



## Lao PDR Primary Health Care Expansion Project: A Case Study of Development Project Implementation Efficiency and Effectiveness

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**Abstract**— This paper examines the effectiveness and efficiency of the Primary Health Care Expansion Project in eight provinces in northern part of Lao PDR to draw lessons for improving levels of efficiency and effectiveness of future project coordination and management. This case study provides lessons, from a management perspective, to larger questions concerning effective and efficient use of scarce financial resources, especially those of foreign loans, on development projects beyond the health sector. Our analysis finds that the implementation of the PHCEP was effective but inefficient, due to cost overrun and abnormally large miscellaneous spending. To improve implementation efficiency, we recommend that project fund from each partner, especially from government's share of financial commitment, should be in place prior to issuing contracts to avoid rising costs due to delays, and keep miscellaneous spending at a minimum. In addition, to improve allocation efficiency, more funding should be allocated for expansion of village-based health service centers, where responses to health care service expansion were highest and the poor benefited most.

**Keywords**— Effectiveness, efficiency, project management, project evaluation.

### 1. INTRODUCTION

Effective and efficient use of Official Development Assistance (ODA) has constantly been an issue of concern for both the donor and recipient countries, and it is the core issue in this paper. How efficient and effective have government development projects been managed and how can improvement be made? This is a larger, dual-question this case study of the Primary Health Care Expansion Project (PHCEP—the Project) seeks to answer. The Project covers eight provinces in northern Lao PDR (hereafter, Laos, for convenience), focusing on the *effectiveness* and *efficiency* issues of project implementation and outcomes of the civil work component of the Project. Improving health care is an integral part of government's strategy towards sustainable socioeconomic development, as better health care helps reduce poverty and promotes equity, which tends to further promote a more sustainable development path. Knowledge gained from this case study is hoped to be applicable to improving future management of development project implementation with cooperative agreement between Laos and foreign/international aid agencies in order to raise effectiveness and efficiency, leading towards a more sustainable socioeconomic development.

Laos' economic reforms, which formally began in 1986, from a centrally-planned economy to a market-oriented one, have resulted in relatively high economic growth with increasing personal incomes and improving wellbeing. Laos' per capita gross national income quadrupled between 2000 and 2011, from \$280 to \$1,130, elevated the country from a low-income to lower-middle income group, and poverty declined from 38.6% in 1997 to 23.2% in 2013 [1]. Life expectancy at birth, between 1995 and 2010, rose from 59.5 years to 68.5 years for female and from 57 years to 65.7 years for male. Infant mortality rate, per 1,000 live births, also nearly halved over the same period, dropping from 80.1 to 42.1 [2].

Despite initial economic success and improvement in social conditions, Laos remains one of the poorest and least developed countries in the world and in Southeast Asian region, thus remained dependent on ODA. Between 1995 and 2011, Laos received a total of \$5,841 million in ODA in grants and loans, accounting for 53% of total government expenditure over this period [3]. ODA accounted for as much as 84.8% of government's total expenditure in 2002, but it has substantially reduced to 25.3% by 2010 [3]. Despite a drastic drop in its share, the actual amount of ODA has actually increased 1.5 times over this period, from \$278.5 million in 2002 to \$413.8 million in 2010. Thus, ODA remains a crucial source for financing the country's development and maintaining economic growth momentum as total government spending has rapidly expanded to meet the growing demand of an expanding economy. Therefore international cooperation remains a critical component of the country's development work.

Effective and efficient management of ODA is critical. Effective use of ODA means intended results/goals are achieved while efficient use of ODA, especially for loans, means better results at a lower cost. An efficient development project is a project that attains a certain set

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of outputs with less resources used, or a project that produces more outputs of a given quality standard with a given amount of resources. That is, given a total of \$2,938.8 million of PPG foreign debts, as of December 2010 [4], with an efficiency gain of just 1% for all development projects, the country would have saved \$29.4 million, excluding interest cost. This can be translated into improvement of many schools, health care centers, clean water facilities, roads or agricultural extension services in many villages around the country.

