Factors influencing the non-sustainability of the Improved Water Supply and Sanitation Program in Rural Area of Poor Provinces in Lao PDR

By

Environmental Health Division
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Introduction

- At the United Nations conference at Mar del Plata in 1977: “all peoples, whatever their stage of development and social and economic condition, have the right to have access to drinking-water in quantities and of a quality equal to their basic needs.”
Introduction

- The health and economic benefits of water supply and sanitation to households and individuals (and especially to children) are well documented.
- Of special importance to the poor are the timesaving, convenience and dignity
- Those without access are the poorest and least powerful.
Introduction

- Access for the poor is a key factor in improving health and economic productivity and is therefore an essential component of any effort to alleviate poverty.
- There are still huge constraints affecting the sustainability of water supply and sanitation services, including funding limitations, insufficient cost-recovery and inadequate operation and maintenance.
Introduction

- Around 2.2 million die of basic hygiene related diseases, like diarrhea, every year.
- The great majority are children in developing countries.
Introduction

- The National Poverty Eradication Program’s Operational Framework (NPEP) of Government on health sector, priorities include strengthening and improving of the quality of health care at the grassroots level, particularly in under-served areas.

- Safe drinking water, sanitation systems and improved nutritional standards are equally urgent priorities.
Introduction

- **Goal 7: Ensure environmental sustainability**
  - **Target 10:** Halve, by 2015, the proportion of people without sustainable access to safe drinking water.
  - **Indicator 29:** Proportion of pop. With sustainable access to improved water source.
  - **Indicator 30:** Proportion of pop. With access to improved sanitation.

- **Current status in the Lao PDR:**
  - National policy is to increase access to clean water from 52% (2000) to 57% (2005), and to achieve 80% coverage by 2010.
  - Access to sanitation to increase to 45% by 2005, and to 55% by 2010.
Introduction

- Province: 16
- Capital: 1
- Special region: 1
- Districts: 142
- Villages: 10,912
- Households: 84,933
Introduction

- Population: 5.3 million
- Density: 22 persons/km²
- Population growth: 2.6%
- Total fertility rate: 4.9%
- Crude birth rates: 41%
- Crude death rates: 16%
- Infant mortality rates: 82.2/1000
- Maternal mortality rates: 530/100,000
- About 20% of the population living in urban areas
Introduction

- Low life expectancy
- Malaria is the most serious public health problem
- Acute respiratory illness and diarrhea remain major causes of child mortality
- Inadequacies of health care system
- Access to drinking water is 60%
- Access to sanitation is 43%
Introduction

- The majority of these diseases are transmitted by the faecooral route and are, consequently linked to poor sanitation and water quality, poor hygiene practice, inadequate quantities of water.
Rehabilitation of water supply systems from **1997-2001** in Lao PDR

<table>
<thead>
<tr>
<th>Types of water supply systems</th>
<th>1997</th>
<th>1998</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
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<tbody>
<tr>
<td>Gravity fed system</td>
<td>13</td>
<td>14</td>
<td>12</td>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td>Borehole</td>
<td>109</td>
<td>158</td>
<td>190</td>
<td>168</td>
<td>145</td>
</tr>
<tr>
<td>Dug-well</td>
<td>2</td>
<td>10</td>
<td>23</td>
<td>24</td>
<td></td>
</tr>
</tbody>
</table>
Water coverage from 1996-2002

YEAR

<table>
<thead>
<tr>
<th>Year</th>
<th>Water supply</th>
<th>Sanitation (Family Latrine)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>42.5</td>
<td>30.6</td>
</tr>
<tr>
<td>1997</td>
<td>47.3</td>
<td>32.8</td>
</tr>
<tr>
<td>1998</td>
<td>51.2</td>
<td>33.5</td>
</tr>
<tr>
<td>1999</td>
<td>54.4</td>
<td>34.7</td>
</tr>
<tr>
<td>2000</td>
<td>52.0</td>
<td>37.6</td>
</tr>
<tr>
<td>2001</td>
<td>55.0</td>
<td>39.7</td>
</tr>
<tr>
<td>2002</td>
<td>58.1</td>
<td>41.6</td>
</tr>
</tbody>
</table>
Cases and deaths from severe diarrhea and typhoid fevers in 2003, Lao PDR

- Severe diarrhea: 2042 cases, 5 deaths
- Typhoid fevers: 1224 cases, 0 deaths
Cases of cholera in each province in 2002

- Phongsaly: 19
- Luangnamtha: 54
- Oudomxay: 40
- Bokeo: 8
- Luangprabang: 460
- Huaphanh: 105
- Xayabuly: 22
- Xiengkuang: 1
Water and sanitation coverages in each district of Phongsaly Province in 2002

Water

Sanitation

Province: 43.69

Province: 13.13

Water and sanitation coverages in each district of Phongsaly Province in 2002.
Water and sanitation coverages in each district of Oudomxay Province, 2002

Province: 38.3%
Province: 18.1%
Water and sanitation coverages in each district of Xekong province, 2002

