A REAL TIME IMPACT EVALUATION OF THE DR. LEE JONG-WOOK—SEOUL PROJECT IN LAO PDR: SECOND-YEAR INTERIM REPORT

KDI SCHOOL
KDI School of Public Policy and Management

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2. The project in its current stage is a three-year collaboration with an annual budget of USD 360,000 with a plan in place to extend the program period to a total of nine years. Fully implemented, the project envisions retraining of about 80 of the 300 UHS professors at the SNUMC. The project also includes provisions to dispatch faculty advisors from SNUMC, and provide equipment and devices for education and research at the UHS.

3. The project was inspired by the erstwhile collaboration between the SNUMC and the University of Minnesota under the aegis of the US ICA from 1954 to 1961. The project, known as the Minnesota Project in Korea, oversaw training of 77 SNUMC faculty members in the US, and involved 11 University of Minnesota faculty advisors invited to serve in Seoul during the project period. It was widely reputed to have a transformative impact on the medical education and practice in Korea.

4. Recently, there has been remarkable progress in reducing infant mortality and other ailments afflicting Lao PDR through combined efforts from the international donor community and the Lao government. In spite of significant improvements, the maternal and infantile mortality rates remain high in Laos, and meeting the MDGs is clearly a priority goal in the Lao Government's National Health Strategy.

5. At the same time, the chronic dearth of qualified health workers is an acute problem. The WHO recommends a minimum of 2.5 health workers per 1,000 people; the ratio stands at 1.53 in Lao PDR. At the heart of the health professional deficit in Lao PDR lies the problem of deficient clinical skills training. Limited government budget means that only about 50% of the UHS graduates get employed in the state health sector, and that attrition is a serious issue as many doctors appointed in provincial and district facilities leave the medical profession. Those not retained mostly stop practicing, even though they could legally open their own private clinics, due to a lack of sufficient clinical experiences. Deficiency in qualified doctors also adds to the difficulties in training of lower level health professionals.

6. To address the human resource challenges in the health sector, the Lao government adopted in 2010 the Strategy for Health Personnel Development by 2020. The Strategy recognized five pillars for human resources development in the health sector, and envisioned "sufficient number of qualified, motivated, and facilitated health workers… by 2020" together with separate numerical targets for 2015 and 2020. It is significant that the Strategy lists capacity building as the first among the five recognized pillars.

7. Both the Lao Ministry of Health and the UHS on the other hand, and the international donor community on the other, recognized the need for investments for human resource development for sustained development of the health sector, in line with the Lao Government's long-term strategic plan. There have been international engagements indeed for this purpose. For instance, the Canadian government recently helped the UHS with a curriculum overhaul. Even though the Dr. LEE Jong-Wook—Seoul Project is the largest of its kind in the history of the UHS, there has been numerous faculty exchange programs intended to help with faculty capacity building. Our sense is that these efforts have been insufficient and all too scattered to effectively enable the UHS to mobilize its internal resources for sustained, long-term, strategic efforts for fundamental institutional transformation.

8. The Education Development Center for Health Professionals (EDC/HP) at the UHS was launched precisely to overcome this problem by serving as a vehicle for effective coordination of internal, as well as international engagement, for upgrading clinical training and education at the UHS. The ECD/HP was launched in 2011; the critical challenge remains where to find the financial resources to fuel the initiative.

9. Amidst high hopes, partnering institutions in Laos and Korea have been working enthusiastically to overcome many challenges. Nonetheless, one may still be reasonable and skeptical that difficulties lurking at every stage of the long results chain might endanger successful implementation. How fruitful will the intellectual collaboration be between the SNU and the UHS faculty members for the learning outcomes of the latter? Language barriers and differences in clinical practice conditions between the two countries should be substantial. How much of the learning would be successfully transmitted to the students at the UHS once the UHS participants return to Vientiane? The UHS faculty members themselves are well aware of the problems including poor physical infrastructure and student distraction and possibly low motivation due to limited job opportunities. How much

of the learning, to the extent it does get transmitted, absorbed by the students would be put to practical use in clinical practice? As things stand in Lao PDR, it is only about 50% of the graduating class from the UHS that get jobs, and of the jobs only 70% are directly related to the provision of healthcare services. Retention of the healthcare professionals in the sector remains a severe challenge due to relatively low compensation and harsh working conditions, especially in the provincial areas. In view of these facts, would an engagement with practicing professionals in the field make better investment sense, compared to a pre-service training intervention such as the Dr. LEE Jong-Wook—Seoul Project?

Overall Research Design

10. The Impact Evaluation Lab of the KDI School of Public Policy and Management is collaborating with the partnering institutions and agencies both in Lao PDR and Korea, the UHS, the Lao Ministry of Health, the SNUMC, and the KOFIH to contribute to the institutions' own efforts at monitoring and evaluation. This volume is the second-year interim report of the collaborative efforts for assessment.

11. The collaboration has two main objectives: impact evaluation and real-time feedback to the partnering institutions and agencies. The three-year timeframe for the collaboration renders impracticable tracing of the project's impact transmission down to the eventual outcome goal: improvement of the Lao people's health. In view of the limitation, the impact evaluation team decided to focus on a series of intermediate outcome measures. They are: learning outcomes for the UHS faculty members participating in the one-year exchange program at the SNUMC; the learning outcomes of the UHS students; and finally improvements in the clinical practices of the young physicians upon their graduation from the UHS. The first of these is to be monitored and assessed by the UHS and the SNUMC. The KDI School's Impact Evaluation Lab is to focus on the latter two measures.

12. For the students' learning outcome measurement, the evaluation team has decided to employ the test battery developed and maintained by the Medical Education Assessment Consortium (MEAC) of Korea. The questions in the test, designed to assess the test-takers' mastery of medical science and clinical knowledge, have been translated into Lao. For measuring the young physicians' clinical practices, we have consulted with the UHS and the Lao Ministry of Health and found out that each central and provincial hospital in Lao are required to establish and collect Disease Treatment Committee (DTC) data, which is composed of two sets of indicators: the Standard Treatment Guidelines (STGs) and the Reasonable Use of Drugs (RUD) guidelines. The Lao Ministry agreed to receive a collection of individual physicians' STG and RUD data at the nation's major hospitals for the purpose of this impact evaluation. Baseline and one round of follow-up studies have been carried out to collect information on UHS student learning using the MEAC test battery, and physician practices using the DTC data from 2011 and 2012. The data collection will be carried out in one more round in 2014.

13. Thus, the impact evaluation strategy will compare the changes in the outcome measures over the years between the treatment and the control groups. The treatment group consists of the UHS students and the young physicians enrolled in classes taught by the UHS faculty members returning from Seoul, and the control groups represent the rest of the student population. Note that the same student may belong to the treatment or the control group, depending on the choice of the subject area, as the student may take courses from both the Dr. LEE Jong-Wook—Seoul Project professors as well as from others. If there is an endogenous selection of subjects into the two groups, then the evaluation results may be subject to bias in some form.. The impact evaluation team is in the process of consulting the UHS management to see the nature of student assignment between different sections of the same subject, and to find out whether randomized assignment of subjects (that is, students) into the treatment and the control groups is feasible.

14. Obviously, the results from the full impact evaluation exercise will be made available only in two years' time. But the team members felt that we already have enough valuable information to share with the partnering institutions and agencies, as well as with the wider development community within Korea. There is already a demand for the information to be published as soon as possible for real-time feedback in the spirit of real-time impact evaluation. Apart from the layout of the evaluation designs, this interim report presents some of the salient findings from the baseline and follow-up studies.

Salient Findings from the 2nd Year Studies

15. By an analysis based on the two rounds of tests of medical knowledge for students in the UHS, it hypothesizes that the Dr. LEE Jong-Wook—Seoul Project will improve the teaching capacity of participating faculty members and it will enhance the students' academic performance. The main finding is that the teaching capacity of trained faculties has improved in the areas of both basic and clinical medicine. The estimates indicate that the first cohorts of trainees in the project account for the increase in the test scores of basic medicine by a standard deviation of 0.352 in case of basic medicine and a standard deviation of 0.098 in the case of clinical medicine. The magnitude of the impact is equivalent to 57% and 6% of the total increase in the test scores between two waves, respectively in basic medicine and clinical medicine.

16. Through the preliminary analysis of the DTC data, DTC indices do not appear to be positively correlated with the service years of the practicing doctors. The doctors with a long on-the-job experience do not appear to provide better health services. The analysis also showed that practicing doctors' DTC scores are positively correlated with their academic achievement level in the UHS at a statistically significant level. Based on this analysis, it could be tentatively concluded that the

improvement of the health service quality in Lao PDR could be more dependent on the improvement in the quality of the pre-service academic program in the UHS than the current on-the-job in-service training program in hospitals. The key element that the evaluation team has found from this analysis is that the academic performance or pre-service training at the UHS is more influential than on- the job training in terms of the quality of the physicians' practice at hospitals.

17. These findings highlight the importance of the Dr. LEE Jong-Wook—Seoul Project. If the UHS can help improve the academic achievement scores of its students substantially through the Dr. LEE Jong-Wook—Seoul Project, we can be reasonably optimistic that future UHS graduates would provide a better quality of health services to Lao people upon their graduation. As UHS students' academic scores rise, their DTC scores would also improve, which means a better health care for Lao people. The Dr. LEE Jong-Wook—Seoul Project aims to improve the academic achievement of the UHS students by improving the teaching and research capacity of UHS faculty members through training and study at the SNUMC in Seoul.

Acknowledgement

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We are also grateful for the participants of the 2012 DTC/RUD Data Collection and Analysis Meeting (3rd) co-organized by the Ministry of Health of Lao PDR and the KDI School, and students who took medical tests for basic and clinical medicine co-organized by the Lao University for Health Sciences, as well as the KDI School generally supported by MEAC. The authors would also like to gratefully acknowledge the diligent and able research assistance provided by Boumny Inthakesone, Sunjin Kim, Eunkyung Min and the superb administrative support from the staff at the KDI School's Impact Evaluation Lab, Mr. Sungmook Kang, Ms. Min Young Seo, Ms. Joung-Hyun Kim and Ms. Hyomin Kwon. Prof. Taejong Kim of the KDI School, who is the Managing Director of the Development Research and Learning Network, was kind enough to read the draft report and provide invaluable comments to the authors. The authors would also like to gratefully acknowledge the two anonymous referees' useful comments/suggestions. Needless to say, the final responsibility for the remaining errors and the shortfalls remain with the authors.

Chapter

01

Dr. LEE Jong-Wook- Seoul Project and Background

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The Dr. LEE Jong-Wook—Seoul Project in Lao PDR is an ambitious development cooperation initiative funded by the Korea Foundation for International Healthcare (KOFIH), which was launched in 2010. Through this project the Lao University of Health Sciences (UHS) and the Seoul National University College of Medicine (SNUMC) are collaborating to upgrade the medical education capacity of the UHS faculty members. (See Annex 1 attached at the end of this Chapter.) The ultimate objective of the project is to contribute to the overall improvement of the Lao people's health. The project is based on the premise that upgrading the clinical education and training of future health professionals represents a vital channel through which the ultimate goal can be attained in a sustainable manner, and the developmental process can be owned by the Lao professionals.

Hope is running high for the success of the project both in Korea and Lao PDR. The project is inspired by, and modeled after, the Minnesota Project that is famous in Korea for the transformative impact it reputedly had on the modernization of Korea's higher education during the aftermath of the Korean War. Under the aegis of the International Cooperation Agency (ICA), the University of Minnesota in the US and Seoul National University in Korea teamed up to work together. The Minnesota Project focused on curriculum modernization and upgrading teaching practices in three key areas: agriculture, engineering, and most importantly for the purpose of this report, medical education. The College of Medicine at the SNU cherishes the help that it obtained from the University of Minnesota. The top management and the whole faculty are committed

to the successful implementation of the Dr. LEE Jong-Wook—Seoul Project. It is their hope that this could in some way pay back part of the institutional debt they feel they owe the international community. Several leading news media in Korea have reported on the launch and the progress of the project. There is already a plan to get the project replicated in some other developing countries, anticipating the success of the Dr. LEE Jong-Wook—Seoul Project. Expectations are also high both at the Lao UHS and at the Lao Ministry of Health, the government ministry overseeing the operation of the UHS. Cooperation between the partnering institutions in Lao PDR and Korea has been enthusiastic and the country is hoping to overcome its tremendous challenges.