Beyond that, efficiency in development projects gets transmit to project outcomes and impacts beyond the investment implementation. On outcomes, has quality standard improved and is utilization rate sufficiently high? On impacts, how much cost savings associated with getting local healthcare services and economic gains associated with increased access to and improved health care services have been created? Although these questions are essential and relevant for our study, this short paper focuses on implementation effectiveness and efficiency. The Project is an ideal case study because it involved multiple locations, multiple contract packages, and multiple levels of management and oversights. Other than on the ADB side, on the Lao side involved the central and local government bodies across eight provinces. Also, the project has been concluded, thus allowing for a conclusive assessment of project performance. The Project civil work primarily involved new construction, upgrade and renovation of provincial and district hospitals and village health care centers. Although the project also has institutional capacity building component, our focus is on civil work, a required step prior to institutional capacity building. Under the Project, six provincial hospitals, 14 district hospitals, 136 health centers, five training facilities (nurse schools and health training centers), and 12 health offices were either constructed new, upgraded or renovated, altogether at a cost of \$6.48 million [5]. It is a cooperative agreement between Lao government and ADB, with the latter as major financial sponsor. The project implementation covered a span of six years (July 2001 – June 2007), financed by a loan from ADB (ADB Loan Number: 1749(SF)). This was part of a much larger assistance programs the ADB has provided to Laos over 2000-2009 as pointed out earlier.

## 2. LITERATURE REVIEW

Chianca (2008) provides a global perspective of aid evaluation, pointing out to common problems involving inadequate care and quality of the evaluation, too much emphasis on project outputs and less on outcomes and impacts, among others [6]. We examine effectiveness and efficiency issues for both of project outputs and outcomes, as well as impacts.

A project performance evaluation report for the Primary Health Care Project (PHCP) in Oudomxay and Xiengkhouang provinces (ADB loan 1348-LAO(SF)) indicates that the project would result in economic benefits through reduced health care costs and increased income for the population in the project area [7]. The PHCP, which was a pilot project preceding the PHCEP

being examined herein, built 73 primary health care centers and three district hospitals, renovated five hospitals in the two provinces and supported an educational program in Oudomxay that trained nearly 6,000 health workers and staff. With increased service coverage, making medicine and treatment more accessible, not only costs associated with travel had decreased, diagnosis and treatment cost also reduced. Increased service coverage also led to better health awareness, which in turns reduced illness and income loss as a result of illness and of time adults used to care for ill children. This effectively resulted in an increase in income. In addition, a healthier population, as a result of improved access to health care and of better health care services quality, is more productive than the less healthy one, leading to income gain through productivity improvement. It was estimated that a 10% reduction in the under-5 mortality rate (U5MR) as a result of the project would result in 12% economic rate of return [7]. Between 1990 and 2000, Laos experienced approximately 40% reduction in U5MR. A cost-benefit analysis with a projection over 1995-2014 indicates that the project could save more than 0.5 million workdays that would have been lost to illness. The economic benefits of the project comprise of 60% cost savings and 40% of labor productivity gain [7].

The PHCP has been judged as effective and efficient. Efficiency evaluation in the performance evaluation report was based only on the difference between the planned budget and actual cost of project implementation. That is, the PHCP was judged to be efficient because there was no cost overrun. This view of efficiency is relevant for cost control of project implementation, but not necessarily from the country level development management perspective. That is, it does not convey whether the project has allocated budget optimally. For example, while the project may have been implemented efficiently, right on the budget, it may have allocated too much resource towards provincial hospitals and too little towards village health service centers where a marginal impact may be much larger. The cost-benefit analysis of the whole project produced a positive result with 12.2% economic internal rate of return, justifying the economic feasibility of the project as a whole. However, while the cost-benefit analysis provides a basis for judgment concerning the entire project, it does not provide micro level information needed to channel the scarce resource towards areas that would generate greater benefits. Micro information would be useful for determining whether more resources should be allocated to provincial level, district level or village level health care facility, or to certain geographical areas. Our analysis addresses these short-comings by going in depth analyzing micro data.

## 3. METHOD AND DATA

The method of analysis employs in this study is qualitative. Strauss and Corbin, (1990) explain that qualitative analysis can be used to better understand many issues or problems where little is known [8]. In fact, it would be the only appropriate approach if

relevant quantitative data is lacking. Palenberg (2011) describes how efficiency can be analyzed as a qualitative concept using comparative rating [9]. However, this study does not get into qualitative rating of efficiency in the sense of efficiency as a qualitative concept. Rather, we employ qualitative analysis mainly to gain a deeper understanding of the quantitative efficiency measure of project outcomes.