Provincial Coverage: 48.1
Sanitation Coverage: 18.9

District Coverages:
- KALEUM: Water 19, Sanitation 2.79
- THATENG: Water 92, Sanitation 18
- LAMARM: Water 43.02, Sanitation 27.25
- DAKCHEUNG: Water 23.36, Sanitation 3.32
Water and sanitation coverages in each district of Attapeu Province, 2002

Province: 59.99
Sanitation: 28.3
## Water supply systems breakdowns in Yot Ou District in 2004

Population: 26,416

<table>
<thead>
<tr>
<th>Number of villages with improvement</th>
<th>Year of construction</th>
<th>Year of completion</th>
<th>Big</th>
<th>Small</th>
<th>Donors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water system 20/89</td>
<td>2003</td>
<td>2003</td>
<td>X</td>
<td></td>
<td>Aus Aid</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>2003</td>
<td>X</td>
<td></td>
<td>Aus Aid</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>2003</td>
<td>X</td>
<td></td>
<td>Aus Aid</td>
</tr>
<tr>
<td></td>
<td>1999</td>
<td>1999</td>
<td>X</td>
<td></td>
<td>ถิ่นทุ่งบาง</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>2003</td>
<td>X</td>
<td></td>
<td>Aus Aid</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>2003</td>
<td>X</td>
<td></td>
<td>Aus Aid</td>
</tr>
</tbody>
</table>
### Water supply systems breakdown in Kaleum in 2004

<table>
<thead>
<tr>
<th>Villa with improvement</th>
<th>Year of construction</th>
<th>Year of completion</th>
<th>Donors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water systems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41/74</td>
<td>2000</td>
<td>2001 (water tap)</td>
<td>ACF</td>
</tr>
<tr>
<td></td>
<td>2000</td>
<td>2003 (intake)</td>
<td>ACF</td>
</tr>
<tr>
<td></td>
<td>2000</td>
<td>2002 (intake)</td>
<td>ACF</td>
</tr>
<tr>
<td></td>
<td>2000</td>
<td>2003 (intake)</td>
<td>ACF</td>
</tr>
<tr>
<td></td>
<td>2003</td>
<td>2003 (leakage of water pipe and water quality)</td>
<td>ACF</td>
</tr>
</tbody>
</table>
Water supply systems breakdown in Phouvong District in 2004

Population: 8,322 ถิม

<table>
<thead>
<tr>
<th>Villag with improved Water systems</th>
<th>Nb of bore</th>
<th>Year</th>
<th>Breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/25</td>
<td>61</td>
<td>1999-2001</td>
<td>16</td>
</tr>
</tbody>
</table>
Conceptual framework

- Personal socio-economic background
- Community management for WSS
- Government roles
- International agencies roles
- Other factors
3. Conceptual framework (Indicators/Sub indicators linkages):

Independent variables
- Personal demographic data:
  - Age
  - Occupation
  - Ethnic group
  - Level of education
  - Sex
  - Economy status

- Community management:
  - Demand responsive approach
  - Informed choices including technology options
  - Village agreement
  - Village action plan
  - Water quality surveillance and control
  - Community participation
  - Capacity building
  - Rule
  - Monitoring

- Go
  - Tec
  - Cap city building
  - Monitoring and evaluation

- External support organizations:
  - Finance
  - Equipments and supplies/Capacity building
  - Monitoring and evaluation

Dependent variables

- Non-sustainability of:
  1. Technical aspects:
    a. Surface water
    b. Ground water

- Health/ Hygiene impacts
  a. Community satisfaction
  b. Equity
  c. Gender

- 3. Environmental aspects
- 4. Institutional aspects:
  a. Financial aspects
  b. Village Committee
  c. Operation and maintenance

Other factors:
- Distance from the capital town
- Private sectors
- Accessibility
- Population size
- Population density
- Age of system
Expected outcomes

- Provide directions in order to improve community water supply and sanitation system in terms of quality, coverage, quantity, sustainability and cost including water quality surveillance.
General objectives

- To know the factors influencing the non-sustainability of the improved rural water supply and sanitation programs in 4 provinces.
Specific objectives

- To identify the community management for water supply and sanitation program
- To identify the government roles in water supply and sanitation program
- To identify the external support agency roles in water supply and sanitation program
- To identify other factors influencing the non sustainability of water supply and sanitation program
- To determine a relationship between the non sustainability of water supply and sanitation program and personal demographic data, community management, government roles, external support agency and other factors
Specific objectives

- To determine a relationship between the community management for water supply and sanitation facilities and the government roles in water supply and sanitation programs.
- To determine a relationship between the community management for water supply and sanitation facilities and the external support agency roles in water supply and sanitation programs.
- To determine a relationship between the community management for water supply and sanitation programs and other factors.
- To determine a relationship between the government roles in water supply and sanitation programs and the external support agency roles in water supply and sanitation programs, and other factors.
Hypothesis

