 1 minute rolling boil. It is probably true that chlorination and filtration are more convenient. And both of these options are perhaps more suitable for larger volumes of water.

3.3 Biosand Filters

Biosand filters (BSFs) have been produced and sold in Lao PDR for some time. During a field visit, the writer observed a working BSF that the householder reported purchasing in 2003 for Kip300,000 (approximately US$34.50); there were at least 3 other commercial BSFs in the village. The Centre for Affordable Water and Sanitation Technology (CAWST), the leading organization for providing engineering, technical and project management assistance for the BSF has been supporting the Lao government and NPAs interested in BSF project in Lao PDR since December 2005. In early 2006, Nam Saat decided to pursue demonstration projects of 2-3 other HWT options in the country. KAP surveys conducted by UNICEF suggested that chlorine smell was a barrier to uptake of the chlorine product and to scaling up the chlorination programme. There was also evidence that householders may find filters that improve water aesthetics may be more acceptable. After examining various options, Nam Saat elected to pilot the BSF.

The Division of Environmental Health of the MoH developed a proposal for a demonstration project involving the fabrication and installation of 320 BSFs in two rural communities. Nam Saat formed a BSF technical committee comprised of four staff members, two from Environmental Health and two from Nam Saat. With financial support from UNICEF and World Bank WSP, Nam Saat engaged CAWST to provide training, project management and technical support for the project. It obtained two moulds and CAWST conducted a training workshop in late October and early November, 2006. Filters were fabricated at Nam Saat Centre and delivered to the demonstration communities beginning in January 2008. Nam Saat decided to require householders to pay Kip50,000 (approximately US$5.70) for each filter. With assistance from CAWST, Nam Saat conducted an evaluation of the project in Na Ngom Mai village in April and May, 2008, and issued an Evaluation Report dated May 2008. The report documents the following findings:

- 92% of householders expressed satisfaction with the taste, smell and appearance of water filtered through the BSF. All reported that the filter provides a sufficient quantity of water for the household for drinking and cooking.
- Filtrate is stored in containers, of which 64% have narrow mouths suitable to prevent contact with hands, a possible source of recontamination.
- While only 17% of 76 source water samples (mainly shallow wells) contained <10 faecal coliforms/100ml (low risk), 71% of BSF filtrate samples fell into this risk category. 76.3% of source water samples contained 10-99 faecal coliforms/100ml (medium risk), while 28.9% of BSF filtrate fell into such risk category. There was some evidence of recontamination of filtrate due to unsafe storage and handling.
- All members of the village were reportedly prepared to pay the Kip50,000 charge for the filters; some actually recommended that the price be increased to assist with replication in other villages.

The Nam Saat demonstration project provides some evidence of the potential scalability of the BSFs in Lao PDR. Nevertheless, in order to be successful, the project must still overcome certain challenges. These include the following:

- To date, all BSFs were fabricated by the BSF Technical Committee at Nam Saat Centre, and trucked to the installation villages. Even the sand was transported from Nam Saat Centre. While this centralized approach is useful for a pilot, it did not demonstrate the field fabrication method using householder participation that is normally used for BSF...
production. Thus, while the pilot seems to have demonstrated householder acceptability of the filter, it is still necessary to plan and organize a decentralized and large scale means of producing and delivering filters in order to demonstrate scalability.

- Although the filters appeared to improve microbiological water quality\(^2\), the microbiological performance of the filters was sub-optimal compared to field test results in other countries. For those families who are currently drinking bottled water or boiled water, a transition to the BSFs may actually represent a compromise in drinking water quality and even present a health risk. It is not clear whether this is due to improper fabrication, seasoning or use of the filter.

- With a Kip 50,000 purchase price, the units are highly subsidized. Nam Saat estimated the cost of production of the filters at Kip 250,000, excluding transportation. Nam Saat does not have funding to cover this gap. Although it is seeking funding for a “revolving fund” to help support the project, there is insufficient revenue in this model for the fund to revolve. It is not clear whether a donor would be willing to continue to cover this subsidy.

- The Kip 50,000 price is probably less than householders would pay for the filter. During a visit to the village, some householders with filters observed that the filters were saving them money over their previous practice of buying bottled water. They reported paying Kip 2,500/20L bottle, and using 2-3 bottles per week, which corresponds to a pay back of just 8 weeks. The price was set by Nam Saat without the benefit of a willingness-to-pay study. As noted above, the May 2008 evaluation reported that householders would pay more. The fact that 100% of householders in villages currently receiving the filters were willing to pay this amount suggests that the units may be underpriced.