Despite such high hopes, it is not obvious that the Dr. LEE Jong-Wook—Seoul Project will deliver the anticipated outcomes. To begin with, one might reasonably entertain some skepticism on whether the erstwhile Minnesota Project was itself really as successful as it was reputed to be. Aarchival research does reveal that participants in the medical education component of the Minnesota Project, on both sides of the Pacific Ocean, were indeed positive that the learning outcomes of the faculty trainees from the SNU College of Medicine and the later institutional transformation of the SNU College of Medicine were remarkable. Understandably, however, there was no attempt at a rigorous modern-style impact evaluation of the project in the course of the project's lifecycle. The glowing reports are based mostly on qualitative assessments carried out by participants and observers. One ironic piece of evidence, however, establishes how successful the Minnesota Project was in the transformation of medical education in Korea: the huge upsurge in the number of Korean physicians emigrating to practice in the US after passing the licensing exams there. The remarkable increase was a temporary phenomenon enabled by the combination of the dearth of gainful employment opportunities for the newly trained medical doctors in Korea and the increase in the demand for physicians in the US due to the escalation of the war in Vietnam. The brain-drain eventually dwindled to a trickle with the economic development of Korea and the expansion of the national health insurance in the country. Such an upsurge would have been unthinkable in the absence of the remarkable development of Korea's medical education that benefitted from the Minnesota Project.

Even if one accepts the success of the Minnesota Project, one may still be skeptical that difficulties lurking at every stage of the long results chain might endanger the successful implementation of the project's modern adaptation in the partnership between Korea and Lao PDR. How fruitful will the intellectual collaboration be between the SNU and the UHS faculty members for the learning outcomes of the latter? Language barriers and differences in clinical practice conditions between the two countries are substantial. How much of the learning would be successfully transmitted to the students at the UHS once the UHS participants return to Vientiane? As noted in this report, physical and institutional infrastructure at the UHS could use a major upgrading. (See Annexes II and III attached to the end of this Chapter.) Limited job opportunities once they graduate from medical school might distract the students' attention and harm their motivation. How much of the learning, to the extent it does get transmitted, absorbed by the students, would be put to practical use in clinical practice? As things stand in Lao PDR, it is only about 50% of the graduating class from the UHS that get jobs, and of the jobs only 70% are directly related to the provision of healthcare services. Retention of the healthcare professionals in the sector remains a severe challenge due to relatively low compensation and harsh working conditions. In view of these facts, would an engagement with practicing professionals in the field make better investment sense, compared to a pre-service training intervention such as the Dr. LEE Jong-Wook—Seoul Project?

The challenges are indeed steep. Yet, most of these conditions, if not all, should have been familiar to an external observer of the Korean medical education and practice scene back in the 1950s and 60s, or during the years of the Minnesota Project. That the Minnesota Project eventually proved successful gives us grounds to be cautiously optimistic. The very real hurdles mean at the same time that careful monitoring and evaluation of the project in progress, as well as flexible adaptation based on real-time feedback will be critical to raising the likelihood of satisfactory implementation of the project.

The Impact Evaluation Lab at the KDI School of Public Policy and Management is collaborating with the partnering institutions and agencies both in Lao PDR and Korea, the UHS, the Lao Ministry of Health, the SNU College of Medicine, and the KOFIH to

contribute to the institutions' own efforts at monitoring and evaluation. This volume is the second-year interim report of the collaborative efforts at assessment.

The collaboration has two main objectives: impact evaluation and real-time feedback to the partner institutions and agencies. The three-year timeframe for the collaboration renders impracticable tracing of the project's impact transmission down to the eventual outcome goal: improvement of the Lai people's health. In view of the limitation, the impact evaluation team decided to focus on a series of intermediate outcome measures. They are: learning outcomes for the UHS faculty members participating in the one-year exchange program at the SNU College of Medicine; the learning outcomes of the UHS students; and finally, improvements in the clinical practices of the young physicians upon their graduation from the UHS. The first of these is to be monitored and assessed by the UHS and the SNU College of Medicine.

The KDI School's Impact Evaluation Lab is to focus on the latter two measures. For the students' learning outcome measurement, the evaluation team has decided to employ the test battery developed and maintained by the Medical Education Assessment Consortium (MEAC) of Korea. The questions on the test, designed to assess the test-takers' mastery of medical science and clinical knowledge, have been translated into Lao. For measuring the young physicians' clinical practices, we have consulted the UHS and the Lao Ministry of Health and found out that each central and provincial hospitals in Lao is required to establish and collect Disease Treatment Committee (DTC) data, which is composed of two sets of indicators: the Standard Treatment Guidelines (STGs) and the Reasonable Use of Drugs (RUD) guidelines. The Lao Ministry agreed to release a collection of individual physicians' STG and RUD data at the nation's major hospitals for the purpose of this impact evaluation. Baseline studies have been carried out to collect information on the UHS student learning and physician practices in late 2011 and 2012. Data collection will be carried out in in 2014.

Thus, the impact evaluation strategy will compare the changes in the outcome measures over the years between the treatment and the control groups. If there is an endogenous selection of subjects into the two groups, then the evaluation results may

be subject to bias in some form or another. The impact evaluation team is in the process of consulting with the UHS management to see whether randomized assignment of subjects (that is, students) into the treatment and the control groups is feasible.

Obviously, the results from the full impact evaluation exercise will be made available only in two years' time. But the team members felt that we already have enough valuable information to share with the partnering institutions and agencies, as well as the wider development community within Korea and outside of Korea, some of who are demanding results be published as soon as possible for real-time feedback in the spirit of real-time impact evaluation. Apart from the layout of the evaluation designs, this interim report will present some of the salient findings from the baseline studies. Chapter I ends with three annexes. Three annexes included are: on the specific details of the Dr. LEE Jong-Wook—Seoul Project (Annex I); on the composition of the faculties, the curricula, and the physical learning environment at the UHS (Annex II); and on the results of the interviews that we have carried out with select groups of UHS students and faculty members (Annex III). Chapter II lays out the overall impact evaluation framework and strategy and discusses the DTC baseline study results. This Chapter also includes three annexes: they are on the STG indicators; on the RUD indicators; and on the important and frequent diseases selected for DTC. The UHS students' test results are discussed in Chapter III.

Annex I. Description of the Dr. LEE Jong-Wook—Seoul Project

Under the Dr. LEE Jong-Wook—Seoul Project, professors from the UHS are invited to receive a training program for one year at the SNU College of Medicine. The first group of trainees was selected by the UHS, and started the program in November of 2010. The group included five professors from basic medicine and an additional three from clinical medicine, and two of the latter subgroups participated in the program for six months. The first batch of trainees was expected to return to UHS in November 2011 and receive funding to purchase equipment and materials for research and education.[1] The second year of the program started in January of 2012. There were two participants in basic medicine and six in clinical medicine in the second cohort. While there was an emphasis on basic science in the first year of the program, pediatrics was the major field in the second year. The fields of specialization of the trainees are presented in <Table A-1>.

<Table A-1> Fields of Specialization of the Trainees in 2010 and 2011 under the Dr. LEE Jong-Wook—Seoul Project

Category	Field of Specialization	2010-2011	2011-2012
Basic Medicine	Anatomy	1	1
	Microbiology	1	
	Pathology	1	
	Pharmacology	1	
	Physiology	1	
	Biostatistics		1
	Biochemistry		

1 Each trainee is expected to receive a grant of 30 million won (around US$ 25,700) upon completion of the program. The trainees who participated in the program for six months are expected to receive 15 million won (around US$ 12,800).

Category	Field of Specialization	2010-2011	2011-2012
Clinical Medicine	Pediatrics – Hematology	1	1
	Pediatrics – Neonatology		1
	Pediatrics – Allergy		1
	Obstetrics and Gynecology	1 (short-term)	1
	Internal Secretion	1 (short-term)	
	Internal Medicine – Endocrinology		1
	Internal Medicine – Respiratory Infection		1
	Public Health		
Total		8	8

Note: 'Short-term' means the participation for six months.

The process of selecting the trainees for the second year was undertaken in May 2011. Eight out of 15 applicants were selected as candidates after the interviews by professors from the SNU College of Medicine. The final candidates were given a chance to takeEnglish and Korean Language courses in Vientiane. The preparatory language courses are an additional feature of the project, introduced after the SNUMC found significant language barriers among the first-year training participants.

The planned duration of the project is a total of nine years, but the fund has been secured only for the first three years at the current stage. The financing for the rest of the planned duration will depend on the evaluation of the project for the first three years.

It should be noted that the Dr. LEE Jong-Wook—Seoul Project is modeled after the Minnesota Project as mentioned earlier. The goals are indeed ambitious. The project envisions the formation of a critical mass of competent and committed change agents for a comprehensive institutional transformation within the UHS and within the medical profession in general. A similar change is perceived to have happened at the SNUMC as a result of the Minnesota Project. For this purpose, the participants are supposed

to be selected in part based on their motivation and commitment. A faculty consensus workshop was organized at the UHS in May 2011, where around 40 faculty members of UHS discussed the fundamental problems at UHS and the goal of the Dr. LEE Jong-Wook—Seoul Project.

Annex II. UHS Education System: Composition of Faculties, Curricula, and Physical Environment

The University of Health Sciences (UHS) is the sole institution of higher learning in medical education in Lao PDR, and is a part of the Lao Ministry of Health. Before the reorganization in May 2007, the UHS was one faculty at the National University of Laos under the Ministry of Education.

Currently the university has seven faculties, or divisions, including the Faculty of Basic Sciences and the Faculty of Medicine, the mainstay of medical education at the UHS. It should be noted that the Dr. LEE Jong-Wook—Seoul Project is mainly partnering with these two Faculties, even though the future collaboration between the SNUMC and the UHS might involve some other faculties as well.

The UHS is a sprawling organization, consisting of many faculties and a fairly large student body. For the 2009-2010 academic year, the total student enrollment at the UHS stood at 4,706 and the number of faculty members was 215. The durations of the degree programs and the sizes of the student body and faculty vary across the constituent faculties. The details are presented in <Table A-2>.

It is noteworthy that the number of incoming students increased rapidly in the recent years due to policy considerations of the government. For the academic year of 2010-2011, the class size of 6th-year students in the Faculty of Medicine is 161, whereas that of 1st-year students in the Faculty of Basic Science is around 400, for instance. The upsurge in the recent years in student enrollments explains why student enrollment figures are at odds with the student intake per year times the duration of the program in the table.

<Table A-2> Number of Students and Professors and Other Program Details by Faculty at the UHS

Faculty	Length of training	Degree/ Diploma	Student Intake per Year	Student Enrollments (2009-2010)	Number of Professors
Basic Sciences	3 years or 1		~ 600	1,151	29
Medicine	6 years	Bachelor	~ 300	787	26
Dentistry	6 years	Bachelor	~ 100	558	47
Pharmacy	5 years	Bachelor	~ 100	734	28
Nursing	3 years	Higher level diploma	~ 100	692	28
Medical Technology	3 years	Mid-level diploma	~ 150	566	44
Post-graduate	1.5 or 3 years	Master Residency	~ 6-15	218	13
Total				4,706	215

Notes: 1) The length of basic sciences training varies for different faculties. For instance, the basic sciences education for those bound for the Faculty of Medicine run for three years, while the duration of the basic sciences program for pharmacy and dentistry students is one year. 2) Post-graduate study is responsible for training masters in public health and residency programs.

Source: UHS

The UHS developed and adopted a new integrated curriculum in 2002 with the support from the Canadian government. The new curriculum aims at training doctors to be capable of "working in hospitals or any other community facilities in Laos, with adequate knowledge, skills and attitudes necessary to improve the health of people".

Focusing on the Faculty of Medicine, <Table A-3> presents the outlines of the curriculum. The structure starts off with one year in foundation studies, and two additional years in preclinical sciences. The preparatory phase, accommodated by the Faculty of Basic Sciences, is then followed up with two years of study in clinical sciences, to be finished off by one year of clinical practice. The overall structure is similar to those adopted by schools in developed countries. However, interview results with faculty members and students reveal that the curriculum is not effectively implemented due to many capacity constraints, both physical and institutional in nature.

<Table A-3> Curriculum for the UHS Students in the Faculty of Medicine

1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year
Lao language and culture	Introduction to medical science	Gastro-intestinal system	Basic research methodology	Health administration	Practice in community
Mathematics	Policy	Musculoskeletal-integumentary system	Clinical skill Part I	Muscle-osteo-dermatology	Practice in hospital
Medical Chemistry	Foreign language	Nervous system I, II	General clinical presentation	Neurology	Practice in Internal medicine
Physical Education	Blood and Immune system	Policy	Hematology and Immunology	Endocrinology	Practice in Surgery
Environment study	Cardio-vascular system	Foreign language	Cardiology	Foreign language	Practice in gyneco-obstetrics
Foreign language	Respiratory system	Endocrine and metabolism	Foreign language	Reproductive system	Practice in Pediatrics
Basic statistics	Renal and Electrolyte system	Reproductive system	Pneumology	Mental health	Practice in emergency care
Biology		Nursing skills	Urology	Human development	Thesis
Biophysics	Foreign language	Nursing practice in hospital	Gastroenterology	Field practice in community medicine	Final State Exam
General Psychology		French	Foreign language	Foreign language	
Policy					

Source: UHS

<Table A-4> compares the curricula at the UHS and the SNUMC. Although the curriculum of UHS includes fewer courses in laboratory and in subspecialty disciplines than that of SNU, the basic structure of the integrated system is quite comparable.