- There is a relationship between Village Committee for Water Supply and Sanitation and the non sustainability of water supply and sanitation program
- There is a relationship between convenience and the non sustainability of water supply and sanitation program
- There is a relationship between water uses and the non sustainability of water supply and sanitation facility
- There is a relationship between health effects and the non sustainability of water supply and sanitation program
- There is a relationship between ethnic groups and the non sustainability of water supply and sanitation program
Methodology

- **Study design:** Cross sectional study
- **Target areas:** 4 provinces, 4 districts and 32 villages:
  - Phongsaly Province: Nyot Ou district,
  - Oudomxay Province: Namor district,
  - Xekong Province: Kaleum district,
  - Attapeu Province: Phouvong district,
Target provinces and districts

LAO PDR: 72 districts identified as poor

According to percentage of poor households

- 25 districts identified in poor
- 17 not identified as poor districts

Method of sampling and instruments

- District
  - 8 Villages
    - Good system with good management
    - Good system with poor management
    - Breakdown with poor management
    - Random sampling
      - Systematic sampling

- Household
  - Village Committee
    - For WSS
      - Water supply systems
      - Latrines
    - Sanitary inspection
      - Latrine hygiene inspection
    - Community survey
      - For WSS
    - Questionnaire
    - General hygiene inspection
  - Pretested and improved
Target villages in Yot Ou District
Target villages in Namor District
Target villages in Kaleum District
Target villages in Phouvong District
Methodology

- **Samples size:**
  - 632 persons (20 persons/village)
  - 32 Village Committee for WSS (One Committee for one village)
  - 8 Provincial Namsaats
  - 8 District Namsaats

- **Target water supply and sanitation facilities:**
  - Water supply facilities in four districts:
    - Gravity fed system: 23
    - Boreholes: 9
  - Sanitation in four districts:
    - Latrines: 99
    - General household hygiene: 258 households (8 in each village)
Methodology

- **Data collection:**
  - Questionnaire consisted of 5 parts:
    - Personal demographic data
    - Community management for water and sanitation
    - Roles of Government
    - Roles of International Agencies
    - Other factors
  - Pretest and improve questionnaire
  - Train teams before actual data collection
  - Teams went to field data collection in accordance to action plan
Scoring

- **Interval scale:**
  - Good = +2, Fair = +1, Poor = 0

- **Multiple choices**
  Scoring:
  - +2 Committee, villagers
  - +1 District Namsaat, Province
  - 0 Don’t know
Methodology

- Open questions and general information: showing in frequency and percentage
- Observations:
  - Maximum 3 or 1.
  - Minimum 1 or 0.
- Ranking:
  If scoring:
  - $< 50\% = \text{Poor general household hygiene}$
  - $> 50\% = \text{Good general household hygiene}$
Data analysis

- Rechecked one more time for completeness and accuracy.
- Developed a coding sheet
- Used SPSS for Windows for data entry
- After completion of data entry, we checked it to avoid its mistakes
- Used Kolmogorov, histogram, plots and Levene's tests to study the normal distribution and the variance of each variable
- Some statistical parameters have been used to explain general characteristics of each variable, the hypothesis and the relationship among variables as below:
  - Descriptive study
  - Chi-square test
Results
General information
Village distance from the city town in 4 provinces

- < 5 Km: 22%
- 5-10 Km: 9%
- > 10 Km: 69%
Access to roads in 4 provinces

- Yes: 84%
- No: 16%
Age of interviewees in 4 provinces

- < 18 year olds: 1.4%
- 18-25 year olds: 10.1%
- > 25 year olds: 88.4%
Relationship to the head of household in 4 provinces

- Spouse: 53%
- Mother in law: 36%
- Daughter: 1%
- Son: 7%
- Father in law: 1%
- Others: 2%
Sex of interviewees in 4 provinces

- Male: 64%
- Female: 36%
Number of family members in one household of interviewees in 4 provinces

- < 6 persons: 66%
- 6-12 persons: 32%
- > 12 persons: 2%
Interviewees' main occupations in 4 provinces

- Rice fields: 58%
- Shifting agriculture: 40%
- Government staffs: 1%
- Farmers: 1%
Interviewees' education level in 4 provinces

- No classroom: 37%
- Primary school but not completed: 36%
- Secondary school but not completed: 3%
- Completed secondary school: 5%
- Completed high school: 1%
- Completed primary school: 17%
Interviewees' living areas in 4 provinces

- < 25 m²: 37%
- 25-50 m²: 40%
- > 50 m²: 23%
Interviewees' types of kitchen in 4 provinces

Percentage

Types of kitchen

Outside the houses: 39.6%
Inside the houses: 60.4%
Energy uses for cooking of interviewees in 4 provinces

- Woods: 98%
- Charcoals: 2%
- Woods and charcoals: 0%
Interviewees' poor families in 4 provinces

- Poor: 61%
- Non poor: 39%
Water and Sanitation Information
Types of improved water supply systems in the study areas in 4 provinces

- Gravity fed systems: 72%
- Boreholes: 28%
Supporting agencies to the construction of water supply systems in the study areas