Both quantitative and qualitative data are used as complements to inquire a more in-depth understanding. Weaknesses in project implementation and management will be identified in order to provide appropriate recommendations for improvement of future development projects where applicable. To assess efficiency and effectiveness, in addition to financial data, survey data on health care facility, professional medical staff, outpatient visit, inpatient admission, and other relevant indicators after the project completion are evaluated against baseline data. Data used in our analysis are mainly from two sources, including Project's Building and Civil Works Component Final Report [5] and Health Facility Survey 2006 [10].

#### 4. MAIN FINDING

Our assessment focuses on effectiveness and efficiency in selected provinces with significant investments in Provincial Hospitals (PH), District Hospitals (DH) and village Health Service Centers (HC). Here, as project investments in certain facilities in some provinces involved minor renovation, only investments that involved new construction or major renovation (deemed as an upgrade) of facilities are considered significant.

Civil works on health facilities in the provinces started in 2003 and nearly all completed in mid-2006. Thus, a few sites weren't captured in the survey which took place in 2006. Table 1 provides a summary of Project's provincial investment distribution, showing types of facility invested and total investment cost in US dollar as reported in Project's Building and Civil Works Component Final Report [5]. The per capita investment cost of the Project was added into the table to provide a cross-province comparison of project investment in per capita term.

**Table 1. PHCEP's Major Areas of Investment**

	Types of Facility Invested	Total Cost (USD)	USD / Capita (2004)
Phongsaly	PH, DH, HC, TF/NS	758,911	4.67
Luang Namtha	PH, DH, HC, TF/NS	1,449,525	10.19
Oudomxay	PH, TF/NS	841,713	3.24
Bokeo	PH, DH, HC	936,865	6.59
Luang Prabang	HO	13,845	0.03
Houaphanh	DH, HC, TF/NS	1,418,326	5.16
Sayaboury	DH	243,144	0.73
Xiengkhouang	TF/NS	194,812	0.87
<b>Sub-Total</b>		<b>5,857,141</b>	<b>3.02</b>
Offices & Misc.		626,075	
<b>TOTAL</b>		<b>6,483,216</b>	

Notes: PH - Provincial Hospital; DH - District Hospital; HC - (village) Health Centers; TF/NS - Training Facility/Nursing School; HO - Health Office; Offices & Misc. - project management office, health offices in southern provinces and miscellaneous.

Table 2 shows levels of project penetration on the three types of public health service facilities in project area. Project's civil works had the greatest penetration on PH, accounting for 50% of the total number of PH. Civil works on DH and HC had relatively small penetration rates of 15.8% and 16.7%, respectively, as DH and HC had relatively large initial units. Thus, it can be said that intervention at the PH level had created the greatest impact to health service capacity in the region in term of physical change to the facilities.

**Table 2. PHCEP's Civil Works Penetration**

	Units of Facility (2004)	Significant Investment		Level of Penetration	Spending Share of Total
		Units Build New	Units Upgrade		
PH	8	2	2	50.0%	32.1%
DH	57	3	6	15.8%	25.7%
HC	275	46		16.7%	32.2%

#### Effectiveness

We examined the effectiveness of the Project by analyzing its impact on various areas, including the direct impact of civil works on service space availability; on equipment, supplies and drugs; on staffing; and on service delivery. If, after completion of project implementation, these indicators increased as expected, the Project implementation is considered effective. Our assessment finds that, overall, the Project implementation is considered effective.

On service space availability, it is clearly noticeable that all provinces with significant investments in civil works experienced significant increases in service space availability, except for DH in Luang Namtha which remained constant. Four provinces (Phongsaly, Luang Namtha, Oudomxay and Bokeo) with significant investment in PH experienced an increase in service space availability between 6 and 30 percentage points (Table 3). All five provinces with significant investments in DH (Phongsaly, Luang Namtha, Bokeo, Huaphan, Sayaboury) experienced an increase in service space availability between 7 and 16 percentage points, except for Luang Namtha, which remained constant. Similarly, all four provinces with significant investments in HC (Phongsaly, Luang Namtha, Bokeo, Huaphanh) experienced an increase in service space availability between 4 and 20 percentage points. Other provinces without significant investment in HC experienced decrease in service space availability, except for Oudomxay.

Though civil works would only directly impact the health care facility space availability, they are prerequisite for hospitals and health service centers to install new equipment and supplies and hire more staff in order to care for more patients. How much has investment in the physical structure affected other measureable indicators of the Project's effectiveness is thus examined.