Under the current curriculum, 4th-year students receive hospital training every morning, and take coursework in the afternoon. Likewise 5th-year students spend every morning in the clinical training in subspecialty areas, and work on the in-field community practice for a month. In the 6th year, students stay at the hospital all day, and are supposed to submit a final project (thesis) and pass the Objective Structured Clinical Examination (OSCE) and a Comprehensive Exam in order to graduate. The comprehensive exam consists of 200 multiple-choice questions. In theory, passing these exams is a requirement; in practice, however, interview results reveal that the requirement is bypassed.

<Table A-4> Comparison of Curricula in the UHS and the SNUMC (2010)

Year	UHS	SNUMC
1	Mathematics Physics Chemistry Biology Basic Statistics General Psychology Policy 1 Lao Language and Cultural Foreign Language 1, 2 Environment Lao Study 1, 2	Calculus for Life Science 1, 2 Calculus 1, 2 Physics & Lab. 1, 2 Chemistry & Lab. 1, 2 (or Biology & Lab. 1, 2) Korean College English 1
2	Introduction to Medical Science Blood and Immune system Cardio-vascular system Respiratory system Renal and Electrolyte system Policy Foreign language	Introduction to Medicine Basic Organic Chemistry & Lab. Basic Medical Statistics and Lab. Genetics New Technologies for Medicine Introduction to Chemical Biology Cellular and Molecular Biology College English 2 Electives by Area

Year	UHS	SNUMC
3	Gastro-Intestinal system Musculoskeletal-Integumentary system Nervous System 1, 2 Endocrine and Metabolism Reproductive System 1, 2 Urinary system Nursing skills Nursing Practice in hospital Policy French Foreign language Social Science Community Development	Anatomy & Lab. Histology & Lab. Physiology & Lab. Biochemistry & Lab. Neuroanatomy & Lab. Embryology & Lab. Neurophysiology & Lab. Pathology & Lab. Microbiology & Lab. Patient-Doctor-Society 1, 2 Basic Immunology Preventive Medicine & Lab. Biomedical Engineering
4	Clinical Skill 1(History taking, Physical exam) General Clinical Presentation (Fever, Sore throat, Weight loss) Research Methodology Respiratory System Hematology-Immunology Cardiovascular System Gastro-Intestinal System Renal System Social Sciences French Practice in Internal Medicine Practice in Surgery Practice in Pediatrics Practice in OB-GYN Practice in District Hospital	Pharmacology & Lab. Parasitology & Lab. Clinical Immunology Oncology Neurosciences Nephrology and Urology Hematology Endocrinology Circulatory System Respiratory System Gastroenterology Medical Genetics Infectious Disease Patient-Doctor-Society 3, 4

Year	UHS	SNUMC
5	Endocrine System Public Health Psychiatry Reproductive System Muscle-Osteo-Dermatology Nervous System Human Developments Field Practice in Community Medicine Social Sciences French Practice in Ophthalmology Practice in Dermatology Practice in Otolaryngology(ENT) Practice in Radiology Practice in Psychiatry Practice in Rehabilitation Practice in Laboratory Practice in Anesthesiology-Resuscitation	Internal Medicine & Clerkship Surgery & Clerkship Obstetrics & Gynecology (OB-GYN) and Clerkship Pediatrics & Clerkship Psychiatry & Clerkship Orthopedic Surgery & Clerkship Radiology & Clerkship Nuclear Medicine & Clerkship Clinical Reasoning Neurology & Clerkship Laboratory Medicine Emergency Medicine & Clerkship Patient-Doctor-Society 5
6	Management of Hospital Social Sciences Final Project (Thesis) Practice in Internal Medicine Practice in Surgery Practice in Pediatrics Practice in OB-GYN OSCE Comprehensive Exam	Anesthesiology and Pain Medicine Dermatology Thoracic Surgery Neurosurgery Urology Otolaryngology Ophthalmology Plastic Surgery Laboratory Medicine Rehabilitation Medicine Radiation Oncology Community Medicine Family Medicine Advanced Clinical Medicine Research in Medicine Clinical Performance Training and Examination Occupational and Environmental Medicine Critical Care Medicine New Horizons in Medicine Integrated Clinical Medicine Patient-Doctor-Society 6

Source: UHS and SNUMC.

Now we turn to the physical and institutional infrastructure for learning at the UHS. The current level of the educational environment at the UHS could be described as minimal and could use a major upgrade. The comparison between UHS and SNU on basic aspects is striking. There are 55 professors at the Faculties of Basic Science and Medicine combined at the UHS, whereas there are 503 professors at the College of Medicine at SNU. The number of students per professor at UHS is about 39, which is much larger than that at the SNUMC, where the student teacher ratio is 1.3. The UHS is short of classrooms, and the existing ones are not adequate for large classes since they have a flat floor. Regarding the laboratories, there are only a few laboratories, but the equipment is limited and the size is too small for a typical class size. The library has a collection of around 4,000 books in different languages, and can accommodate only 50 students in the reference room.

<Table A-5> Comparison of Educational Environment at UHS and SNUMC (2011)

Category	UHS Faculty of Basic Science Faculty of Medicine	SNU College of Medicine
Number of Professors	55	503
Number of Students	1st year: around 400 2nd year: around 400 3rd year: around 500 4th year: 408 5th year: 256 6th year: 161	1st year: 164 2nd year: 162 3rd year: 161 4th year: 148
Classroom	There are a few large classrooms with an ascending floor.	There are 7 large classrooms that can accommodate more than 150 people and have an ascending floor.
Laboratory	T There exist a few laboratories, but the equipment is limited and the size is small.	There are in total 32 laboratories: MDL: 28 Clinical Skill Center: 4 → OSCE: 3 → CPX: 1
Library	Collection: around 4,000 books Accommodation: around 50	Collection: 200,950 books It provides facilities for browsing theses and a large collection of academic journals. Accommodation: 566

Source: Department of Medical Education, College of Medicine, SNU.

Annex III. Interview Results with UHS Students and Teaching Staff

This note summarizes the results of on-site interviews conducted with the students and teaching staff, separately, of the University of Health Sciences (UHS) of Lao PDR in the UHS campus on May 17, 2011. The interviews were arranged with the help of the UHS and were carried out by the KDI School Impact Evaluation team (Prof. Lee, Kye Woo for the whole interview time; Prof. Kim, Jung Ho, Ms. Choi, Eun Ji, and Mr. Bounmy Inthakesone for parts of the interviews).

The purpose of the interviews was to identify some weaknesses of the UHS to be improved with the help of foreign assistance, to help design the assessment strategy and to provide the basis for the real-time feedback to partnering institutions.

The interviews were conducted with a randomly selected group of 8 students divided into two groups and 4 faculty members divided into two groups (two junior and two senior members).

The subjects covered in the interviews included various aspects of internal and external conditions in and around the UHS: student body, tuition and fees, teaching staff, curriculum, classroom facilities, learning materials, library, computer facilities, job prospects for graduates, compensation to medical doctors and their working conditions and other barriers to quality education.

I. Interview with 4th Year Students (a total of 8 students divided into two groups)

Student Body

- About 45% of students are regular students.
- Remaining 55% of students are special students.
- Regular students are selected on the basis of their entrance exam results.

- Besides the difference in the level of tuition and fees, there is no difference in the status of students between the regular and special students.

Tuition and Fees

- Regular students receive scholarships and therefore pay only 175,000 Kip per year. (US$ = About 10,000 Kip)
- Special students do not receive scholarships and therefore pay about 1.2 million Kip per year for tuition and fees, i.e., special students pay about 7 times more than regular students.

Teaching Staff

- They assessed the quality of professors as satisfactory; however, the quality of basic science courses is low since some professors are teaching courses in which they have not specialized. Before worrying about the quality of classes, the more urgent concern is over the short supply of professors in both basic sciences and specialized courses.
- Since full time faculty members are in short supply, the UHS hires many part-time lecturers, especially in special courses. As a result, the class schedule is not fixed and subject to abrupt changes, depending on the convenience of the lecturers. Moreover, some courses, especially the specialized courses, are often offered as a team teaching sequence. Class schedule changes are more frequent in these courses taught by teams of faculty members.
- The quality of lessons in clinical practice needs improvement. UHS students take practice sessions during the 5th year of their study, and on a full-time basis, during the 6th year. Students are assigned by the school to one of the four teaching hospitals in Vientiane, and to medical doctors of the hospitals as their clinical practice professor. However, the quality of the hospital service is poor in general, and it is hard for students to learn quality practice. The number of students assigned to each professor is too large for effective learning (about

32 students are assigned to one professor). Sometimes, the professors are not available, and therefore students just observe patients. Students prefer Mahosot Hospital and Mother and Child Hospital among the four teaching hospitals since the service quality is perceived to be higher.

Classroom Facilities

- The number of classrooms is too few compared with the number of students and subjects to be taught. The student body increased sharply over recent years.

Curriculum

- The curriculum should be improved. One particular concern was the sequencing of the courses. Students believe that some subjects that are offered in the third year should be taught earlier during the second year, for instance.

Learning Materials

- The number and quality of learning materials is limited. Few books are available in the library. Most books including textbooks are in French, followed by Thai and then English. Most students in the University take French; however, their level of proficiency is too low to study the French books, which are also of the old vintage. Both Thai and English books are relatively old and too few. They have no problems in reading Thai books. Although their English level is limited, they can read it with the help of the Internet or dictionaries. They wish to have more English books.

Library

- Library hours are severely limited: 1 or 2 hours in the morning and afternoon, respectively. The books are arranged on the shelves in a rather haphazard way so that it is often difficult to locate them.

Computer Facilities

- Computer facilities are too limited, and Internet access is not available for general search or for access to databases on school computers. Only e-mail services are available.

Skill Labs

- Labs are poorly equipped and too small to be used by each group of students. Labs are not available for the 1st year students' use.
- The number and type of model bodies (mannequins) for teaching/learning are too few.

Job Prospects

- At present, they all know that only about 50% of the graduates will get medical jobs with the government-run hospitals.
- The other 50% will have to get jobs with non-governmental organizations, such as NGOs, private enterprises or informal businesses. They understand that about 30% of graduates are working with NGOs.
- They mostly learn about the general picture of job prospects when they reach their 3rd year of medical school.
- Although most students learn about the uncertain job prospects by the 3rd year of the UHS, they do not drop out, since they have already invested in the UHS and believe that other opportunities might be available. Moreover, they are personally committed to helping and advising on the health of other people and love the medical field.
- The medical jobs with the government hospitals start with a probation basis and become regular official jobs only when vacancies emerge.

- Vacancies are made available normally in 1-3 years, but in some hospitals it might take up to 7 years, especially in the more popular urban hospitals.

- Most students want to work as medical doctors with government hospitals since the jobs are secure and provide generous fringe benefits.

- As an alternative to medical careers with government hospitals, doctors take private clinic jobs since they remunerate better, require high competence, and provide better health services.

- Private clinic jobs cannot be an option right after graduating from the UHS, since one has to serve with government hospitals at least three years in rural areas and five years in urban areas before opening up a private clinic, and there are no private hospitals. Private clinical practice by government hospital doctors is allowed only after the official hospital hours (9:00-18:00).

Compensations for Medical Doctors

- The starting salary of contracted medical doctors with government hospitals is between 300,000-400,000 Kip per month. This means that even special students who pay 1.2 million Kip per year can recover the tuition and fees in less than three years and explains partly why the competition for the entrance to the UHS is keen.

- However, the starting salary for the medical doctor is lower than that for other governmental officials since the starting medical doctors are not regular government officials, but contracted workers.

- Most NGOs pay much better than the government.

Barriers to Quality Education

- In the order of importance, students listed the major barriers to quality education as follows: number of classrooms, availability of learning materials including library facilities, and number and quality of professors, and poor arrangements for teaching practice.

II. Interviews with Faculty Members (8 faculty members in two groups)

The major topic of the interviews was barriers to quality education in the UHS. The interviews were conducted in two sessions: one session with four junior faculty members without administrative responsibilities, and another session with four senior faculty members with administrative responsibilities, separately. However, the results of the interviews are fairly similar. The only major difference was what they identified as the major challenge among the same perceived set of barriers to quality education. Therefore, this note combines the interview results of the two sessions.

Difference in Opinions between Junior and Senior Professors

- In terms of importance and seriousness, the junior professors emphasized the issues concerning the teaching staff, followed by paucity of classrooms, and then inadequate supply of teaching/learning materials. However, the senior professors with administrative responsibilities emphasized the issues of classrooms, followed by teaching/learning materials, and only then issues related to the professors. However, the general shape of the problems associated with each issue was more or less the same.