- Government: 3.1%
- NAFRI: 3.1%
- Enfant d'ailleurs: 3.1%
- ADB: 3.1%
- CIDSE: 3.1%
- Quaker: 6.3%
- UNICEF: 6.3%
- SEPDEV: 9.4%
- ACF: 15.6%
- Aus-Aids: 21.9%
- ADRA: 25%

Percentage
Types of organizations to manage water supply systems

- Village heads: 38%
- Mass organizations: 9%
- Village Committee for Water and Sanitation: 53%
Village Committees officially assigned and selected by villagers

Percentage

Village Committee for WSS officially assigned
- Yes: 40.6%
- No: 59.4%

Village Committee for WSS selected by villagers
- Yes: 56.3%
- No: 43.7%
Number of women in the Village Committee fr Water and Sanitation

- 1 person: 28%
- 2 persons: 19%
- Zero: 53%
Village Committee for Water and Sanitation shared responsibilities, participated in the training course on water and sanitation and health education.

- Village Committee for WSS shared responsibilities: 59.4%
- Village Committee participated in the training course on water and sanitation management: 25%
- Village Committee participated in the training course on health education: 25%
Village health volunteers have been assigned and participated in the training course on operation and maintenance.
Number of women in the village health volunteers for WSS

- Zero person: 81%
- One person: 19%
Village water rules

No
50%

Yes
50%
Distance of drinking water source of interviewees in 4 provinces

<table>
<thead>
<tr>
<th>Distance</th>
<th>Raining season</th>
<th>Dry season</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 20 m</td>
<td>53.1%</td>
<td>49.3%</td>
</tr>
<tr>
<td>20-50 m</td>
<td>22.5%</td>
<td>23.6%</td>
</tr>
<tr>
<td>&gt; 50 m</td>
<td>24.4%</td>
<td>27.1%</td>
</tr>
</tbody>
</table>
Time taken in fetching drinking water source of interviewees in 4 provinces

- **< 5 mn**
  - Dry season: 54.4%
  - Raining season: 51%

- **5-10 mn**
  - Dry season: 26%
  - Raining season: 27.4%

- **> 10 mn**
  - Dry season: 19.6%
  - Raining season: 21.6%
Characteristics of people went to fetch water before having water supply systems in 4 provinces

- Others: 1.7%
- Women, girls and boys: 2.1%
- Women, men, girls and boys: 5.1%
- Women, men and girls: 5.1%
- Women and girls: 16.7%
- Women and men: 26.5%
- Boys: 0.2%
- Girls: 3.4%
- Men: 1.9%
- Women: 37.4%
The water supply systems came from village demand in 4 provinces

- Village demand: 94%
- Project provided: 6%
People ideas to build the water supply systems in 4 provinces

- Village leaders: 19.7%
- Villagers: 72.1%
- Mass organizations: 1.1%
- Project staffs: 1.3%
- Village leaders and villagers: 4.8%
- Others: 4.5%
Families participated in the community dialogue in 4 provinces

- Yes: 86%
- No: 14%
Families participated in the selection of water supply options in 4 provinces

- Yes: 74%
- No: 26%
Household contributions to the construction of water supply systems in 4 provinces

- **Materials**
- **Labors**
- **Money**
- **Contribution**

<table>
<thead>
<tr>
<th>Contribution</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>100</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>Zero</td>
<td>60.5</td>
</tr>
<tr>
<td>&lt; 30,000 kips</td>
<td>32.9</td>
</tr>
<tr>
<td>&gt; 30,000 kips</td>
<td>6.6</td>
</tr>
<tr>
<td>Zero</td>
<td>0.8</td>
</tr>
<tr>
<td>1-2 persons</td>
<td>49.8</td>
</tr>
<tr>
<td>&gt; 2 persons</td>
<td>49.4</td>
</tr>
<tr>
<td>No materials</td>
<td>16.9</td>
</tr>
<tr>
<td>Sand, gravels, woods and foods</td>
<td>83.1</td>
</tr>
</tbody>
</table>
Villagers washed their clothes at stand posts in 4 provinces

- Yes: 57.7%
- No: 36.8%
- Don't know: 5.9%
Water supply systems were breakdown last year in 4 provinces.
Types of water supply systems breakdown in 4 provinces

- Small breakdown: 63%
- Big breakdown: 31%
- Small and big breakdown: 6%
Location of water supply systems breakdown in 4 provinces

- Stand post did not work
- Leakage of water pipe
- Intake
- Leakage of water pipe and stand post did not work
- Intake and leakage of water pipe
- Intake and stand post did not work
- Leakage of water pipe and stand post did not work
- Water tank, leakage of water pipe and stand post did not work
- Others

Percentage distribution:
- Stand post did not work: 29.4%
- Leakage of water pipe: 13.7%
- Intake: 10.4%
- Leakage of water tank and leakage of water pipe: 8.2%
- Intake, leakage of water pipe: 7.4%
- Intake and leakage of water pipe: 4.1%
- Intake, water tank, leakage of water pipe: 4.1%
- Others: 2.4%
- Intake, water tank, leakage of water pipe and stand post did not work: 2.5%
Main causes of water supply systems breakdown in 4 provinces