- As Nam Saat and CAWST have observed, there is a need for IEC materials and an IEC strategy for introducing the BSFs into the villages. An effective IEC approach should help increase demand for BSFs, improve their microbiological performance, and optimize their use.

- Nam Saat and the Division of Environmental Health will need to establish and maintain a system of monitoring and evaluation for the BSF project. This will require additional resources.

- Scaling up BSFs will need to be supported by a significant campaign to create awareness of the option and generate demand. While it is possible for the Lao government to undertake such a campaign, this will require additional resources.

The Division of Urban and Rural Development, Department of Housing and Urban Planning, Ministry of Construction, Transportation, Post, and Communications is the “lead agency” for the CAWST-assisted biosand project. UN-HABITAT is also supporting the initiative. Other NPAs are either actively engaged in BSF projects or considering the same. Concern Worldwide conducted a survey in their existing project of preferences between rainwater, BSF, SODIS, and a traditional practice. Approximately 90% of those surveyed expressed a preference for the BSF. Community Development and Environment Association (CDEA) are now beginning their second BSF project and is working closely with Nam Saat on monitoring and quality control. Other NPAs have received training or otherwise expressed interest in BSFs, but no details were available on their present activities or plans for implementation.

### 3.4 Ceramic Water Filters

There is currently no established ceramic filter project underway in Lao PDR. Some higher-cost Chinese, Thai and Korean brands are available in certain population centers. The quality of these units, however, has not been established. Lao Water Resources, Inc. (LWR) a Lao-American venture, is working on a potters-for-peace pot-style ceramic filter operation in Lao PDR using the model

\(^2\) The sampling strategy and statistical methods used in the report did not allow for definitive conclusions about the statistical significance of the reported results.
developed in Cambodia by Rural Development International (RDI) in Cambodia. Activities to date have been limited to pilot projects and to 300 school-based supported by ADB’s Basic Education for Girls programme. In Cambodia, RDI, IDE and the Cambodian Red Cross have each had considerable success manufacturing and selling these locally-produced filters, known as Ceramic Water Purifiers (CWPs). The RDI an IDE filters have been rigorously assessed and shown to be microbiologically effective and protective against diarrhoeal disease (Brown 2007). In 2007, the collective sales of the three Cambodian producers reached almost 70,000 units for the year. It is estimated that 760,000 people in Cambodia are currently using CWPs.

3.5 Solar disinfection

International Relief and Development is believed to be launching a SODIS project in Khammouane province. No information was made available on this project, its funding, current coverage or plans for scaling up.

4. Recommendations for Scaling Up HWTS in Lao PDR

The foregoing findings lead to two compelling conclusions. First, there is great potential to achieve significant gains in the health and wellbeing of rural populations in Lao PDR though the rapid and sustained scale up of HWTS. This potential rises first out of a number of factors that are present in rural populations in the country:

- A heavy burden of diarrhoeal disease, especially among young children
- Relatively low coverage of improved water supplies
- Mainly adequate year round-access to sufficient quantities of water
- Evidence that water supplies are currently highly contaminated with faecal pathogens
- Comparatively smaller levels of chemical contamination
- Evidence that the population is willing and able to contribute to the cost of effective HWTS interventions
- Risk of high profile outbreaks of waterborne diseases, such as cholera, that sensitize a population to the need to protect themselves by treating their own drinking water

In addition, there is already a strong governmental commitment to HWTS interventions, and some experience and lessons learned in programming.

The second inescapable conclusion from these findings is that this considerable potential will not be realized simply by staying the present course. The 15,000 to 25,000 people who are reported to be using sodium hypochlorite under the nine-year-old chlorination programme, and the several thousand who could be reached with BSFs in the next year, collectively represent less than 1% of the millions of people in Lao PDR who would benefit from HWTS. What is needed is a breakthrough in the way HWTS is done in the country.