Learning Facilities

- Imbalance between the size of the student body and the number of classrooms and hospital spaces is so serious that the quality of education is severely compromised. For example, currently about 300 students are enrolled in the 4th year. However, there are only two available classrooms: about 200 students are accommodated in one room with an instructor, but the remaining 100 students have to sit in another room without a teacher with only the audio facility. The same course cannot be offered in several sections, since both the available classrooms and teaching staff are limited. The 5th year students are accommodated in rented spaces of hospitals (at the cost of 2 million Kip per month).

- For the 5th and 6th year students, clinical courses are offered in the hospitals. However, training spaces including clinical labs are heavily crowded since other program students, such as postgraduate students, are also using the same hospitals. Each group is composed of more than 30 students per teacher. Next year, it will be 50 students per group. The size of the student body increases faster than the number of patients. Recently, therefore, provincial hospitals are being used for clinical training with 20 students per group. However, the quality of training is uneven.

- The number of students increased recently. The number of students enrolled in the 4th year was 200 in 2009; 250 in 2010; and 300 students in 2011. The optimum number for the current facilities is considered to be about 150 students. New entrants to the School in 2011 were 160 students. Perhaps, the size of the student body is getting normalized.

Teaching Staff

- Teaching staff is in short supply. Especially in the basic science fields of the medical science faculty and clinical teaching fields at hospitals, more specialists should be hired. While the number of students has increased, the number of teaching staff has declined. There are a number of basic science volunteer teachers, who work for the UHS, expecting that vacant positions will be made available in the future. Some volunteer teachers have worked without pay for several years.

- The number of clinical teaching staff is in short supply, too. Although both hospitals and the UHS belong to the Ministry of Health organizationally, they have difficulty in communication and cooperation. The UHS cannot force the hospitals to assign more doctors for clinical teaching.

- For hiring both regular faculty members and volunteer teachers, there are no clearly established procedures for recruitment. Hiring is done on a non-open and non-competitive basis.

- Promotion processes and criteria are clearly spelled out; however, the actual practices and operations are ambiguous.

- The quality of faculty members needs to be improved. In particular, faculty members responsible for basic sciences and clinical teaching courses need to improve their teaching methods and techniques to compensate for their short period of teaching experience.

- Teacher evaluation and promotion systems need to be reviewed, and adherence to the established criteria and processes should be enforced more rigorously.

- There is no quality control of students' learning. Students are promoted automatically. There is a graduation exam system, but all students graduate. In fact, only about 70% of students passed the graduation exam last year; however, the MOH allowed all students to graduate with equal qualification. Therefore, the graduation examination results served no useful purpose.

Teaching Materials

- Integrated curriculum was adopted in 2004. However, there is weak coordination and cooperation between faculties. Each faculty offers the same or similar courses separately, and taking courses across faculties is not allowed. There are 7 faculties in the UHS: besides the faculties for post-graduate study, Medical Science, and Basic Sciences, there are Faculties of Nurses (3 year, BA); Technology (3 years, non BA); Pharmacy (3 year, BA); and Dentistry (6 years, BA). Furthermore, there are three separate curricula tracks for nurses: technical nurse, midwife, and community service. They could share the courses, teaching materials, and faculty members across the boundaries of faculties in theory; however, there is no such practice yet.

- Clinical teaching at hospitals is of poor quality. Too few skill labs are available to be used by the increasing number of students.

- Access to the library, Internet, and books is extremely limited.

- Labs, model human bodies, and other teaching materials are limited.

How can we evaluate the Dr. LEE Jong-Wook—Seoul's Impact?

- The ultimate test would be an improvement in the diagnostic procedures of the UHS graduates.

Chapter

02

A Real Time Impact Evaluation of the Dr. Lee Jong-Wook—Seoul Project in Lao PDR

A Real Time Impact Evaluation of the Dr. Lee Jong-Wook—Seoul Project in Lao PDR

1. Introduction

The main purpose of this chapter is to outline the overall scheme of a real time evaluation exercise and lay out the design of baseline studies of the Dr. LEE Jong-Wook—Seoul Project in Lao PDR, and to present some of the initial findings from the baseline study focused on the clinical practices by young physicians, or recent graduates from the UHS. The Dr. LEE Jong-Wook—Seoul Project was launched in 2010 and is scheduled to be completed in 2013 with the possibility of a continuation afterward. Conventionally an evaluation study is an ex-post evaluation exercise after the completion of a project. However, one salient feature of this evaluation study is that the evaluation exercise is being carried out in parallel with the implementation of the project.

There are several developmental and environmental imperatives that force evaluators to take a real time evaluation approach (Thomas 2011, Lee 2011). Firstly, multiple players are involved in development assistance. Besides the traditional OECD/DAC (Development Assistance Committee) members, rapidly increasing is the number of emerging bilateral donors and new international organizations, as well as numerous agencies in recipient countries. In addition, there have been an increasing number of development programs and projects financed by numerous donor agencies in a given developing country. These developments have inevitably made the causal chain more complex than before. Secondly, the rapid speed of changes in today's development

world makes ex-post summative evaluations more likely to be irrelevant. Thirdly, today's evaluators face the multi-faceted and crosscutting nature of emerging development issues, such as climate change, pandemic diseases, and environmental degradation. The nature of these emerging issues also makes the causal chain more complex and broad, which poses new challenges for development evaluators. A traditional summative or ex-post evaluation would not help evaluators cope with the new development environment and make their evaluation results relevant to project staff.

A more effective solution to cope with the new challenges is to take a real time evaluation approach, which will go along with each stage of the whole project cycle starting from the project design to preparation and throughout the implementation stages, providing pertinent feedbacks to project staff in a timely manner. For this reason, this evaluation study of the Dr. LEE Jong-Wook—Seoul Project will take a real time evaluation approach.

This chapter is laid out as follows. We start with a description of the overall design of the real time impact evaluation study together with its methodology and data. Three approaches are proposed for the methodology of this study. Then, the progress with the first two approaches is briefly discussed since the other evaluation team members provide a more in-depth treatment in separate reports. A more detailed description of the progress in the third approach is presented, followed by an analysis of the baseline data (2010) obtained in 2011 and 2012. The paper concludes with a list of remaining tasks to be monitored and completed in the future.

2. The Content of the Impact Evaluation Study

The objectives of the real time impact evaluation are two-fold. The first objective is to provide feedback, as the project is being implemented, to the implementing agencies (UHS, Ministry of Health of Lao PDR, Seoul National University College of Medicine (SNUMC), and the Korea Foundation for International Health (KOFIH) of the Republic

of Korea, the funding agency), regarding the progress of the project and the attainment of its intermediate outputs. On the basis of the feedback, the implementing agencies should be able to decide whether a modification of the project design is warranted or not during the implementation of the project.

The second major objective is to provide feedback to the project implementing agencies and policy makers of both governments regarding the attainment of the project objectives on the basis of the assessment of the project's final outputs and outcomes. In this way the accountability of the project entities (the donor, recipient, and other stakeholders) would be enhanced.

The project's final outcomes will be the overall improvement of the Lao people's health, who have been serviced by the graduates of the UHS, who will be taught by the UHS faculty members trained in Korea through the project. Therefore, the assessment of the final outcome should be made through a comparison of the health status outcomes of Lao people with and without the project.

Measurement and assessment of the health status of Lao people can be made using their morbidity and mortality rates. However, this will require a long and extended time even after the termination of the project and will be completed much beyond the current contract for this impact evaluation study. Therefore, for this real time evaluation study, intermediate outcome measures will be used.

3. The Methodology and Data

The methodology adopted for the real time impact evaluation of this project is based on the principles of the Paris Declaration for Aid Effectiveness. At the Second High-Level Forum on Aid Effectiveness in Paris (2005), more than 180 ministers of developed and developing countries responsible for promoting development and heads of multilateral and bilateral development agencies resolved to take far-reaching reform of the ways they deliver and manage aid by adopting the Paris Declaration for Aid Effectiveness. They

also agreed on 12 action indicators and targets to be attained by 2010. OECD claims that this Declaration builds on the lessons learned over many years about what works. It also claims that donors and recipients are committed to adopting the best policies and principles in aid management to increase the impact that aid has in reducing poverty and inequality, and increasing growth of developing countries (OECD 2009).

The Declaration incorporated five principles: development of country ownership of policies and strategies; alignment of donor aid to developing countries' priorities and systems in a predictable and transparent manner; donor efforts to harmonize aid practices; results-oriented aid management; and mutual accountability by both donors and recipients (Paris High Level Forum 2005). These five principles will be used as a basis for this impact evaluation study.

For the real time evaluation study, this study will, first, assess the design of the Dr. LEE Jong-Wook—Seoul Project against the policy and strategic statements of the Lao government and the need for calibration in the design. This method is consistent with the Alignment Principle of the Paris Declaration on Aid Effectiveness (OECD 2005). The Paris Declaration exhorts all donors to align their aid programs and projects with the development policy/strategy/plan of a recipient developing country. The Lao government elaborated its development policies for all sectors in its Poverty Reduction Strategy Paper: National Socio-Economic Development Plan: 2011-15 (Committee for Planning and Investment 2008) and Seventh Five-Year Health Sector Development Plan: 2011-2015 (Ministry of Health 2010).

The second approach of this study is to assess the appropriateness of the design of the project against the aid activities of other donors for Lao PDR in the health sector. This approach is consistent with the Harmonization Principle of the Paris Declaration on Aid Effectiveness (OECD 2005). Many donors are active in Lao PDR, and therefore all donors active in the health sector formed a Sector-wide Coordination (SWC) mechanism, co-chaired by the Vice Minister of Health and the government of Japan (represented by the ambassador). The SWC mechanism reviews existing aid activities for coordination and adjustment, and new initiatives of donors are expected to be submitted for the

mechanism's considerations to best avoid possible overlap and conflicts. Therefore, the Dr. LEE Jong-Wook—Seoul Project should also be assessed against other donors' existing activities and new initiatives.

Results of the team members' explorations based on these two approaches (ownership and alignment) are discussed and presented in separate chapters. In sum, our conclusion is that the project is well aligned with the Lao government's own strategy and policy. Regarding harmonization, however, there is much room for improvement. Both the Korean (and also Lao) agencies should explore ways to heighten effectiveness of the project through a more perspicacious harmonization with other donor-funded and Lao-initiated programs and projects.

A third and final approach of this study is to test several hypotheses for the purpose of assessing the effectiveness of the project. This approach is consistent with the Result-Based Aid Management Principle of the Paris Declaration (OECD 2005). The first hypothesis (H1) is whether the UHS students taught by the professors who were trained in Seoul under this project (the treatment group) attain a higher level of academic achievements than the rest of the UHS students (the control group). For this purpose, the two groups' academic achievements will be tested during their study at the UHS and at the time near their graduation from the UHS. The reason for this hypothesis test is the underlying assumption that the UHS graduates with a higher level of academic achievements would also provide a higher level of quality health services to patients. This assumption is testable and should also be tested since it provides the link between the first hypothesis and the second, which is stated below.

The second hypothesis (H2) is whether the UHS graduates who were taught by the professors trained under this project (the treatment group) provide a higher level of quality health services than those who were not taught by the professors trained under the project (a control group). A fair comparison needs to make sure that both groups of graduates have the same years of practicing experience. For this purpose, those two groups of doctors who are approaching the end of their first year health service practice in central and provincial hospitals will be compared.

The third hypothesis (H3) is whether UHS graduates who were taught by the professors trained under this project provide a higher level of quality health services (the treatment group) than those doctors who were not taught by the professors trained under this project, but have a longer period of on-the-job training and experience (the comparison group). For this purpose, those doctors who are at the end of their first (the treatment group), third, and fifth (or more) year (control group) health service practice in central and provincial hospitals will be tested. The purpose of this test (H3) is to compare the relative effectiveness of pre-service training provided by the professors trained under this project with that of on-the-job training or learning-by-doing provided by the central and provincial hospitals. The result of this test will help assess the desirability of continuing with the UHS-type of Dr. LEE Jong-Wook—Seoul projects in the future or with an alternative project design, especially a project placing more emphasis on the on-the-job training of practicing medical doctors, instead of pre-service training, for future medical doctors. The literature indicates that on-the-job training or experience is often more effective than or as effective as formal, pre-service education in explaining wage differentials of workers (Mincer 1961, Lee 1982).

Investment in on-the-job training of practicing doctors might be more efficient in Lao PDR since only about half of the UHS graduates started working as government officials in the last ten years, and the other half undertook jobs unrelated to their health education. Moreover, even the half of all graduates who started working as government officials, only 70% worked for health service, and the remaining 30% worked on jobs unrelated to health service. The wastage has been high in investment in the UHS, while it might be lower in investment in on-the-job training of practicing doctors (Thongphachanh, Inpong et al 2010).