- Poor management: 35.2%
- Water pipe broken: 13.5%
- Accidents: 10.8%
- Children played: 10.8%
- Obstruction of intake: 9.8%
- Water not good: 4.4%
- Much used and water tap broken: 4.6%
- Others: 10.9%
Number of water supply systems breakdown per year in 4 provinces

- < 2 times/year: 60%
- 2-4 times/year: 25%
- 4-13 times/year: 15%
Number of days small repairs completed

- One day: 46%
- 2-4 days: 36%
- 4-60 days: 18%
People did the small repairs in 4 provinces

- Water users: 54.2%
- Village health volunteers: 28.9%
- District/Provincial staffs: 7.9%
- Private sectors: 1.6%
- Water users and village health volunteers: 2%
- Others: 5.4%
Having spare parts in 4 provinces

- Yes: 24%
- No: 76%
Money contributed to the repairs of water supply systems breakdown in the last 12 months

- Zero: 60%
- 500-1000 kips: 19%
- > 1000 kips: 21%
They got water from other sources when water supply systems were breakdown.

- Rivers: 79%
- Old dugwells: 17%
- Others: 4%
Village financial management in 4 provinces

- Financial village: 78.5%
- Recording in the book: 73.1%
- Reporting the expenditures and balances: 47.8%
- Showing the bills of all expenditures: 41%
Participation and monitoring of Government staffs, International agencies and private sector on water projects after its completion in 4 provinces

- **Private sector participated with the project**: 22.5%
- **Government staffs monitored water projects after its completion**: 64%
- **International agencies including NGO's monitored water projects after its completion**: 55.4%
Water coverage in 4 districts

- Percentage > 100: 31.3
- Percentage = 100: 68.7

- Coverage < 100: 31.3%
- Coverage = 100: 68.7%
Water coverage by province/district
Water coverage by village category

- Villages with water supply systems breakdown: 25%
- Villages with no water supply systems breakdown but poor management: 30.8%
- Villages with no water supply systems breakdown but good management: 42.9%
Water quantity by village category

Villages with water supply systems breakdown
Villages with no water supply systems breakdown but poor management
Villages with no water supply systems breakdown but good management
Total

Percentage

Water quantity by village category

Percentage

20 l/capita/day
20-50 l/capita/day
50-100 l/capita/day
> 100 l/capita/day

Villages with water supply systems breakdown
Villages with no water supply systems breakdown but poor management
Villages with no water supply systems breakdown but good management
Total
Continuity of water supply by province

- Phongsaly/Yot Oe: 25% < 50, 25% Between 50-80
- Oudomxay/Naoro: 25% < 50, 12.5% Between 50-80
- Xekeong/Kaleum: 12.5% < 50, 12.5% Between 50-80
- Attapeu/Phoung: 15.6% < 50, 12.5% Between 50-80
Continuity of water by village category

- Villages with water supply systems breakdown: 33.3% < 50%, 58.4% 50-80%, 8.3% >80%
- Villages with no water supply systems breakdown but poor management: 7.7% < 50%, 15.4% 50-80%, 76.9% >80%
- Villages with no water supply systems breakdown but good management: 14.3% < 50%, 85.7% >80%
- Total: 15.6% < 50%, 12.5% 50-80%, 71.9% >80%
Sanitary inspection of Gravity Fed System in 3 Provinces

Percentage

Sanitary status

- Poor: 14.5%
- Moderate: 74.2%
- Good: 11.3%
Sanitary inspection of gravity fed system by Province/District

<table>
<thead>
<tr>
<th>Province/District</th>
<th>Poor</th>
<th>Moderate</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phongsaly: Yot Ou District</td>
<td>8.3</td>
<td>91.7</td>
<td></td>
</tr>
<tr>
<td>Oudomxay: Namor District</td>
<td>14.3</td>
<td>52.4</td>
<td>33.3</td>
</tr>
<tr>
<td>Xekong: Kaleum</td>
<td>14.5</td>
<td>76.5</td>
<td>11.3</td>
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<td>14.5</td>
<td>74.2</td>
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Percentage
Sanitary inspection of boreholes in 2 provinces

<table>
<thead>
<tr>
<th>Province/District</th>
<th>Poor</th>
<th>Moderate</th>
<th>Good</th>
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</thead>
<tbody>
<tr>
<td>Oudomxay: Namor District</td>
<td>100</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Attapeu: Phouvong District</td>
<td>0</td>
<td>65</td>
<td>25</td>
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<tr>
<td>Total</td>
<td>0</td>
<td>15</td>
<td>14.3</td>
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</table>
General household hygiene by province/district

Provinces/Districts

- Phongsaly: Yot Ou District
- Oudomxay: Namor District
- Xekong: Kaleum District
- Attapeu: phouvong
- Total