We start with changes in equipment and supplies and staffing. The survey shows that equipment installment in provincial hospital and district hospital type A (DH-A) increased considerably, especially for high and middle

range equipment, with between 24% and 38% percentage point increases as illustrated in Table 4. However, civil works do not seem to have any impact on supplies and drugs neither at provincial hospital nor district hospitals of both type A and type B.

**Table 3. PHCEP Impact on Service Space Availability**

Province (significant investments)	Change in % Space Availability for All Services Over 2004 - 2006		
	PH	DH	HC
Phongsaly (PH, DH, HC)	30	16	4
Luang Namtha (PH, DH, HC)	15	0	20
Oudomxay (PH)	6	-3	12
Bokeo (PH, DH, HC)	17	16	11
Luang Prabang	-7	-6	-3
Houaphanh (DH, HC)	4	7	4
Sayaboury (DH)	-6	9	-2
Xiengkhouang	-5	-3	-7
<b>Overall</b>	<b>8</b>	<b>4</b>	<b>12</b>

The situation at the village health service center, summarized in Table 5, is less clear. It should be noticed that all eight provinces in the Project area are shown in Table 5 and others through Table 8 with indicators specifying which province had significant investment in PH, DH, or HC in parentheses for convenient of making comparison. That is, for example, even if the focus is on PH, provinces without significant investment in PH are included. Four provinces with significant investments in HC (Phongsaly, Luang Namtha, Bokeo and Houaphanh) all experienced declines in equipment availability between 5 and 12 percentage points, except for Luang Namtha with no change over 2004 – 2006. Supplies also show a similar pattern as that of equipment. Nonetheless, drugs availability increased in all other provinces with significant investments in HC, except for Luang Namtha. In fact, other provinces either with insignificant or no investment in HC, except for Oudomxay, experienced improvements in availability of equipment, supplies and drugs. This could be a result of survey timing and site selection. The survey could have taken place before installments of equipment, supplies and drugs, causing the survey results for provinces with significant investments in HC to show availability deterioration. At the mean time, the Project most likely had selected appropriate provinces to intervene—those that needed additional investment. Thus, provinces without significant investments did not suffer equipment, supplies and drugs availability deterioration.

On staffing, the survey in general shows improvements for at all three types of health care facility. At provincial hospitals, Table 6, the share of high level staff increased (4 - 12 percentage points) while the share of low level staff declined (2 - 16 percentage points) in all four provinces with significant investments in PH (Phongsaly, Luang Namtha, Oudomxay, Bokeo). It is noteworthy to point out that, while Luang Namtha PH's total number of staff decreased over 2004 - 2006, the province's PH had the highest gain in the share of high level staff (12 percentage points), relative to other provinces with

significant investments in PH, and the biggest lost in the share of low level staff (16 percentage points) compared to all eight provinces in the Project area. This can be interpreted as a significant quality improvement. At district hospitals, Table 7, all five provinces with significant investments in DH (Phongsaly, Luang Namtha, Bokeo, Houaphanh and Sayaboury) experienced an increase in total number of staff and the share of high level staff, Except in Luang Namtha which lost 1% of high level staff. In general, district hospitals in all eight provinces lost the share of low level staff, including those without significant investment in DH. At the village health service centers, the survey clearly reveals that staffing was growing rapidly in all provinces with and without significant investment in HC over 2004 – 2006. The increased was contributed mainly by growth in the number of public health care workers (PHC Worker) as illustrated in Table 8. In 2004 one HC had a doctor. By 2006, none of the HC had any doctor, as staffing at HCs was dominated by nurses/midwives and PHC workers.

**Table 4. PHCEP Impact on Equipment & Supplies at PH and DH**

	Change in % of Availability Over 2004 - 2006		
	PH	DH-A	DH-B
Basic Range Equipment	8	8	1
Medium Range Equipment	30	24	-3
High Range Equipment	38	33	0
All Equipment Av.	25.3	21.7	-0.7
Supplies	0	-4	6
Drugs	-7	2	1

**Table 5. PHCEP Impact on Equipment & Supplies at HC**

Province (significant investments)	Change in % of Availability Over 2004 - 2006		
	Equip't	Supplies	Drugs
Phongsaly (PH, DH, HC)	-7	-8	11
Luang Namtha (PH, DH, HC)	0	1	-3
Oudomxay (PH)	-12	19	19
Bokeo (PH, DH, HC)	-5	-2	4
Luang Prabang	3	11	9
Houaphanh (DH, HC)	-11	3	12
Sayaboury (DH)	2	0	2
Xiengkhouang	2	11	4
<b>Overall</b>	<b>-3.5</b>	<b>4.4</b>	<b>7.3</b>