For the purpose of this third approach, some select indicators of intermediate outcomes will be collected. Three types of indicators are considered:

Type 1 -- Indicators reflecting the learning achievement of the UHS professors being trained in the SNU; these indicators are to be developed and applied by the SNU College of Medicine on the basis of its standardized examination or interview battery at the beginning and end of the training period.

Type 2 -- Indicators reflecting the improvement in learning achievements of the UHS students; these indicators are to be developed on the basis of Korean Medical Education Assessment Consortium's standardized examination battery for those students who are in the middle of their six-year study program at the UHS.

Type 3 -- Indicators reflecting the diagnosis and treatment performance of the practicing doctors, who graduated from the UHS and are working in central and provincial hospitals; these indicators will be applied to those doctors who are near the end of first, third, and fifth (or longer)-year of health service practices. For this purpose, this study will use the (Lao) Disease Treatment Committee (DTC) indicators.

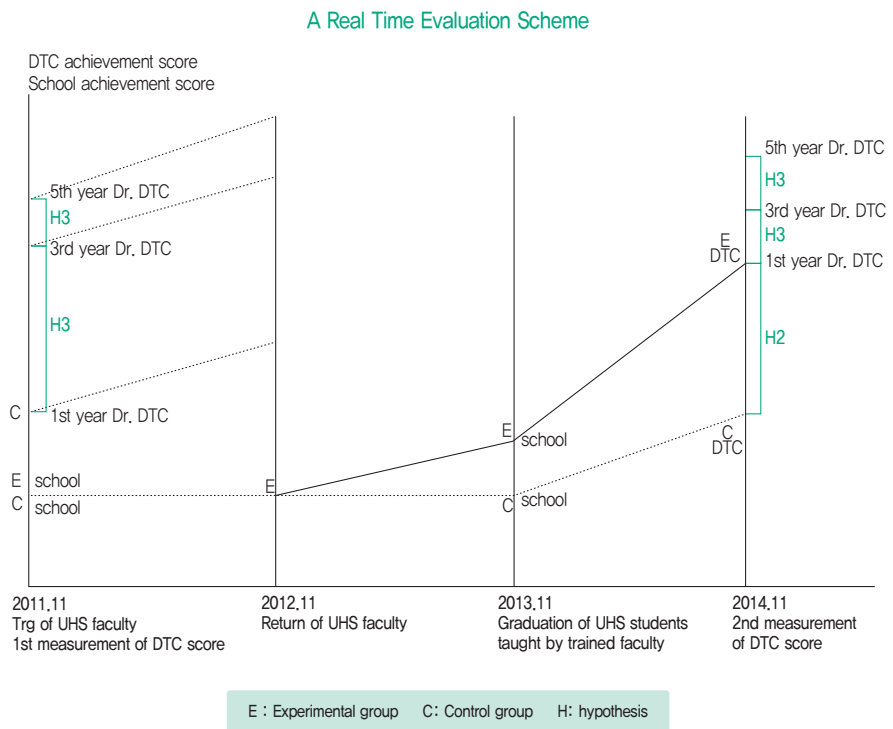
The DTC indicators were developed by the Ministry of Health with technical assistance provided by the government of Sweden in 2002 and were formally instituted by the Lao Ministry of Health in all hospitals only in 2006 after experimentations by some hospitals. Although the Ministry provided detailed technical guidelines (Ministry of Health 2006), it has not enforced the system in all hospitals. It is left to each hospital for voluntary implementation. Moreover, the Ministry of Health has not collected the data from hospitals for compilation and analysis. Therefore, these DTC indicators will be collected systematically for the first time from all four central hospitals and 16 provincial hospitals under this evaluation study.

The DTC indicators are divided into two sets. One set is for the Standard Treatment Guidelines (STG), and the other for the Reasonable Use of Drugs (RUD) (Annex I and Annex II). For the purpose of this study, the DTC score is defined as an average of RUD and STG scores. The Ministry of Health Guidelines for the DTCs (2006) were provided for 25 important and frequent diseases in Lao PDR (Annex III. For this evaluation study, DTC data will be collected for the five most critical and often observed diseases chosen by each hospital. Each hospital is to establish a DTC to implement the guideline and collect the STG and RUD data on a monthly basis. The committee of each hospital is to analyze the data at the individual, department, and the entire hospital level. On the basis of the analysis, the Committee is to recommend that the Director of the hospital organize seminars, training courses, counseling for individuals and groups, and take

other remedial actions. This evaluation study team consulted with several specialists in Lao PDR and Korea, especially faculty members of the SNU College of Medicine, for the adequacy of the DTC data to be used in this evaluation study. The judgment was that although they are not the best, they are reasonable indicators to measure the quality of medical doctors' health service practices.

A summary of the real time evaluation scheme, especially the third approach, is depicted in the following diagram [Figure 1].

[Figure 1] A Real Time Evaluation Scheme – The Third Approach



4. Progress in the First Two Approaches

Satisfactory progress has been made in each of the three methodological approaches. Since there was no in-depth appraisal document to justify the project, the evaluation team made efforts to improve its understanding of the background of the health sector project. It first undertook in-depth interviews with government officials and visited several health institutions at all three different levels: central, provincial, and district hospitals and health centers. In addition, it randomly selected eight UHS students in two groups and four faculty members (two junior and two senior members) for interviews (The results are found in Annex 1 of Chapter I).

On the basis of the interview results, the policy statements of the government of Lao PDR, and information on other donors' aid activities, the evaluation team proposed a restructuring of the current and programmed health projects financed by the government of Korea, including the Dr. LEE Jong-Wook—Seoul Project (Cho and Kim 2011). The objective and general direction of the restructuring is to increase the synergistic effects of the health projects financed by the government of Korea and to align them with the Lao government's emphasis on the construction of healthy villages based on the expansion and quality improvement of the primary health care network and personnel (Ministry of Health 2010, 2007, Perks et al 2006, World Bank 2010 and 2006). As a result of the restructuring proposal, the Children's Hospital provided by the Korea International Cooperation Agency (KOICA) would function as a teaching hospital in collaboration with the UHS, and some trained faculty members under the Dr. LEE Jong-Wook—Seoul Project would be assigned to the hospital upon their return.

At the same time, KOICA's programmed project to follow up the Children's Hospital Project will include a component to provide in-service training for the primary health care personnel working at the district hospitals and health centers, including those health centers to be strengthened under the Mother and Child project being supported by the KOFIH and the WHO, World Bank, ADB, and the Government of Belgium. Therefore, the Dr. LEE Jong-Wook—Seoul Project also emphasized primary health care and other

clinical specialties for the selection of the UHS faculty members to be trained in Seoul starting in November 2011. Also, the Dr. LEE Jong-Wook—Seoul Project would support the establishment of the Educational Development Center for Health Professionals (EDC/HP), which will strengthen the curriculum, teaching/learning materials, and teaching methods of the UHS with finances from other donors in the future. Both the UHS-Dr. LEE Jong-Wook—Seoul Project and future projects would reinforce the improvement of educational quality in the UHS. As mentioned earlier, a fuller description of this proposal will be provided in a separate chapter.

5. Progress in the Third Approach

To pursue the third approach, a set of baseline data has been collected and analyzed. The Type 1 indicators (Achievement of the UHS faculty members being trained in Seoul) have been collected by the staff of the SNU College of Medicine at the beginning and end of the training program, as follows:

<Table 0> Achievement of Faculty Members Trained at SNUMC: 2010-2012

Assessment by Trainning Advisors		2010-2011 Training Program		2011-2012 Training Program	
		Beginning	End	Beginning	End
General Medical Knowledge*	Assessment of Knowledge	12.5%	14.3%	42.8%	57.1%
	Learning Achievement during the Program	37.5%	71.4%	71.4%	71.4%
Specialized Medical Knowledge*	Assessment of Knowledge	25.0%	14.3%	14%	14.3%
	Learning Achievement during the Program	75.0%	57.1%	71.4%	85.7%

*: Based on answers to questionnaires; % indicates the proportion of answers above 4 of the 5-point scale (Likert style) total answers.

Self-Assessment by Faculty Members Trained		2010-2011 Training Program		2011-2012 Training Program	
		Beginning	End	Beginning	End
General Medical Knowledge *	Assessment of Knowledge	62.5%	100.0%	14.3%	33.3%
	Learning Achievement during the Program	75.0%	100.0%	57.1%	66.6%
Specialized Medical Knowledge *	Assessment of Knowledge	12.5%	57.1%	0%	0%
	Learning Achievement during the Program	87.5%	100.0%	57.1%	83.3%

*: Based on answers to questionnaires; % indicates the proportion of answers above 4 of the 5-point scale (Likert style) total answers.

Source: SNUMC

Assessment was made separately by both training advisors and trainees based on answers to subjective questions. Since the assessment was not based on scientifically constructed objective medical questions, its validity is questionable. However, positive progress was indicated in each of the two training programs. More positive progress was indicated in the self-assessment of the trainees and in the specialized medical knowledge. Therefore, there is reasonable grounds to believe that the UHS faculty members trained through the project will make positive contributions to improving the academic achievement of the UHS students in the future.

(1) Hypothesis 1 Test Data

For the test of the Hypothesis 1 (that academic achievement of the UHS students taught by the UHS faculty members trained in Seoul under this project is greater than other students), the Type 2 data (academic achievements of the UHS students near graduation) were obtained and analyzed. In May 2011 and January 2012, a group of the UHS students in 4-6th grades were tested with the academic performance test battery used for the Korean medical students in the past. The May 2011 test was a pilot survey, and the January 2012 test was undertaken to establish the baseline, against which the impacts of the Dr. LEE Jong-Wook—Seoul project would be measured. This will be discussed in Chapter III.

The results will be used as the baseline for the control group to be compared with the scores of the UHS students who will be taught by the UHS faculty members trained in Seoul during 2010-2011 and 2011-2012 under the Dr. LEE Jong-Wook—Seoul Project (treatment group). The scores of the treatment group were collected in January 2013. The scores of another treatment group will be collected in early 2014.

However, the 2013 scores of the treatment group will not be significantly different from the 2012 baseline data, and a set of the scores for the treatment group should be collected in early 2014. The reason is that all UHS faculty members trained in 2010-2011 specialized in basic sciences and therefore would not teach the UHS students in 4-6th grades. However, the UHS faculty members trained in 2011-2012 include clinical science specialists who would be teaching the UHS students in 4-6th grades when they return to the UHS in late 2012. Therefore, their scores to be measured in early 2014 will be more significant when compared with the control group (who were not taught by the UHS faculty members trained in Seoul under this project). Once this set of data is collected in early 2014, the Hypothesis 1 will be tested meaningfully.

(2) Hypothesis 2 Test Data

For the test of the Hypothesis 2 (the quality of the health service practice measured by DTC indicators of the first year practicing doctors who graduated from the UHS and taught by the UHS faculty members trained in Seoul under this project (treatment group) is better than the other first year practice doctors of the same year or the previous years (control group)), the 2010 (June-December average) DTC data have been collected for two out of four central hospitals and 15 out of 16 provincial hospitals, a total of 17 hospitals in September 2011. These data will serve as a control group's baseline data.

The DTC data for the treatment group, who will graduate from the UHS in 2013, should be collected in late 2014. The 2011 and 2012 graduates were not taught by the UHS faculty members who were trained in Seoul through this project. These faculty members trained in 2010-2011 specialized in basic sciences, and therefore would teach only those students in grades 1-3 in 2011 and 2012. Only those UHS students graduating

in late 2013 would have been taught by some UHS faculty members specializing in clinical sciences and trained in Seoul under this project in 2011-2012. Therefore, the DTC data for the first year practicing doctors in 2010 and 2012 will serve as control group data.

The DTC data of 2010 were collected from 17 out of a total of 20 central (2 out of 4) and provincial (15 out of 16) hospitals. However, most data are aggregated for each hospital as a whole and are not identified by the name of individual doctors in the first, third, or fifth (or more) year of service practices. The DTC data for individual doctors of different lengths of service were available for only 40 doctors (about 20% of total doctors). These DTC data for individual doctors in 2010 will serve as control group data, which will be compared with the DTC data for the treatment group, who would have graduated from the UHS in 2013 and were taught by the faculty members specializing in clinical sciences, trained in SNUMC under this project and have practiced for one year by 2014. The data from these two groups will serve to test the Hypothesis 2.

In 2012, the DTC data were also collected from 19 out of a total of 20 central (4 out of 4) and provincial (15 out of 16) hospitals. And the DTC data for individual doctors of different lengths of service were available for 106 doctors. Together with 40 individual doctors whose 2010 DTC data are available, these additional 106 doctors with different lengths of service would serve as part of the control group data for the Hypothesis 2 test.