Percentage

- Poor
- Good

- Phongsaly: Yot Ou District
  - Poor: 11.1%
  - Good: 88.9%

- Oudomxay: Namor District
  - Poor: 34.8%
  - Good: 65.2%

- Xekong: Kaleum District
  - Poor: 38.5%
  - Good: 61.5%

- Attapeu: phouvong
  - Poor: 46.9%
  - Good: 53.1%

- Total
  - Poor: 51.9%
  - Good: 48.1%
General household hygiene by village category

- **Villages with water supply systems breakdown**: 58.9%
  - Poor: 41.1%
  - Good: 58.9%
- **Villages with no water supply systems breakdown but poor management**: 51.9%
  - Poor: 48.1%
  - Good: 51.9%
- **Villages with no water supply systems breakdown but good management**: 52.6%
  - Poor: 47.4%
  - Good: 52.6%
- **Total**: 51.9%
  - Poor: 48.1%
  - Good: 51.9%
Latrine hygiene by province

Provinces/Districts:
- Phongsaly: Yot OU
- Oudomxay: Namor
- Attapeu: Phouvong
- Total

Percentage:
- Phongsaly: Yot OU - 55.6%
- Oudomxay: Namor - 72.5%
- Attapeu: Phouvong - 64.3%
- Total - 63.6%

Legend:
- Orange: Poo
- Green: Goc
Latrine hygiene by village category

- Total: 63.6%
- Villages with no water supply breakdown but good management: 60.0%
- Villages with no water supply breakdown but poor management: 71.1%
- Villages with water supply breakdown: 50.0%

Latrine hygiene categories:
- Poor
- Good
Community satisfaction by province

- Phongsaly: Yot Ou District
- Oudomxay: Namor District
- Xekong: Kaleum District
- Attapeu: Phouvong District
- Total

Percentage

<table>
<thead>
<tr>
<th>Province/District</th>
<th>Poor</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phongsaly: Yot Ou District</td>
<td>70.5</td>
<td>29.5</td>
</tr>
<tr>
<td>Oudomxay: Namor District</td>
<td>54.4</td>
<td>45.6</td>
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<tr>
<td>Xekong: Kaleum District</td>
<td>55.1</td>
<td>44.9</td>
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<td>35</td>
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<tr>
<td>Total</td>
<td>61.3</td>
<td>38.7</td>
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</table>
Gender status in 4 Provinces

- Percentage

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<tr>
<th>Status</th>
<th>Percentage</th>
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<td>Poor</td>
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</tr>
<tr>
<td>High</td>
<td>52.4</td>
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</table>
Community management for water and sanitation in 4 provinces

- Poor: 43.3%
- Good: 56.7%
Community management for water and sanitation by province/district

<table>
<thead>
<tr>
<th>Province/District</th>
<th>Poor</th>
<th>Good</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phongsaly/Yot Ou</td>
<td>95.3</td>
<td>64.7</td>
</tr>
<tr>
<td>Oudomxay/Namor</td>
<td>27.5</td>
<td>72.5</td>
</tr>
<tr>
<td>Xekong/Kaleum</td>
<td>31.3</td>
<td>68.7</td>
</tr>
<tr>
<td>Attapeu/Phouvong</td>
<td>49.6</td>
<td>59.6</td>
</tr>
<tr>
<td>Total</td>
<td>56.7</td>
<td></td>
</tr>
</tbody>
</table>
Community management for water and sanitation by village category

- villages with water supply systems breakdown: 51.5% Poor, 48.5% Good
- villages with no water supply systems breakdown but poor management: 39.4% Poor, 60.6% Good
- villages with no water supply systems breakdown but good management: 41.3% Poor, 58.7% Good
- total: 43.3% Poor, 56.7% Good
Sufficiency of water in 4 provinces

- Sufficient throughout the year: 58.6%
- Somewhat sufficient: 27.1%
- Not sufficient: 14.3%
Part of the year when water was somewhat sufficient or not sufficient in 4 provinces

- Most of the dry season: 60.1%
- Some of the dry season: 39.9%

Part of the year
Water taste in 4 provinces

Percentage

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Good</td>
<td>61.8</td>
</tr>
<tr>
<td>Moderate</td>
<td>28.4</td>
</tr>
<tr>
<td>Poor</td>
<td>4.7</td>
</tr>
<tr>
<td>Others</td>
<td>5.1</td>
</tr>
</tbody>
</table>
Water color in 4 provinces

<table>
<thead>
<tr>
<th></th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transparent</td>
<td>91.7</td>
</tr>
<tr>
<td>Red</td>
<td>3.2</td>
</tr>
<tr>
<td>Concentrated white</td>
<td>3.5</td>
</tr>
<tr>
<td>others</td>
<td>1.6</td>
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</tbody>
</table>
Reducing labors and timings of women and children in fetching water

- Much reduced: 75.3%
- Somewhat reduced: 19.3%
- Same: 5.4%
Purposes of using water supply systems in 4 provinces

- Drinking, washing, clothing and cooking: 47.4%
- Drinking and cooking: 19.9%
- Drinking: 13.5%
- Drinking, washing, clothing, cooking and vegetable gardens: 12%
- Cooking: 1.8%
- Drinking, washing and clothing: 1.8%
- Washing, clothing and cooking: 1.3%
- Washing and clothing: 0.8%
- Others: 2.4%
Households spend time per day on fetching water from the water supply systems to the house in 4 provinces.