**Table 6. Impact on PH Staffing, Change in Number and Composition Over 2004 - 2006**

Province (significant investments)	Total No.	% High Level	% Mid. Level	% Low Level
Phongsaly (PH, DH, HC)	7	5	-2	-2
Luang Namtha (PH, DH, HC)	-10	12	4	-16
Oudomxay (PH)	17	8	1	-9
Bokeo (PH, DH, HC)	9	4	11	-15
Luang Prabang	-62	5	4	-9
Houaphanh (DH, HC)	-7	13	-10	-3
Sayaboury (DH)	19	-1	-8	8
Xiengkhouang	16	1	4	-4
<b>Overall</b>	<b>-11</b>	<b>6</b>	<b>1</b>	<b>-6</b>

**Table 7. Impact on DH Staffing, Change in Number and Composition Over 2004 - 2006**

Province (significant investments)	Total No.	% High Level	% Mid. Level	% Low Level
Phongsaly (PH, DH, HC)	55	1	7	-10
Luang Namtha (PH, DH, HC)	40	-1	9	-10
Oudomxay (PH)	-7	1	-1	-3
Bokeo (PH, DH, HC)	6	2	6	-11
Luang Prabang	-10	-1	1	-3
Houaphanh (DH, HC)	20	12	8	-6
Sayaboury (DH)	12	1	2	-4
<u>Xiengkhouang</u>	61	1	-2	-1
<b>Overall</b>	177	2	3	-5

**Table 8. Impact on HC Staffing, Change in Number and Composition Over 2004 - 2006**

Province (significant investments)	Total No.	Doctor	Nurse / Midwife	PHC Worker	Auxil. Nurse
Phongsaly (PH, DH, HC)	10	0	6	7	-2
Luang Namtha (PH, DH, HC)	38	0	9	22	4
Oudomxay (PH)	27	0	0	34	-11
Bokeo (PH, DH, HC)	25	0	6	19	0
Luang Prabang	24	0	7	24	-7
Houaphanh (DH, HC)	32	-1	3	23	1
Sayaboury (DH)	31	0	1	24	-6
<u>Xiengkhouang</u>	17	-1	7	11	-1
<b>Overall</b>	204	-2	39	164	-22

As has been discussed, the Project civil works had considerably contributed to improvement in service capacity for all three types of health care facility over 2004 - 2006. Health facilities gained more service space, installed new and better equipment, hired more staff, and the share of more skilled staff had increased. Next, we examined impacts on health service facility utilization. We selected three types of services outcomes as indicators for Project's impact on service capacity. Other important services delivery indicators reported in the health facility survey 2006 that were not discussed includes cases for X-Ray examination, surgical intervention, ultrasound examination, pre- and postnatal care, blood transfusion, immunization of women and children, etc.

Table 9 – Table 11 summarize project impact on services delivery of the three health facility types across provinces. To isolate project impact from other factors, only those with significant investment are included. As a whole, the numbers of outpatient visit, inpatient admission and birth delivery had all significantly increased across three types of health facility, except for inpatient admission at district hospitals, which increased just 0.1%. The numbers of inpatient admission and birth delivery in HC increased the most, compared with DH and PH, indicating that village-based health service facility was in high demand.

Services outcomes, however, varied across provinces. Among the four provinces with significant investments in PH, Phongsaly's provincial hospital was the only one experiencing substantial declines in all three selected services delivery indicators—outpatient visit, inpatient admission and birth delivery—while Luang Namtha's was the only one that had substantial increases in all three indicators. While Bokeo's provincial hospital experienced a considerable decline in the number of

inpatient admission (22.7%), it had considerable increases in the numbers of outpatient visit (13.4%) and birth delivery (87.4%). Oudomxay's provincial hospital had a slight decline in the number of birth delivery (-0.2%), but the province had significant rises in the number of outpatient visit (74.5%) and inpatient admission (51.8%).