Appendix A to this report contains a list of possible action items for scaling up HWTS in Lao PDR that were identified in interviews or during the HWTS national workshop. This section sets forth recommendations that the writer regards to have particular priority. Many of the recommendations reflect initiatives that Nam Saat and other governmental agencies are themselves advocating. The recommendations obviously fall short of a “national plan.” They are, however, a relatively short list of strategies which, if pursued in earnest, could streamline the delivery of HWTS in Lao PDR and result in a rapid and dramatic increase in coverage within 12-24 months.
4.1 Engage partners to undertake actual implementation of HWTS

To date, HWTS programming in Lao PDR has been undertaken principally by Nam Saat. There has been relatively little participation on the part of NPAs or commercial sector partners. Outside of Lao PDR, however, HWTS interventions (other than boiling) have reached approximately 18 million users worldwide (Clasen 2008b). Virtually all of the programmes that have succeeded in reaching large numbers of users have been implemented by NPAs and the private sector, working in partnership with government. Population Services International (PSI), a social marketing NPA, has reached 10.4 million users with sodium hypochlorite products sold in more than 71,000 distribution outlets in 21 countries. From 2005 to 2007, Medentech Ltd., the manufacturer of Aquatabs brand of NaDCC tablets, increased its coverage from 800,000 to 2.3 million users. As noted above, Cambodian NPAs are reaching 760,000 users with locally fabricated ceramic water filters. In addition to their success in scaling up, these and other partners have demonstrated capacity for maintaining high quality control standards to ensure performance and safety. Finally, as they all follow commercialization strategies that seek at least cost recovery through product sales, their delivery models are sustainable, and growth in not limited by funding. For these reasons, it is recommended that NPAs and private sector partners be encouraged (and provided start-up funding, where necessary) to undertake the actual implementation of HWTS programmes in Lao PDR.

Implementers who require donor funding for the programme launch should be selected on the basis of their track record for past performance and their capacity and experience in Lao PDR. The HWTS methods they elect to promote do not need to be stipulated in advance; it is only necessary to prescribe that the methods and delivery models have been shown to be safe, effective, acceptable to the target population, affordable, appropriate and sustainable. While the programmes should be potentially national in scale, implementers should focus at the outset on two or three challenging provinces to demonstrate feasibility and take advantage of lessons learned. Proposals should include funding for a rigorous and independent assessment at regular intervals. Proposals should also include funding for Nam Saat collaboration, technical support, community participation, coordination and monitoring/evaluation, in order to ensure that the centre can exercise its mandate, transfer its experience to implementers, facilitate vertical participation between Nam Saat central and provincial/local participants, and continue to build institutional capacity.

4.2 Allow Nam Saat to focus on technical leadership and oversight of HWTS in accordance with its prescribed mandate

Nam Saat’s institutional mandate is clear from the laws, regulations and decisions establishing its authority. As a centre of excellence in water supply and environmental health, Nam Saat’s duties reside primarily in providing technical leadership, capacity building, coordination, and assessment. As expressed in the National Strategy for the Rural Water Supply and Environmental Health Sector, those duties include:

- Collecting baseline data of projects and reporting on project progress
- Assessing the implementation strategies
- Arranging training courses
- Devising and supporting approaches for IEC and community participation
- Providing technical assistance to the grassroots to prevent health effects from environmental pollution
- Coordinate with RWSS sector implementation organizations and cooperating partners
- Provide and promote technical skills in water quality control
- Assess water quality through sampling and analysis at the central level
- Monitoring and evaluating projects

This is already an extensive list of duties. However, in recent years, Nam Saat’s core functions have been diverted to organize and undertake pilot and demonstrations projects and transition them to
Nam Saat recognizes that this diversion of resources has limited its ability to focus on its core functions. It is also clear that Nam Saat’s core strengths reside in the technical arena rather than implementation. It has therefore sought to reposition its role in HWTS to allow it to focus on its legally-mandated duties.

Using partners to actually undertake the implementation of HWTS projects in Lao PDR will not reduce the responsibilities of Nam Saat; it will allow Nam Saat to focus on core technical, supervisory, and assessment functions. Moreover, Nam Saat should continue to promote the use of boiling, an effective and widely practiced means of treating water in the home. As boiling does not offer opportunities for a NPA or commercial partner to recover its costs, it is properly within the purview of the governments. Governments have been particularly successful in promoting boiling for both the routine and emergency treatment of drinking water, particularly in Asia. Finally, it is essential that Nam Saat or another governmental agency establish a rigorous system of monitoring and evaluation to ensure that any programme implementers who are benefiting from donor funding are reaching actually the target population and securing their correct and consistent use of the interventions in order to optimize the potential health impact.