In addition, these data for both the control and treatment groups would serve a test of another useful corollary hypothesis: the academic achievement in the UHS is a good indicator of the quality of the health service practices in hospitals after graduation. In other words, the UHS graduates with a better academic achievement will provide a better quality of health services in hospitals after graduation. If this hypothesis is rejected, the value of the pre-service training at the UHS has to be questioned. This corollary hypothesis test will provide a sound basis for the test of the Hypothesis 2. The Hypothesis 2 test is based on two assumptions. First, the academic achievements of the UHS students taught by the faculty members trained in Seoul under this project (treatment group) will be higher than the UHS students who were not (control group). This

assumption will be confirmed with the Hypothesis 1 test. Second, these students with a higher level of academic achievements will provide a higher quality of health services. We need to confirm this assumption with this corollary Hypothesis 2 test.

Once we obtain the DTC data of individual practicing doctors in the first year of service, we can link them to their level of academic achievements (e.g. GPA points) at the UHS in the previous years. The UHS faculty members promised to provide this academic achievement data if a complete name of the first year practicing doctors is provided. Since this information is sensitive to practicing doctors, we will have to handle it with care and absolute confidentiality.

(3) Hypothesis 3 Test Data

For the test of the Hypothesis 3 (the level of the health service quality of the first-year practicing doctors taught by the UHS faculty members trained in Seoul is higher than that of other practicing doctors who have a longer period of experience but not taught by the UHS faculty members trained in Seoul), the DTC data collected in 2011, 2012, and 2013 will serve as a time series data for the control group. For the test of the Hypothesis 3, the control group (third and fifth (or more)-year practicing doctors) data will be compared with the late 2014 DTC data for the first year practicing doctors who graduated in 2013 and were taught by the UHS faculty members trained under this project in Seoul in 2010-2012.

The assumption behind this Hypothesis 3 test is that the level of health service quality of practicing doctors increases with on-the-job training or experiences. If the DTC scores of the third-year practicing doctors are higher than that of the first year practicing doctors, the quality of health services must have improved by in-service (on-the-job) training of practicing doctors after graduation from the UHS. On the one hand, it can be hypothesized that the government's investment in the practicing doctors could be more efficient than additional investment in the pre-service training of the UHS students, if the investment in the in-service training of UHS graduates is more effective than the same amount of additional investment in pre-service training at the UHS. On the other hand, it can be

hypothesized that the government's additional investment in the pre-service training of the UHS students (such as the Dr. LEE Jong-Wook—Seoul Project) is so efficient that the quality of health services provided by the new graduates from the UHS would be higher than the health service quality of the more experienced practicing doctors who graduated from the UHS before the additional investment in the UHS training was made. The Hypothesis 3 test would confirm one of the alternative hypotheses.

6. Analysis of 2010 DTC Data

During September 5-6, 2011, the 2010 (June-December average) DTC data of 17 hospitals (2 central and 15 provincial hospitals) were collected as baseline data for the control group. There were altogether 20 hospitals (4 central and 16 provincial hospitals) in Lao PDR. Although each hospital selected 3-5 important diseases, only a few diseases are common to many hospitals. The most common disease among hospitals is acute lung disease. Therefore, DTC data on acute lung diseases collected by 17 hospitals are presented below by region and poverty level.

(1) DTC Data on Acute Lung Disease by Hospital and Province

The average DTC score on acute lung disease of all hospitals is 7.97. The average DTC score for central hospitals is 8.25; however, the average DTC score of all 15 provincial hospitals is 7.93. The two averages are not different statistically. Therefore, the quality of health services offered by medical doctors does not seem to differ between central and provincial hospitals.

There is also a regional difference among provincial hospitals. The standard deviation of the DTC scores among provincial hospitals is 0.7. The average DTC score for the central region is 7.80, while the average for the northern region is 8.13, and the southern region is 7.72. However, these regional differences are not large enough to reject the null hypothesis that there is no difference between pairs of regions (i.e., Central vs.

Northern; Central vs. Southern, and Northern vs. Southern regions) at the 10% level of significance.

The DTC scores are also negatively related to the level of poverty among provinces. The higher the level of poverty in the provinces, the lower the DTC score. The Pearson correlation coefficient between the DTC scores of all hospitals and the poverty level of all provinces is -0.32. The coefficient between STG scores and the poverty index is -0.35. We can therefore conclude that the quality of health services offered by medical doctors is somewhat negatively correlated with the level of poverty among provinces. The Lao government and the donor agencies already recognize the imbalances in the allocation of medical resources across regions as one of the major challenges (Ministry of Health 2007). This finding shows that the regional imbalance also exists in the distribution of quality medical personnel across regions.

<Table 1> DTC Data on Acute Lung Disease by Region and Poverty Level: 2010

Region	Hospital	Acute Lung Disease			Poverty	Average by Region (Std.dev.)		
		DTC	STG	RUD	Level*	DTC	STG	RUD
Central Hospital	Mitthaphab							
	Mother and Child	8.50	8.38	8.63	1.33	8.25	8.32	8.18
	Setthatilath					(0.35)	(0.04)	(0.63)
	Mahosot	8.00	8.26	7.73	1.33			
Central Provincial	Vientiane	8.25	8.00	8.50	1.73			
	Khammouan	8.02	8.07	7.96	2.00	7.80	7.73	7.87
	Savannakhet	7.90	8.30	7.50	1.38	(0.54)	(0.81)	(0.47)
	Bolikhamxay	7.02	6.53	7.51	2.20			
Northern Provincial	Louangphrabang	8.70	9.30	8.10	1.78			
	Xayabouly	8.05	8.25	7.85	1.67			
	Phongsaly	9.87	9.87	9.87	1.73			
	Louangnamtha	7.60	7.70	7.50	1.70	8.13	8.25	8.01
	Bokeo	7.13	7.26	7.00	2.14	(0.90)	(0.98)	(0.90)
Northern Provincial	Houaphan	7.83	8.00	7.65	2.00			
	Xiengkhouang	7.75	7.40	8.10	2.43			
Southern Provincial	Salavan	7.75	7.40	8.10	1.36			
	Champasak	8.29	8.30	8.27	2.17	7.72	7.63	7.89
	Sekong**	7.30		7.30	2.00	(0.42)	(0.59)	(0.42)
	Attapeu	7.55	7.20	7.90	1.86			
Total	Average	7.97	8.01	7.97	1.84			
Central	Total	8.25	8.25	8.18	1.33			
Provincial	Total	7.93	7.97	7.94	1.88			

* Constructed as a ratio between the sum of the number of districts of extremely poor, poor, and non-poor to a total number of districts in each province. Poor and extremely poor are weighted by 2 and 3, respectively. Therefore, 1 represents that all districts are non-poor (Source: Committee for Planning and Investment (2006)).

** DTC data is only based on RUD data

(2) DTC Data and Experience of Practicing Doctors

Of the 17 hospitals that reported DTC data, only 8 (3 central and 5 provincial) hospitals provided the DTC scores at the individual doctors' level. These eight hospitals show the DTC scores of individual doctors by the year of practice experience, and therefore we can compare the DTC scores of doctors with different lengths of practice experience. However, one problem is that since each hospital selected the most frequently observed and important five diseases prevalent among its population under its purview, the diseases selected for DTC scores are not exactly the same across all hospitals. Some overlap, but others do not. Therefore, we cannot compare the DTC score of doctors with different lengths of experience for all groups of diseases across hospitals. The overlapping groups of diseases are too few to compare for all doctors and across all hospitals.

To solve the problem, we carried out a hypothesis test of independent groups between the DTC score in the disease common among all hospitals (e.g. acute lung disease) and the DTC scores in all 26 diseases, for which some DTC scores were collected by each hospital. Luckily, the null hypothesis that the two groups of DTC scores are statistically equal was not rejected at the 10% significance level. Therefore, we have decided to analyze the DTC scores in all 26 diseases, for which only some DTC scores were collected by each hospital. We can compare the DTC scores of 40 doctors with different lengths of practice experience across 17 different hospitals and 26 disease groups. DTC scores were distributed by years of experience of practicing doctors, as follows: 15 first year doctors from 8 hospitals, 11 third year doctors from 7 hospitals, and 14 fifth (or more) year doctors from 5 hospitals.

A preliminary analysis indicates that the DTC indices are positively correlated with the practice years of the doctors. The doctors with a longer experience do provide higher-quality health services. The mean DTC score of the first-year doctors is 7.72, while the mean DTC score of the third-year doctors is 7.88. The third-year doctors earned higher mean scores in both RUD and STG. The fifth (or more) -year doctors scored higher mean DTC (in both RUD and STG) than the first-year doctors. However, the mean DTC score of

the fifth-year doctors is equal (7.88) to that of the third-year doctors (7.88). The fifth year doctors scored higher in the STG than the third year doctors, but scored lower in the RUD.

However, the differences between the mean DTC scores of the first-year and third-year doctors, and between the first and fifth (or more) -year doctors are statistically insignificant at the 5% level of significance. This means that the difference in the mean DTC scores among doctors with different practice years is statistically meaningless, and the scores are practically the same. It also means that doctors' clinical skills do not necessarily improve over their years of service and with their on-the-job training or experiences.

Therefore, whether the doctors' quality of health care services increases with their years of service needs to be confirmed with a greater number of observations in disease types, hospitals, and doctors. If it is not confirmed, we should conclude that the difference in the quality of health services between doctors with different years of practice is insignificant. This means that the current in-service or on-the-job training programs are ineffective. Therefore, for the future improvement of health service quality in Lao PDR, improving the quality of the academic programs of the UHS could play a more important role than the current in-service training programs in hospitals, as long as a higher level of academic achievements leads to a higher quality of health services. This stresses the importance of verifying the linkage between the academic achievement at the UHS and the quality of health services of the doctors upon graduation from the UHS as part of testing Hypothesis 2.

<Table 2> DTC and Academic Score: 2010

Hospitals	Practice Score				Academic Score (GPA)			
	DTC*	RUD	STG	No. of Doctors	1-4th avrg	6th yr	1-6th avrg	No. of Doctors
1st year practice doctors								
Mother and Child	8.50	8.43	8.57	3	2.58	2.91	2.69	1
Setthatilath	8.55	8.47	8.63	3	2.96	3.33	3.03	2
Mahosot	7.46	7.24	7.68	1				
Luang Namtha	7.01	7.27	6.76	3	2.26	2.42	2.33	3
Houaphan	8.51	8.50	8.52	1				
Xien Khouang	6.65	6.87	6.43	2				
Champasak	7.75	8.05	7.45	1	2.28	3.13	2.41	1
Sekong	7.31	7.96	6.66	1	2.56	3.05	2.60	1
Average (Std. dev)	7.72 (0.74)	7.85 (0.64)	7.59 (0.91)	15	2.51 (0.37)	2.88 (0.48)	2.59 (0.39)	8
3rd year practice doctors								
Mother and Child	8.70	9.00	8.40	1				
Setthatilath	8.85	8.87	8.84	3	2.47	3.06	2.52	3
Mahosot	7.17	6.94	7.40	1				
Luang Namtha	7.62	7.87	7.37	2	2.63	2.86	2.44	2
Houaphan								
Xien Khouang	7.68	7.75	7.60	1				
Champasak	7.28	7.80	6.75	1				
Sekong	7.84	8.18	7.50	2	2.21	2.96	2.31	1
Average (Std. dev.)	7.88 (0.66)	8.06 (0.71)	7.69 (0.70)	11	2.48 (0.40)	2.98 (0.44)	2.46 (0.22)	6
5th year practice doctors								
Mother and Child								
Setthatilath	8.73	8.60	8.87	3	2.44	3.04	2.55	2
Mahosot	7.51	7.32	7.70	1				
Luang Namtha	7.71	7.81	7.60	7				
Houaphan								
Xien Khouang	7.98	8.15	7.80	1				

Hospitals	Practice Score				Academic Score (GPA)			
	DTC*	RUD	STG	No. of Doctors	1-4th avrg	6th yr	1-6th avrg	No. of Doctors
Champasak	7.49	7.76	7.22	2				
Sekong								
Average (Std. dev)	7.88 (0.51)	7.93 (0.48)	7.84 (0.62)	14	2.44 (0.55)	3.04 (0.44)	2.55 (0.54)	2

*DTC is a simple average of RUD and STG.

(3) Relationship between DTC and Academic Achievement Data

The UHS uses three types of academic achievement scores. They are: grade point averages (GPA) of 1-6th years; 6th year; and 1-4th years. Our hypothesis tests of independent groups between 1-6th years average scores and 1-4th years average scores confirms that we cannot reject the null hypothesis that they are the same group. In other words, 1-6th years average scores and 1-4th years average scores of the sample doctors are statistically the same (p=0.73). However, 1-6th years average scores and 6th year scores are different statistically at the 1% significance level (p=0.0065). Also, 1-4th years average scores and 6th year scores are statistically different at the 1% level (p=0.0044). Therefore, we will examine the relationships between DTC and 1-6th years GPA first and between DTC and 6th year GPA later.