**Table 9. Impact on Outpatient Visit: Percent Change over 2004 - 2006**

Province (significant investments)	PH	DH	HC
Phongsaly (PH, DH, HC)	-35.5	6.2	28.1
Luang Namtha (PH, DH, HC)	64.2	-24.8	49.1
Oudomxay (PH)	74.5		
Bokeo (PH, DH, HC)	13.4	-12.1	49.0
Luang Prabang			
Houaphanh (DH, HC)		98.5	1.5
Sayaboury (DH)		59.2	
<u>Xiengkhouang</u>			
<b>Overall</b>	39.3	34.5	19.9

**Table 10. Impact Inpatient Admission: Percent Change over 2004 - 2006**

Province (significant investments)	PH	DH	HC
Phongsaly (PH, DH, HC)	-66.5	-49.8	121.6
Luang Namtha (PH, DH, HC)	113.5	-0.7	96.4
Oudomxay (PH)	51.8		
Bokeo (PH, DH, HC)	-22.7	49.3	-23.0
Luang Prabang			
Houaphanh (DH, HC)		-16.9	81.9
Sayaboury (DH)		33.4	
<u>Xiengkhouang</u>			
<b>Overall</b>	13.4	0.1	22.9

**Table 11. Impact on Birth Delivery: Percent Change over 2004 - 2006**

Province (significant investments)	PH	DH	HC
Phongsaly (PH, DH, HC)	-28.2	30.0	130.5
Luang Namtha (PH, DH, HC)	63.7	-10.4	132.1
Oudomxay (PH)	-0.2		
Bokeo (PH, DH, HC)	87.4	43.9	20.8
Luang Prabang			
Houaphanh (DH, HC)		7.9	26.1
Sayaboury (DH)		82.6	
<u>Xiengkhouang</u>			
<b>Overall</b>	34.6	30.0	48.6

The service delivery outcomes in Phongsaly may suggest that there was a shift in utilization from provincial and district hospitals to village health centers, as the number of patients at PH declined for all of the three selected types of services and the number of inpatient admission at DH also declined while those at HC increased phenomenally, 28.1% for outpatient visit, 121.6% for inpatient admission and 130.5% for birth delivery. As a whole, Project impact on services delivery outcomes was most dramatic at the village health centers. All provinces with significant investments in HC had substantial increases in the number of outpatient visit,

except for Huaphanh, with only 1.5% increase, in the number of inpatient admission, except for Bokeo which experienced a decrease of 23%, and in the number of birth delivery, ranging from 20.8% to 132.1%.

**Efficiency**

We examined two types of efficiency. The first type of efficiency is project implementation efficiency, which focuses on cost control. The second type of efficiency involves resource allocation. Beyond examining the total financial cost of project implementation, efficiency can be examined in more depth by focusing on cost per unit of benefit created by the Project. How much did it cost to add a percentage of service space availability in provincial and district hospitals and village health service centers? How much per outpatient visit did it cost the project in each of the three types of the health care facilities and at different provinces? How much did it cost to allow one more patient to obtain health care in each of the three types of health care facilities and at different provinces? The answers to these questions provide essential knowledge for efficient resource allocation. That is, they can guide future development project preparation to decide whether more resource should be allocated to provincial hospitals, district hospitals or village health centers, and in which province.

**Implementation Efficiency:** The Project's civil works component was completed at a cost of \$6.483 million, 14.3% above the total contract signed (Table 12). The civil works final report [4] explains that this cost overrun was contributed by rising domestic costs as the civil works covered a span of several years. Civil works started with Project Management Office in April 2002, followed by the provinces in early 2003, and nearly all were completed by mid-2006, with Huaphanh completed last in October of the same year. Over 2002 and 2006, inflation, measured by the Consumer Price Index (CPI), rose 10.1% annually on average. Another factor contributing to cost overrun involved delays in some construction projects caused by late payments to contractors whose work plans and schedules included expected payments from the Project. This led to upward cost adjustments as contractors must continue to pay certain cost commitments such as salaries to essential workers and interest cost of loans. The delay also further exacerbated the inflation effect. The loan agreement includes a condition that payments to contractors would be 12% from Lao government's contribution and 88% from ADB loan funds. The problem was originated from government's contribution commitment, according to the civil works final report [4].

Another area requiring attention, which the report did not point out, is miscellaneous spending of \$359,320, which accounts for 5.5% of the total project expenditure. This miscellaneous spending is an exclusive category from other miscellaneous that would be included in all construction contracts. Thus, Project's cost that was bunched into the "miscellaneous" cost category was certainly higher than 5.5%. Since this miscellaneous spending does not have a clear record of what the

spending was for, much of that was most likely a lost for the Project an equivalent of 7-8 village health centers.