- 97% of households spend less than 1 hour fetching water.
- 2.6% of households spend 1-2 hours fetching water.
- 0.5% of households spend more than 2 hours fetching water.
Households use water from other sources in 4 provinces

Percentage

Households that use water from other sources: 64.7%
Households that do not use water from other sources: 35.3%
People drank boiled water in 4 provinces

Percentage

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>93.6</td>
<td>6.4</td>
</tr>
</tbody>
</table>
People drank boiled water regularly

- Regular: 68.4%
- Irregular: 31.6%
After having water supply systems, family members got diarrhea.
Family health members got better after having water supply systems
Children with 0-15 year olds got diarrhea in the past two weeks

- Yes: 9.6%
- No: 90.4%
Women participated in water management after completion of water supply projects.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>76.7</td>
<td>23.3</td>
</tr>
</tbody>
</table>
Women participated in water installation in 4 provinces.
Poor families used water as equal as wealth families

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>94.9</td>
<td>5.1</td>
</tr>
</tbody>
</table>

Poor families used water as equal as wealth families.
Families had latrines in 4 provinces

- Yes: 23.8%
- No: 76.2%
Types of family latrines in 4 provinces

- Pourfresh latrines: 68.9%
- Dry latrines: 28.4%
- Pourfresh latrines and dry latrines: 2.7%
Family members used latrines in 4 provinces

- All members used: 63.5%
- Some members used: 17.6%
- They did not use: 18.9%

Family members used latrines in 4 provinces.
Area where family members defecated when they had no a latrine

- Open field: 99.2%
- Dig a hole: 0.8%
Relationship between some key factors and non-sustainability of improved water supply systems, and community management for water and sanitation
Relationship between some key factors and non-sustainability of improved water supply systems (Breakdown)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Chi-square</th>
<th>d.f</th>
<th>p-value</th>
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<tbody>
<tr>
<td>Poverty</td>
<td>20.004</td>
<td>1</td>
<td>0.000</td>
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<tr>
<td>Community satisf</td>
<td>23.74</td>
<td>1</td>
<td>0.000</td>
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<tr>
<td>DRA</td>
<td>4.419</td>
<td>1</td>
<td>0.036</td>
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<tr>
<td>Informed choices</td>
<td>2.282</td>
<td>1</td>
<td>0.131</td>
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<tr>
<td>Financial village</td>
<td>13.699</td>
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</tr>
<tr>
<td>Monitoring of Village</td>
<td>2.286</td>
<td>1</td>
<td>0.131</td>
</tr>
<tr>
<td>org for Water and Sanitation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private sector</td>
<td>1.027</td>
<td>1</td>
<td>0.311</td>
</tr>
<tr>
<td>Monitoring of Gov staffs</td>
<td>18.114</td>
<td>1</td>
<td>0.000</td>
</tr>
<tr>
<td>Monitoring of Inter ag</td>
<td>31.965</td>
<td>1</td>
<td>0.000</td>
</tr>
</tbody>
</table>
Relationship between some key factors and non-sustainability of improved water supply systems
(Breakdown)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Chi-square</th>
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<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sanitary Inspection of water supply systems</td>
<td>50.450</td>
<td>1</td>
<td>0.000</td>
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<tr>
<td>Reducing labors and timings of women and children</td>
<td>9.248</td>
<td>1</td>
<td>0.010</td>
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<td>Diarrhea diseases</td>
<td>3.531</td>
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<td>0.060</td>
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<tr>
<td>Gender participation</td>
<td>9.809</td>
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<td>0.002</td>
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<td>Village health volunteers</td>
<td>1.464</td>
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<td>0.226</td>
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<td>Village committee taken Care WS</td>
<td>4.735</td>
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<td>0.094</td>
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<tr>
<td>Age of villagers</td>
<td>2.649</td>
<td>2</td>
<td>0.266</td>
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<tr>
<td>Main Occupations</td>
<td>3.296</td>
<td>3</td>
<td>0.348</td>
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<tr>
<td>Ethnic groups</td>
<td>184.912</td>
<td>15</td>
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</table>
Relationship between some key factors and non-sustainability of improved water supply systems (Breakdown)