4.3 Develop and implement a plan to build HWTS awareness and demand.

As noted in the National Strategy, “demand needs to be developed” (Sec. 4.3). According to the National Strategy, this will be achieved by Nam Saat “through the development and operation of a coherent communication strategy which identifies target audiences and IEC approaches.” Hygiene campaigns should use mass media, schools, health authorities and others to establish household water treatment of drinking water as an essential practice, to be observed consistently and unfailingly by householders who do not have the benefit of conventionally treated water supplied by pipes to the home. The campaign should recognize a variety of methods that have been shown to be safe, effective and suitable for rural householders—boiling, chlorination, filtration (BSF and ceramic), and solar disinfection—provided these methods are available through implementing partners. Where possible, messages on HWTS should be incorporated into school curricula and health programmes (immunization, child and maternal care, etc.). These campaigns should be generic (non-branded), as government should not be seen as endorsing any particular product. They should also be targeted specifically at the most vulnerable populations in rural settings.

While Nam Saat should take the lead in developing the campaign and IEC strategy, it should work closely with programme implementers and other stakeholders. The campaign should be evidence-based, taking advantage of the considerable research on HWTS methods, delivery strategies, and tactics for reaching the most vulnerable populations. Johns Hopkins University’s Center for Communication Programmes has particular expertise in behaviour change communication in the area of HWTS, and has worked extensively in South East Asia. The WHO-backed International Network for Household Water Treatment and Safe Storage maintains a library of fact sheets, guidelines, graphics, images and other materials that can be accessed and used. The World Bank-WSP in Lao PDR has extensive experience and expertise in developing culturally-appropriate and language-specific environmental health IEC materials for the many ethnic groups present here; they have also expressed a willingness to support the IEC effort in HWTS. At the HWTS workshop in Vientiane, implementing partners working in other countries showed some of their own materials, and illustrated the need for pre-testing and validation.

4.5 Establish a HWTS plan for emergency/outbreak response

Rapid and creative action on the part of WHO to produce and distribute a stock chlorine solution from calcium hypochlorite provided householders in Sekong with a means of protecting themselves from waterborne cholera in the December 2007 outbreak. Nevertheless, the crisis revealed shortcomings in current levels of preparedness, the inability to rely on existing production of sodium hypochlorite at the provincial level, and the risk of relying on chlorine tablets ordered only after the onset of the outbreak. While outbreaks are not regular in Lao PDR, it is important to
improve preparedness in order to ensure a prompt and effective response when necessary. Provinces such as Sekong, where a larger portion of the population is believed to rely on river and other surface waters for their drinking water supplies and where sanitation coverage is low, are particularly vulnerable. As household water treatment has been shown to be an effective means of rapidly preventing waterborne transmission of cholera, emergency/outbreak response should be included in governmental action plans for HWTS. Some solutions offer certain benefits over others. NaDCC tablets, for example, which have a shelf-life of 5 years compared to 6-12 months for bottled sodium hypochlorite, have been used widely in emergency response, but may need to be stockpiled in country in advance.

4.6 Ensure adequate funding

Limited funding is always identified as a significant restriction on the ability to scale up health interventions. Diarrhoeal diseases tend to be underfunded compared to HIV/AIDS, malaria and tuberculosis, particularly in view of the fact that effective and cost-effective interventions such as HWTS are immediately available to reduce this disease burden and advance other MDGs. While funding is undoubtedly in impediment for HWTS in Lao PDR, however, this may be attributable in part to a lack of clear programmatic opportunities. Until recently, HWTS in the country was limited to pilot projects by Nam Saat. Even the BSF project is still in the demonstration phase.

UNICEF, the Asian Development Bank, AusAid and others have supported water and health interventions in Lao PDR and have expressed a willingness to consider committing additional resources to the sector. In order to attract significant investment, however, programme proposals will need to demonstrate not only pilot-level feasibility but also scalability and sustainability. They should also ensure accountability by including a rigorous and independent monitoring and evaluation component. This will require collaboration between Nam Saat, the implementing partner, and independent evaluators. Assuming such proposals are forthcoming, it is essential that these and other funders be prepared to make significant, long-term funding commitments.

4.7 Build institutional capacity

Lao PDR benefits from experience in household chlorination and a strong commitment on the part of MoH and its agencies to ensure the quality of drinking water at the point of consumption. There is a favourable policy environment, and governmental institutions are enthusiastic about providing vulnerable rural populations with the tools they need to take charge of their own drinking water security. Nevertheless, governmental agencies, including Nam Saat, would benefit significantly from additional institutional capacity. The need is even greater at the provincial and local level. All such agencies appear eager to build their capacity, and individuals working in these organizations are committed to excellence. Experienced implementing partners can help with capacity building. However, it is important that a systematic strategy be developed, funded and implemented in order to ensure that these agencies can play their critical role in advancing water and health in the country.