A. Using Academic Score: 1-6th Years Average Score

Relationships between academic scores and practice scores will be analyzed by hospital location and experience of practicing doctors.

i. DTC and Academic Scores in Central and Regional Hospitals

In 2012, we collected some additional information on the doctors whose 2010 DCT scores were collected in 2011. Among the 40 doctors for whom DTC scores were collected, 16 doctors (about 8% of total doctors) were identified by their name and birth

date. And we have obtained their academic achievement scores at the UHS. These 16 doctors were distributed to 5 hospitals (8 doctors in 2 central hospitals; 8 doctors in 3 regional hospitals).

<Table 3> DTC and Academic Scores of Doctors in Central and Regional Hospitals: 2010

Category	Doctor ID	Academic score				Practice Score			
		1-6th average		6th average		DTC		RUD	STG
2 Central Hospitals	1	2.69	2.68 (0.36)	2.91	3.11 (0.39)	8.40	8.73 (0.23)	8.20	8.60
	2	2.71		2.94		8.45		8.40	8.50
	3	3.35		3.72		8.95		8.80	9.10
	4	2.62		2.97		9.00		9.10	8.90
	5	2.29		2.66		8.70		8.70	8.70
	6	2.65		3.56		8.85		8.80	8.90
	7	2.17		2.73		8.60		8.40	8.80
	8	2.93		3.35		8.90		8.70	9.10
3 Regional Hospitals	9	2.67	2.40 (0.24)	2.63	2.77 (0.43)	6.87	7.34 (0.31)	7.20	6.54
	10	2.06		2.09		7.10		7.10	7.10
	11	2.25		2.54		7.07		7.50	6.64
	12	2.70		2.37		7.57		7.54	7.60
	13	2.18		3.35		7.67		8.20	7.14
	14	2.41		3.13		7.75		8.05	7.45
	15	2.60		3.05		7.31		7.96	6.66
	16	2.31		2.96		7.40		7.70	7.10
Average		2.54		2.94		8.04		8.15	7.93

Numbers in () are standard deviations.

Although an equal number of doctors were selected from central and regional hospitals, their average academic scores were different. Doctors working at the central hospitals had, on average, a higher achievement level (2.68) than those who were working for the regional hospitals (2.40). This difference is statistically significant at the 10% significance level (p=0.09).

Similarly, differences in the practice performance are observed between doctors in central and regional hospitals. The mean DTC score of the central hospital doctors was higher (8.73) than that of the regional hospital doctors (7.34). The differences in the practice scores between doctors in central and regional hospitals were also statistically significant at the 1% level (p-value=0.0000). Therefore, we can state that between doctors of central and regional hospitals, their DTC scores are positively correlated with their academic achievement scores. The difference in the DTC scores between central and regional hospitals may also be explained by factors other than the difference in academic achievement scores. Perhaps, the regional hospitals may not have as good in-service training programs as the central hospitals, or may have inferior equipment or facilities. However, the academic achievement score is one of the important factors explaining the difference in the practice scores between doctors of central and regional hospitals.

ii. DTC Scores of Doctors with Higher and Lower Academic Scores

To verify the relationship between DTC and academic scores, we made another analysis. The 16 doctors, for whom academic scores were collected, were divided into two groups by the academic score: those doctors with above the median academic scores (2.70), and those doctors with below the median academic scores, and then each group's average DTC scores were compared. First, each group's academic and DTC scores were statistically different from the other group's scores at the 1% level (p=0.003) and 10% level (p=0.064), respectively. Second, the higher academic score group showed a higher average practice (DTC) score than the lower academic score group. The higher academic score group average was 3.00, compared with the lower academic score group average of 2.43. The average DTC score of the higher academic score group is 8.77, while it is 7.87 for the lower academic score group. Therefore, we can state that DTC and academic scores are positively correlated among all the doctors sampled.

The same positive relationship was observed between academic scores and STG scores. The two average STG scores of the two different average academic score groups were not equal at the 10% significance level (p=0.0515). However, the relationship

between academic scores and RUD scores was not positive. The two average RUD scores of the two different average academic score groups were statistically equal at the 10% significance level.

<Table 4> DTC and Academic Scores of Groups Divided by the Median Academic Scores: 2010

Academic scores	Group by Academic scores	Practice Scores					
1-6th avrg		DTC	DTC avrg	RUD	RUD avrg	STG	STG avrg
2.06	2.43 (0.23)	7.10	7.87 (0.74)	7.10	8.03 (0.62)	7.10	7.70 (0.94)
2.17		8.60		8.40		8.80	
2.18		7.67		8.20		7.14	
2.25		7.07		7.50		6.64	
2.29		8.70		8.70		8.70	
2.31		7.40		7.70		7.10	
2.41		7.75		8.05		7.45	
2.60		7.31		7.96		6.66	
2.62		9.00		9.10		8.90	
2.65		8.85		8.80		8.90	
2.67		6.87		7.20		6.54	
2.69		8.40		8.20		8.60	
2.70		7.57		7.54		7.60	
2.71	3.00 (0.32)	8.45	8.77 (0.28)	8.40	8.63 (0.21)	8.50	8.90 (0.35)
2.93		8.90		8.70		9.10	
3.35		8.95		8.80		9.10	

Numbers in () are standard deviations.

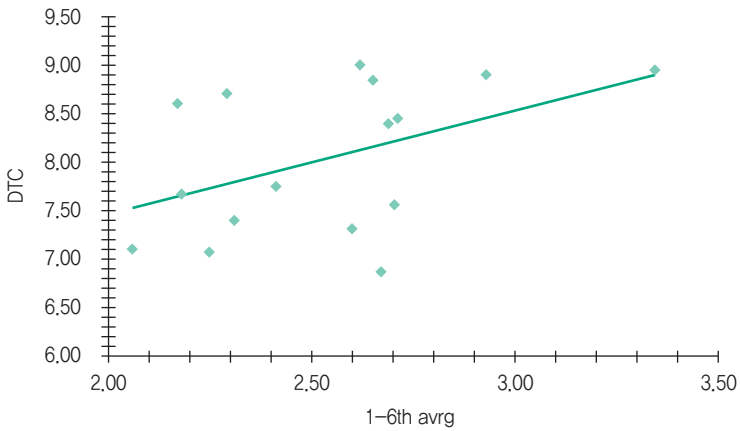
iii. Causal Relationship between Academic and Practice Scores of All Doctors

To verify the seemingly positive relationship between academic scores and practice scores, we computed the Pearson correlation coefficient between the practice scores (DTC) and the academic scores of all 16 doctors sampled. It was 0.47, confirming a medium level correlation. Similarly a medium level correlation was observed between the academic achievement scores and STG at 0.47 (as well as RUD at 0.42).

To check whether the variations in the practice scores (DTC) can be explained by the differences in academic achievement scores (GPA) of the 16 doctors, we ran a regression analysis between the two sets of scores. When we regressed the practice performance scores (DTC) on the academic achievement scores (1-6th years GPA) of all 16 sample doctors, the estimated coefficient was 1.08, which was significant at the 10% level. The R square (coefficient of determination) was at 0.218 (Prob>F=0.068) ([Figure 2] and <Table 5>). A similar relationship is observed between STG (and RUD) and academic achievement scores with coefficient of 1.39 and R squared value of 0.22 at the 10% significance level (as well as with the RUD scores with coefficient of 0.77 and R squared value of 0.18, but not significant at the 10% level) <Table 5>.

This is a good sign for our future test of the corollary Hypothesis 2 since the variations in the practice scores are explained by the differences in academic scores at a statistically significant level. When we collect the experimental group data in the future, we can expect that if UHS graduates who were taught by the faculty members trained at the SNUMC under the Dr. LEE Jong-Wook—Seoul Project have a higher level of academic achievement scores (Hypothesis test 1), they may also have a higher level of practice performance scores than other doctors, who were not taught by the SNUMC trained faculty members (corollary Hypothesis 2), proving the effectiveness of the aid project.

[Figure 2] Relationship between DTC Data and Academic Scores of all Doctors: 2010



<Table 5> Regression Analysis of DTC and Academic Scores Among All Doctors: 2010

Dependent Variable	DTC		RUD		STG	
1-6th Years Score for all 16 Doctors	Coeff.	1.08*	Coeff.	0.77	Coeff.	1.39*
	t	1.98	T	1.74	T	1.99
Constant	5.30		6.18		4.41	
R-squared	0.22		0.18		0.22	
Adj. R-squared	0.16		0.12		0.16	
Prob > F	0.0683		0.1044		0.0665	

* denotes significance at the 10% level.

iv. Relationship between DTC and Academic Scores of Doctors with the Same and Different Experience

The above analyses have been done for all 16 doctors with different years of practice experience as a group, for whom academic achievement scores were collected. However, we have to do more analyses with different groups of doctors. First, we have to verify whether the same positive relationship exists between practice (DTC) scores

and academic achievement scores even among doctors with the same period of practice experience. In particular, we need to verify the relationship among doctors with first-year practice experience, since we will compare the experimental and control group doctors with the first-year practice experience for the Hypothesis 2 test. Second, we have to verify whether the same positive relationship between practice (DTC) scores and academic achievement scores exists between two groups of doctors with different years of practice experience. In the Hypothesis 3 test, we will compare the DTC scores of the experimental group doctors, who are in their first year practice and was taught by faculty members trained in the SNUMC under the aid project, with the doctors who are in their third (or fifth) year practice experience and were not taught by the faculty members trained under the aid project.

First, therefore, DTC scores of doctors with the first-year practice experience were compared with their academic achievement (1-6th years) scores. And then the same analysis was done for the doctors with the third-year practice experience. We did not do the same analysis for the doctors with fifth (or more) year practice experience since the number of observations is too few <Table 6>.

<Table 6> Average DTC and Academic Scores of Doctors with Same Experience: 2010

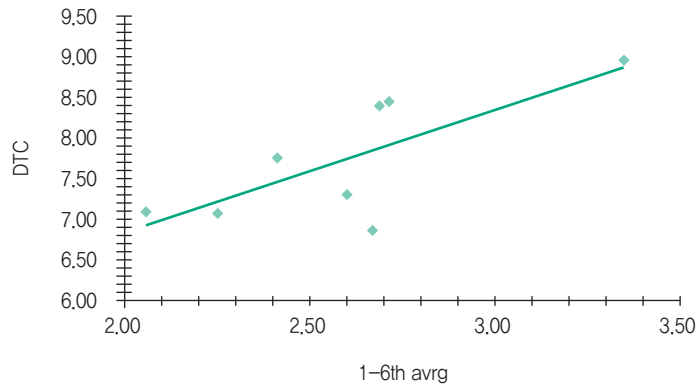
Category by experience	Academic score		DTC score	
	1-6th avrg	Average (std.dev.)	DTC	Average (std.dev.)
1st Year Doctors	2.69	2.59 (0.38)	8.40	7.74 (0.77)
	2.71		8.45	
	3.35		8.95	
	2.67		6.87	
	2.06		7.10	
	2.25		7.07	
	2.41		7.75	
	2.60		7.31	

Category by experience	Academic score		DTC score	
	1-6th avrg	Average (std.dev.)	DTC	Average (std.dev.)
3rd Year Doctors	2.62	2.46 (0.22)	9.00	8.20 (0.73)
	2.29		8.70	
	2.65		8.85	
	2.70		7.57	
	2.18		7.67	
	2.31		7.40	
5th Year Doctors	2.17	2.55 (0.54)	8.60	8.75 (0.21)
	2.93		8.90	

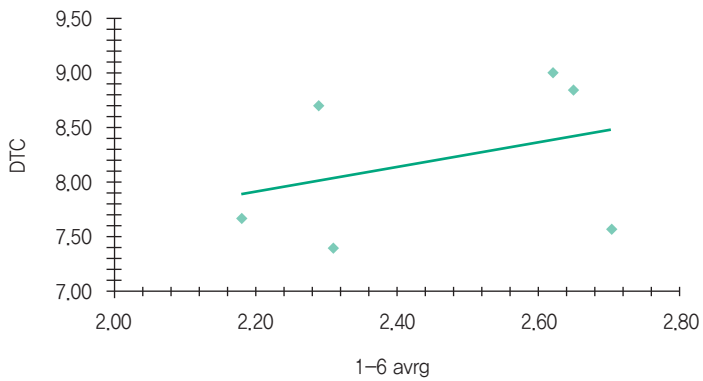
Among the first year practice doctors, there was a strong positive relationship between academic achievement and practice performance scores. The Pearson correlation coefficient was 0.75. Similarly, a strong correlation coefficient was observed between academic scores and STG at 0.68 (and RUD at 0.78). This level of correlation is much higher than among all doctors with different years of practice experience, as shown earlier (0.47, 0.47, and 0.42, respectively).