<table>
<thead>
<tr>
<th>Factors</th>
<th>Chi-square</th>
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<tbody>
<tr>
<td>Level of education</td>
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<td>6</td>
<td>0.016</td>
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<tr>
<td>Sex</td>
<td>0.160</td>
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<td>0.689</td>
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<tr>
<td>Washing clothes</td>
<td>1.938</td>
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<td>0.380</td>
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<tr>
<td>Convenience of using water</td>
<td>39.235</td>
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<tr>
<td>Satisfaction with job of Village</td>
<td>6.917</td>
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<td>0.031</td>
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<tr>
<td>organization for water and sanitation</td>
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<tr>
<td>Training on Community management</td>
<td>2.263</td>
<td>1</td>
<td>0.133</td>
</tr>
<tr>
<td>for water and sanitation</td>
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<td></td>
</tr>
<tr>
<td>Far from the city town</td>
<td>1.974</td>
<td>2</td>
<td>0.373</td>
</tr>
<tr>
<td>Population size</td>
<td>2.376</td>
<td>2</td>
<td>0.305</td>
</tr>
<tr>
<td>Access road</td>
<td>19.467</td>
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<td>0.000</td>
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</table>
### Relationship between some key factors and community management for water and sanitation

<table>
<thead>
<tr>
<th>Factors</th>
<th>Chi-square</th>
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<th>p-value</th>
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<tbody>
<tr>
<td>Age of people</td>
<td>1.288</td>
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<td>0.525</td>
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<td>Main occupations</td>
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<td>Ethnic groups</td>
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<tr>
<td>Level of education</td>
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<td>Monitoring of Gov</td>
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<td>Monitoring of Inter agency</td>
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### Relationship between some key factors and community management for water and sanitation

<table>
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<tr>
<th>Factors</th>
<th>Chi-square</th>
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<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community satisfaction</td>
<td>19.431</td>
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<td>Health education</td>
<td>71.608</td>
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<tr>
<td>Reducing labors and timings of women and children</td>
<td>5.080</td>
<td>2</td>
<td>0.079</td>
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<tr>
<td>Convenience of using water</td>
<td>14.373</td>
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<td>0.001</td>
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<td>Diarrhea cases</td>
<td>7.507</td>
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<td>0.006</td>
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<tr>
<td>Women participation in water management</td>
<td>19.632</td>
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<tr>
<td>Family latrines</td>
<td>3.712</td>
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<tr>
<td>Access road</td>
<td>0.468</td>
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<td>0.494</td>
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</table>
Conclusions
Conclusions

- Even though national water supply and sanitation coverage in 2003 were 60.0% and 43.0% respectively, it does not mean that all villagers with the existing of improved water supply systems used enough and safe water.

- From this case study, we found that there were many villages with improved water supply and sanitation had problems with:
  - water quantity
  - water quality
  - water coverage
  - continuity of water supplied
  - Cost for O&M
Conclusions

- The survey results showed that 58.6% of villagers indicated that water was sufficient throughout the year.
- Besides using the improved water supply systems, they were still needed safe water from other sources like rivers for other purposes such as drinking, washing, cooking and bathing.
- The general hygiene of each household and latrine hygiene were poor.
- Although most of people drank boiled water, some of them got diarrhea.
Conclusions

- 58.4% water supply systems breakdown especially small breakdown 63.2%
- The main causes of breakdowns were poor management of community.
- The community management status for water and sanitation was poor with 43.3%.
- They had water quality problems during raining seasons especially gravity fed systems.
- The monitoring of Government staffs and International agencies were poor.
Conclusions

- Further, we should pay more attention to the existing of the improved water and sanitation through regular monitoring of organizations concerned like Government and International agencies including NGO’s.
- In addition, strengthening community management for water supply and sanitation including water quality surveillance.
- Increasing gender awareness should be emphasized.
Recommendations
Recommendations

- Apply rural water supply and sanitation strategy into local area in order to aware the local authorities and all stakeholders for homogenous implementation.
- Regulation on drinking water quality standard management should be applied and enforced by all local authorities and stakeholders.
- Develop clear guidelines on community management for water and sanitation including water quality surveillance.
- At the district level, where were the planning unit and close links with grass root level, this increases a coordination with concerned organizations, develop integrated planning and monitoring such as local authorities, NGOs, and private sector actors.
Recommendations

- At community level:
  - Develop management mechanisms such as financial management, operation and maintenance, participatory monitoring, sanitary inspection of water supply systems etc.
  - Encourage community to be the ownership in water and sanitation management
  - Promote women to be more participated in water and sanitation management
Recommendations

- For poor families, appropriate policy on contribution in water construction, establishment of financial village, operation and maintenance etc. should be developed.
- Encourage people to use widely family latrines.
- Promote household water treatment and safe storage.
Recommendations

- Appropriate technical issues should be discussed and fit to the local situations for water supply system construction.
- Strengthen Government monitoring systems including International Agencies.
- Promote widely and deeply hygiene educations to villagers.
- Research or case study on why some families did not use latrines and appropriate technology for improving water quality should be carried out in order to further improve rural water supply and sanitation programs.
Acknowledgements

- Department of Hygiene and Prevention, Ministry of Health
- Center for Water and Sanitation
- Environment Research Institution, STEA
- World Bank
- Local authorities of Yot OU, Namor, Kaleum and Phouvong Districts
- Provincial Health Department of Phongsaly, Oudomxay, Xekong and Attapeu
- Provincial and District Namsaats in target areas including Provincial STEA
- Village heads, Elders, Front Union, Mass organizations in the target villages including villagers both men and women for good cooperation and coordination