**Table 12. Cost Overrun**

	Original Plan	Contract as Signed	Final Cost	% Cost Overrun from Contract
Phongsaly	569,000	679,285	758,911	11.7
Luang Namtha	1,077,500	1,158,097	1,449,525	25.2
Oudomxay	589,000	650,737	841,713	29.3
Bokeo	865,500	845,599	936,865	10.8
Luang Prabang	823,500	13,845	13,845	0.0
Houaphanh	730,000	1,287,241	1,418,326	10.2
Sayaboury	352,500	213,356	243,144	14.0
Xiengkhouang	158,000	176,812	194,812	10.2
PMO	100,000	174,939	177,298	1.3
Other-South	80,000	89,457	89,457	
Supplementary	360,000			
Miscellaneous		384,320	359,320	
<b>TOTAL</b>	<b>5,705,000</b>	<b>5,673,688</b>	<b>6,483,216</b>	<b>14.3</b>

**Allocation efficiency:** Four indicators were selected for benefit-based efficiency analysis. They include change in space availability for all services, outpatient visit, inpatient admission and birth delivery. The service space indicator measures the direct impact of the Project's civil works, while the other three indicators assess indirect impacts made possible by the completion of the civil works. While outpatient visit gauges change in the service space capacity for all patients that visited the health care facility and received services, the inpatient admission measures the facility's capacity to provide services to patients that needed to stay overnight for more attentive care by medical professionals. Birth delivery in a modern health care facility is an important indicator as it has a significant impact on the health and chance of survival of both the mother and child. Birth delivery at a modern health care facility equipped with qualified staff, medical equipment and drugs would not only significantly reduce infant and maternal mortality rate, compared to traditional rural birth delivery without proper medical care. The mother would receive basic but critical knowledge from professional medical staff, important for the health of both the mother and child throughout their lives beyond the postnatal recovery period. This would have a long term positive impact on the general health of the population, increasing labor productivity in a broad sense. That is, more healthy population tends to be more productive than less healthy population.

First, we compare across the three health facility types—PH, DH, and HC—cost per percentage change and per unit increase of the four selected indicators, and the results are summarized in Table 13. For each type of facility, only provinces with significant investments in that type of facilities, not from all 8 provinces, are included in the analysis. For instant, for PH, only four provinces (Phongsaly, Luang Namtha, Oudomxay and Bokeo) with significant investments in PH are included. Analysis for DH and HC was done in a similar fashion. The health facility survey [10] reported change in service

space of the health facility only in percentage term. Thus, we compare across facility types—PH, DH and HC—the cost of a percentage increase in service space, and it reveals that increasing service space at the provincial hospital was most efficient, as it cost the least per percentage point increase, followed by district hospital and village health service center. In term of cost per percent and per person increase in the number of outpatient visit, the district hospital was the most efficient, followed by provincial hospital and village health center. This suggests that investing in DH is most efficient, relative to PH and HC, as both per percent increase and per each additional outpatient cost of investment was the lowest.

The investment cost per percent increase in inpatient admission and in birth delivery was the lowest at HC, as provinces with significant investments in HC experienced the highest percent increase in the number of inpatient admission and birth delivery in HC over 2004 – 2006 (Table 13). The percent increase in the number of inpatient admission at HC, at 22.9%, was far exceeding the 13.4% increase at PH and 0.1% at DH. As well, the 48.6% increase in birth delivery at HC was far exceeding the 34.6% increase at PH and 30% at DH. In contrast, investment cost per each additional inpatient admission and birth delivery at HC was not the lowest. This suggests that although it cost more per each additional inpatient admission at the HC than at the PH and it cost the most at the HC per each additional birth delivery, investing more in HC would be relevant because demand for village-based basic health services was the highest, as response to improved basic health care in the villages was highest.

**Table 13. PHCEP Efficiency Across Health Care Institutional Types**

Category	PH	DH	HC
\$ per % Change in Space	122,434	173,454	268,041
\$ per % Change in OP Visit	52,928	48,214	105,268
\$ per % Change in IP Admission	155,465	14,856,334	91,233
\$ per % Change in Birth Delivery	60,185	55,543	49
\$ per Additional OP Visit	106	67	204
\$ per Additional IP Admission	1,374	104,072	1,815
\$ per Additional Birth Delivery	4,179	3,750	11,301