4.8 Research open issues

While the foregoing actions should proceed with dispatch, there are a number of nagging questions about HWTS in Lao PDR that should be investigated on a parallel basis. These include:

- To what extent can household water treatment be extended to ensure that the target population will be protected while working in the field and otherwise away from the home?
- What are the most cost-effective means of creating awareness and demand for HWTS in Lao PDR, especially among remote populations with different languages and ethnic origins?
- What is the estimated cost of extending coverage of various HWTS options to the target population, and to what extent could these costs be offset by savings to the public sector and to the householder through reduced costs for medical care and improved productivity
• How widely practiced is boiling in Lao PDR, how effective is it as actually practiced, and how does the cost of boiling compare with other HWTS options? Could the effectiveness of boiling be improved by promoting safe storage?

• Are social marketing and commercial strategies to scale up HWTS effective in securing correct, consistent and sustained use of the intervention, and are these strategies reaching the most vulnerable population.

• Are there settings/locations in Lao PDR where improvements in water supplies (protected wells, boreholes, protected springs, etc.) should be a priority over HWTS because of inadequate access to sufficient quantities of water? Can these be mapped to help coordinate optimal delivery of water solutions?

• Is it necessary to provide free distribution of HWTS to some populations because they cannot contribute to the cost? To what extent does such free distribution interfere with demand-driven approaches?

These and other questions should be explored as part of an overall effort to optimize the benefits from HWTS.

References


Appendix A

POSSIBLE ACTION ITEMS FOR SCALING UP HWTS IN LAO PDR

1. Governmental Policy, Regulation and Planning

   a. Policy
   - Highlight the fact that Lao PDR is “off track” on achieving MDG water target, and that this sector therefore needs attention and investment
   - Adopt clear policy that confirms that effective HWTS “count” toward the MDG target for safe water whether or not householders have improved water supplies provided the have sufficient quantity and access to water year round
   - Ensure that national policies and strategies of the MoH recognize HWTS as an effective and cost-effective means of delivering the health gains associated with safe water in furtherance of national priorities and the MDGs
   - Emphasize the economic and poverty reduction benefits of HWTS, and secure promotional/training funding as part of the larger water supply/water resource policy and budget
   - Define role of HWTS in emergency response and promote the transition of emergency to routine use; coordinate with MoH Division of Laboratory and Epidemiology and Division of Prevention and Communicable Diseases
   - Forecast and stockpile supplies of effective point-of-use products in order to improve preparedness and prevention
   - Encourage inclusion of research and practices into school curriculum as part of the wider water, sanitation and hygiene programme
   - Promote safe storage whenever boiling is used for disinfecting water

   b. Regulatory Matters
   - Develop guidelines for national level standards for HWTS products
   - Expedite registration of proven HWTS products
   - Reduce duties, taxes and other costs on imported HWTS products in order to improve affordability
   - Develop an alternative dosing scheme for NaOCl to minimize complexity

   c. Leadership, Advocacy and Administration
   - Establish and equip Nam Saat to provide effective technical assistance to provinces and zones to optimize HWTS choices, performance and coverage
   - Contract with NPAs and the private sector to deliver targeted HWTS interventions
   - Coordinate the development of IEC materials that all stakeholders can use to promote HWTS at all levels
   - Once adequate supplies are available, consider the launch of generic (non-branded) national media campaign to increase awareness and demand for HWTS products, followed by community-based promotion by NGOs/CBOs at the local level
   - Coordinate HWTS activities with other water, hygiene and sanitation strategies and initiatives, and encourage pursuit of synergistic opportunities with other interventions (mother and childhood health, immunizations, malaria control, etc.)
   - Develop mechanism for assisting householders to purchase BSFs and other filtration devices on an instalment basis
   - Work with NPAs, donors and other stakeholders to develop a comprehensive, multi-year proposal to demonstrate the feasibility of scaling up HWTS in 2-3 key provinces, including the cost and cost savings per person reached
   - Actively promote boiling provided it includes safe storage
2. **Increase understanding and awareness of, and demand for, HWTS**