While the overall investment cost per percent increase in service space availability was lowest for PH and highest for HC, the results vary across provinces (see Table 14). For Phongsaly and Bokeo, increasing space of PH was the most efficient and increasing service space in HC was the least efficient. In Luang Namtha, however, increasing HC service space was most efficient, and despite that 16% of the \$1.4 million allocated to the province was spent on DH civil works, there was no change in service space availability. Across provinces, investment in PH had the highest impact on increasing service space availability per cost unit in Phongsaly, with Oudomxay having the lowest impact, while investment in DH had the highest impact on service space availability per unit cost in Sayaboury. Investment in HC had the highest impact on service space availability per unit cost in Kuang Namtha. While measuring per unit cost of increasing service space is important for

comparing efficiency, the unit cost per percent change in the service space may not convey efficiency comparison properly if the service space in each of the province's PH varied. The same amount of space increase at the same cost would cause the percent increase in space higher for the PH with less space than the PH with more space before the civil works began. However, the comparison offers a broader picture of the Project's impact.

**Table 14. Investment Cost in USD per Percent Increase in Space Availability for All Services**

Province (significant investments)	PH	DH	HC
Phongsaly (PH, DH, HC)	7,023	20,430	
Luang Namtha (PH, DH, HC)	44,775		25,012
Oudomxay (PH)	129,511		
Bokeo (PH, DH, HC)	14,922	18,657	34,971
Luang Prabang			
Houaphanh (DH, HC)		96,874	170,844
Sayaboury (DH)		14,728	
Xiengkhouang			

## 5. CONCLUSION AND RECOMMENDATIONS

We found that the Project was implemented effectively overall, based on our analysis of the civil works direct impact on service space availability and indirect impacts on equipment, supplies and drugs; on staffing; and on service delivery. However, the civil works implementation is not considered to be efficient due to cost overrun of 14.3%, compared to the total amount of contracts signed, contributed by delays of funding on the part of Lao government's share of financial commitment for all contracted works and miscellaneous expenses. Although the cost overrun was largely contributed by domestic price increases, it was exacerbated by delays of some construction sites caused by delays of payments to contractors which originated from government's 12% share of financial commitment for all contracted works. This can be avoided by ensuring that committed funding from all project partners be in place prior to any contract is signed. Also, a strong committee to oversee the bidding process and approval for all contracts is critical to ensure quality job outputs at a competitive cost.

The miscellaneous spending of 5.5% is not considered an abnormality. However, this was added to the miscellaneous items normally would have already been included in every contract, which normally can be anywhere between 2% and 5%. This additional miscellaneous expenses, which lack a clear record of what they were for and how they contributed to project outputs, can be translated into 7-8 additional HCs. Therefore, miscellaneous expenses must be controlled and kept at a minimum. In association with miscellaneous spending, funding for minor, unessential renovation that does not contribute to improving service capacity or quality should not be allowed. Funding for this category should be coming from regular maintenance budget.

Additional analysis finds that efficiency of resource utilization can be improved by allocating more to the development of HCs, where responses to expanded service space in terms of inpatient admission and birth

delivery were most robust. Due to high responses, investment cost per percent increase in inpatient admission and birth delivery was the lowest at HCs. Thus, it is recommendable that increasing investment in HCs would better serve the needs of the population and would be economically more cost effective, as financial cost of investing in health care facility is only part of the entire economic cost to the country.

Total economic cost of health care to the country is one that involves both health care service providers and users. Going to a hospital located in the capital city of the province or to a district hospital from many villages could be a matter of an entire day, and returning home would be another day. Thus, time alone can be a factor discouraging villagers from getting proper health services both for basic and more serious care. The transport cost between home and the hospital and overnight cost are out-of-reach for many poor villagers. Thus, the village-based HC would substantially reduce transport cost and the opportunity cost of time for villagers who need health services. A more convenient and affordable basic health services by HCs would encourage villagers to obtain basic health care services, leading to better health and higher productivity. A statistical analysis finds evidence that, over 2002/03 – 2007/08, expanding HC services greatly benefit the poor while expanding PH services favors the better off [11].

It should be pointed out that the analysis relied heavily on two sources of data, both of which are project reports. Although data in these two sources are considered reliable, without a third party, independent source of data, some biases may exist in the report. For instance, miscellaneous expenses were not pointed out as an issue of efficiency lost in these reports. Several limitations of our study exist. Our analysis does not include the post-project impact on measureable health conditions of the population in the Project area, such as changes in infant and maternal mortality rate, under-5 mortality rate and a loss of time due to sickness. An analysis of the Project's impact on cost associated with travel and other costs involved in obtaining health care services is another limitation of this paper. These important data would allow an economic impact analysis of the Project.

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