- Identify the awareness gaps (e.g., that diarrhoea is natural/inevitable, that improving and protecting water quality minimized disease) and make those first priority; this will require multi-focused strategy depending on the target audience
- Engage the Ministry of Culture and Information to help develop messages and promote HWTS; also engage the Ministry of Education for school-based programmes
- Adopt a consumer-oriented strategy; use consumer research to find out what the target population wants, and try to meet their demands
- Consider a “national HWTS day” to coordinate governmental and non-governmental promotional campaigns
- Use sports figures and celebrities to promote HWTS
- Encourage targeted promotion of HWTS during rainy season when populations feel most vulnerable to waterborne diseases and are thus more willing to adopt protective measures
- Develop and disseminate effective, language- and culturally-appropriate IEC materials
- Develop specialized IEC materials for schools, clinics, emergencies
- Emphasize community- and household-based communication and demonstrations in addition to mass media Use locally-produced video to promote HWTS in mobile “road shows”, schools, community gatherings
- Using donor support, develop and implement campaign to give away initial supply of HWTS products as an introductory measure
- Publicise success stories
- Create more visibility for HWTS at schools, clinics, health posts, etc.
- Use rapid sanitary surveys and drinking water quality indices to create awareness of water resource conditions and encourage householders to use the best available water sources
- Use Village Health Workers (VHW), teachers and health care providers to promote HWTS
- Include HWTS products in VHW drug bags
- Develop a curriculum for HWTS in medical schools, military academies, universities, and high schools

3. **Coordination among HWTS Implementers**

- Establish partnerships with MoH, provincial and municipal governments optimize coverage and allocation of resources
- Develop coordinated advocacy strategy to develop support and funding to make HWTS a priority at provincial level by demonstrating not only health but also economic benefits (net savings) from investing in HWTS
- Conduct technology and stakeholder forums at provincial level
- Continue to map existing HWTS implementation efforts to improve awareness and monitoring of progress
- Introduce HWTS in emergencies and outbreak response as a long-term solution
- Provide training to in HWTS technology to provincial sanitary inspectors and BHWs
- Promote choice of different technologies and delivery strategies (public, social marketing, NGO, commercial)
- Provide training in various HWTS products and technologies to promote optimal solutions and sustained uptake through greater acceptability
- Encourage collaboration with International HWTS Network, WPRO and other international HWTS efforts
- Increase access to research and lessons learned
- Emphasize overall programme management in delivery of HWTS interventions

4. **Improve access to HTWS by vulnerable populations**

- Transition implementation of pilot and demonstration projects to NPAs to improve coverage and free up Nam Saat to focus on its core functions.
• Increase availability/access to commercial HWTS products by taking advantage of and improving supply chains, especially to remote rural and costal populations
• Use schools, clinics, emergency-response and other special settings to promote and deliver HWTS options
• Include HWTS options as part of preparedness for natural disasters, and take advantage of special funding reserved for emergency response
• Look for opportunities to achieve multiple goals (e.g., primary health care, safe water and AIDS project, school-based initiatives, child survival, survival kits)
• Employ micro-enterprise and micro-finance to enhance delivery and access
• Take advantage of entrepreneurial opportunities for fabricating, distributing and selling HWTS products
• Promote local production of effective HWTS options (e.g., ceramic filters) and improve capacity of existing producers
• Improve project/process management capacity for producing, delivering and securing use (behaviour change) of HWTS products as part of the effort to ensure quality control and optimize results

5. Promote research, monitoring and evaluation
• Involve Nam Saat and other governmental laboratories and epidemiologists, WPRO, universities, reference libraries and other research institutions in HWTS research and M&E
• Map existing and planned HWTS activities in Lao PDR to improve coordination and ensure optimal delivery
• Conduct complete and assessment of chlorination programme to date to determine best means of transitioning this to scale
• Document and publicise the economic advantages of HWTS over bottled water sold in Lao PDR
• Explore potential of HWTS options to address elevated levels of arsenic
• Assess the effectiveness and cost of boiling as actually conducted in Lao PDR
• Evaluate the effectiveness of HWTS options to contain cholera and other outbreaks of waterborne disease
• Document and publicise the out-of-pocket savings to the public sector and householders from using HWTS (less diagnostic and treatment costs, medicines, lost productivity, etc. in Lao PDR
• Document other benefits associated with HWTS (reduced school absenteeism, increased productivity, possible reduction in co-morbidity with other infections/diseases)
• Emphasize strategies for achieving acceptability, correct/consistent use, sustained use
• Study why people adopt household water treatment (aspirational, family, beauty, “good mother”, etc.) and other issues of behaviour change using Lao chlorination project
• Implement longitudinal studies to verify efficacy trials
• Evaluate extent to which introduction of HWTS in emergency, outbreak or higher risk (e.g., rainy season) context increases adoption and long-term use of HWTS
• Develop and implement systems to monitor longer-term adoption