Regression analyses of the scores for the first year practice doctors also confirmed that variations in practice performance scores (DTC, RUD, and STG) were explained by the differences in academic achievement scores at the statistically significance levels of 5% or 10%. The R square was also high at around 0.5 with Prob.>F between 0.02 and 0.06 ([Figure 3] and <Table 7>). Again, this degree of positive correlation among doctors in the first year of practice is much higher than among all doctors with different years of practice experience. However, this positive relationship was not observed among third year practice doctors ([Figure 4] and <Table 7>). Perhaps the number of observations is too few.

[Figure 3] Relationship between DTC and Academic Score among 1st- year Doctors: 2010



[Figure 4] Relationship between DTC and Academic Scores among 3rd- year Doctors: 2010



<Table 7> Regression Analysis of DTC and Academic Scores of First and Third-Year Doctors: 2010

Dependent Variable	DTC		RUD		STG	
1-6th Years Score for Eight 1st – year Doctors	Coeff.	1.51**	Coeff.	1.21**	Coeff.	1.81*
	t-value	2.76	t-value	3.08	t-value	2.29
Constant	3.83		4.77		2.89	
R-squared	0.56		0.61		0.47	

Dependent Variable	DTC		RUD		STG	
Adj. R-squared	0.49		0.55		0.38	
Prob > F	0.0328		0.0217		0.0621	
1-6th Years Score for Six 3rd -Year Doctors	Coeff.	1.14	Coeff.	0.37	Coeff.	1.91
	t-value	0.75	t-value	0.26	t-value	1.12
Constant	5.40		7.44		3.36	
R-squared	0.12		0.02		0.24	
Adj. R-squared	-0.10		-0.23		0.05	
Prob > F	0.4958		0.8071		0.3243	

*and** denotes significance at the 10% and 5% level, respectively.

Second, to explain the variations in DTC scores properly, besides variations in 1-6th years academic scores, variations in the number of practice years and the practice province (central or provincial hospitals) should be considered. When DTC scores were regressed against multiple regressors (i.e., practice province and 1-6th years academic scores) among the first year doctors, the coefficient of the provinces is significant at the 5% significance level. However, the coefficient of the 1-6th years academic scores is insignificant even at the 10% level, as shown below <Table 7-A>. Similar results are obtained with the third year practice doctors <Table 7-B>. The peculiar situation of different locations between the capital and provincial hospitals, such as poverty, patients' education level, hospital facilities, and laboratory equipment, may have stronger effects on the DTC scores than the 1-6th academic scores.

<Table 7-A> Regression Analysis of DTC and Academic Scores of 8 First-Year Doctors: 2010

		DTC	RUD	STG
Province	coeff.	1.17**	0.54	1.79***
	Std. err.	0.34	0.37	0.41
	P	0.018	0.206	0.007
GPA 1-6th	coeff.	0.41	0.70	0.13
	Std. err.	0.45	0.50	0.55
	P	0.402	0.224	0.823
Constant	coeff.	6.23***	5.89***	6.57***
	Std. err.	1.09	1.22	1.32
	P	0.002	0.005	0.004
Number of obs.		8	8	8
Prob > F		0.006	0.039	0.004
R-squared		0.87	0.73	0.89

****and ** denote statistical significance at the 1 and 5% level, respectively.

<Table 7-B> Regression Analysis of DTC and Academic Scores of Third-Year Doctors: 2010

		DTC	RUD	STG
Province	coeff.	1.28***	1.11**	1.45***
	Std. err.	0.14	0.26	0.08
	P	0.002	0.024	0.000
GPA 1-6th	coeff.	0.19	-0.46	0.84**
	Std. err.	0.33	0.64	0.19
	P	0.609	0.524	0.02
Constant	coeff.	7.10***	8.91***	5.28***
	Std. err.	0.80	1.54	0.45
	P	0.003	0.01	0.001
Number of obs.		6	6	6
Prob > F		0.0047	0.0517	0.0005
R-squared		0.97	0.86	0.99

***, **, * denotes statistical significance at the 1%, 5%, and 10% level, respectively.

Third, when the DTC scores are regressed against multiple factors among all doctors with different years of practice experience and different practice locations, the 1-6th years academic scores did not explain variations in DTC scores at even the 10% significance level. Most of the variations in DTC scores are explained by variations in the practice experience and province (central or provincial hospitals) at the 10% and 1% significance levels, respectively <Table 7-C>. This result is obtained partly because a substantial part of the variations in DTC is explained by variations in practice experience and province, and partly because there was no systematic relationship between academic and DTC scores across the groups of doctors with different periods of practice experience. There was no statistical difference in average academic achievement scores between two groups of doctors with first and third-year (and fifth-year) practice experience. Academic achievement scores of doctors with same years of practice experience were as follows: 2.59 for the first year doctors; 2.46 for the third year doctors; and 2.55 for the fifth (or more) year doctors. These scores were not different statistically at the 10% significance level (p-value=0.4674). Likewise, there was no statistical difference in practice scores between the two groups of doctors with the first and third year practice experience. Their average DTC scores were: 7.74 for the first year doctors; 8.20 for the third year doctors; and 8.75 for the fifth (or more) year doctors. However, these DTC scores are not different statistically at the 10% significance level (p-value=0.2803) <Table 8>. Therefore, the academic scores and the practice scores of the first year and third year practice doctors are not positively correlated. It is interesting to note that the variations in DTCs are explained by the variations in academic scores at the significant level <Table 7C>, even when the two scores of the first and third year doctors are not systematically correlated.

<Table 7-C> Regression Analysis of DTC and Academic Scores of All Doctors: 2010

		DTC	RUD	STG
Experience	coeff.	0.099*	0.078	0.122*
	Std. err.	0.05	0.07	0.06
	P	0.078	0.304	0.056
Province	coeff.	1.201***	0.84***	1.567***
	Std. err.	0.16	0.22	0.18
	P	0.000	0.003	0.000
GPA 1-6th	coeff.	0.314	0.244	0.382
	Std. err.	0.23	0.33	0.26
	P	0.205	0.468	0.169
Constant	coeff.	6.416***	6.934***	5.896***
	Std. err.	0.60	0.84	0.68
	P	0.000	0.000	0.000
Number of obs.		16	16	16
Prob > F		0.0000	0.0011	0.0000
R-squared		0.911	0.727	0.932

*** and * denote statistical significance at the 1% and 10% level, respectively.

A further analysis has been made to compare half of the first-year doctors with higher academic achievement scores and half of the third-year doctors with lower academic achievement scores. We find that the above average academic score of the first year doctors (2.85) is higher than the below average academic score of the third year doctors (2.26), which are statistically different at the 10% significance level (p=0.0298). We also find that the DTC score of the higher academic achievement group of the first year doctors (8.17) is higher than that of the lower academic achievement group of the third year doctors (7.92). However, we cannot reject the hypothesis that the average DTC score of the above average academic score group of the first year doctors (8.17) is statistically equal with the DTC score of the below average academic score group of the third year doctors (7.92) at the 10% significance level <Table 8>.

From this we can infer that even if the experimental group of the first year practice doctors, who will be taught by the faculty members trained at the SNUMC under the aid project, improves their academic achievement scores to a level as high as the average first-year doctors of the 2010 sample, their DTC scores would not be higher than the DTC scores of the below average academic score group of the third year practice doctors of the 2010 sample, who were not taught by the SNUMC trained faculty members. That is, Hypothesis 3 is rejected. However, it remains to be seen whether the experimental group of the first year doctors improves their academic achievement scores to a sufficiently high level. Then their DTC scores could be higher than that of the below average third year practice doctors in 2010. This is exactly the purpose of the Hypothesis 3 test, and we can check the effectiveness of the aid project, depending on the results of the Hypothesis 3 test.

<Table 8> DTC and Academic Achievement Scores between First and Third-Year Doctors: 2010

Cumulative No. of Obs.	1st Year Doctors				3rd Year Doctors			
	Academic score		DTC score		Academic score		DTC score	
	1-6th avrg	Average	DTC	Average	1-6th avrg	Average	DTC	Average
2	3.35	2.85	8.95	8.17	2.70	2.66	7.57	8.47
4	2.71		8.45		2.65		8.85	
6	2.69		8.40		2.62		9.00	
7	2.67		6.87					
9	2.60	2.33	7.31	7.31	2.31	2.26	7.40	7.92
11	2.41		7.75		2.29		8.70	
13	2.25		7.07		2.18		7.67	
14	2.06		7.10					
Average		2.59		7.74		2.46		8.20

A caveat should be added to the above analyses and inferences. Since the number of observations is too few to make any definitive conclusions, the interpretations made in the preceding sections should be treated as tentative and provisional.

B. Using Academic Score: 6th Year Average Score

The above analysis of the positive relationship between the practice (DTC) score and the academic achievement (GPA) score was done on the basis of the 1-6th years average academic achievement scores. However, as we have seen earlier, the 1-6th years average academic scores are statistically different from the 6th year academic achievement scores. Therefore, we have performed the same analyses of the relationship between the practice (DTC) scores and the academic achievement scores, as we have done above, on the basis of the 6th year GPA scores.

i. DTC Data and Academic Scores in Central and Regional Hospitals

Doctors in central hospitals show higher academic and practice scores than the doctors in regional hospitals <Table 3>. On the one hand, the average academic score of central hospital doctors (3.10) is higher than that of regional hospital doctors (2.76). However, statistically this difference is not significant at the 10% level (p-value=0.1195). On the other hand, the average DTC score of the central hospital doctors (8.73) is higher than that of the regional hospital doctors (7.34). This difference is significant at the 1% level (p-value=0.0000). Other measures of the practice scores (RUD and STG) also show a similar level of difference. Therefore, we cannot state that the difference in practice scores between central and regional hospital doctors can be attributable to the difference in their academic scores. This phenomenon is different from the situation when we measured the academic achievement of doctors by the 1-6th years average GPA. The difference comes entirely from the fact that the average academic achievement scores of the doctors between the central and regional hospitals are not different at the statistically significant level when they are measured by the 6th year, instead of 1-6th years, academic score. In terms of the 6th year academic score, the doctors of central and regional hospitals are homogeneous. Therefore, the difference in

doctors' practice performance score between the central and regional hospitals can be explained by doctors' 1-6th year academic achievement scores, not by 6th-year academic scores. Perhaps, when the central hospitals hire doctors, they pay more attention to the 1-6th years academic achievement scores than the 6th year academic scores.

ii. DTC Data of Doctors with Higher and Lower Academic Scores

The 16 sample doctors were divided into two groups by the median 6th year academic achievement scores, and then their average DTC (RUD and STG also) scores were compared with their average academic scores. The average academic scores of the above and below the median score groups were 3.26 and 2.61, respectively. Their DTC scores were 8.23 and 7.85, respectively. First, we find the average academic scores of the two groups are statistically different at the 1% significance level (p=0.0004). Second, however, the average DTC scores of the two groups are not statistically different at the 10% significance level (p-value=0.3324). Likewise, the STG scores of the two groups are not statistically different, either (p-value=0.6382). Therefore, although we find a seemingly positive relationship between the DTC (or STG) and academic scores of the above median and below median academic score groups, the positive relationship is not statistically significant at the 10% level. This finding is different from the one obtained by using the 1-6th years average academic achievement scores. When 1-6th years academic scores were used, there was a positive relationship between these practice scores (DTC or STG) and academic scores.

However, the difference in RUD scores of the two groups is statistically significant at the 10% level (p=0.077), and there are positive relationships between the practice scores (RUD scores in this case) and the 6th year academic scores of the two doctors' groups divided by the median academic scores. There seems to be a close relationship between RUD practice scores and 6th year academic scores, while there appears to be a close relationship between DTC (or STG) practice scores and 1-6th years academic scores.

<Table 9> DTC and 6th Year Academic Scores of Groups divided by the Median Academic Scores: 2010

Academic score 6th yr	Group by Academic scores	Practice Scores					
		DTC	DTC Avrg	RUD	RUD Avrg	STG	STG Avrg
2.09	2.61 (0.28)	7.10	7.85 (0.77)	7.10	7.88 (0.61)	7.10	7.81 (0.96)
2.37		7.57		7.54		7.60	
2.54		7.07		7.50		6.64	
2.63		6.87		7.20		6.54	
2.66		8.70		8.70		8.70	
2.73		8.60		8.40		8.80	
2.91		8.40		8.20		8.60	
2.94		8.45		8.40		8.50	
2.96	3.26 (0.28)	7.40	8.23 (0.76)	7.70	8.41 (0.50)	7.10	8.04 (1.05)
2.97		9.00		9.10		8.90	
3.05		7.31		7.96		6.66	
3.13		7.75		8.05		7.45	
3.35		8.90		8.70		9.10	
3.35		7.67		8.20		7.14	
3.56		8.85		8.80		8.90	
3.72		8.95		8.80		9.10	

Numbers in ( ) are standard deviations.

iii. Causal Relationship between DTC Data and 6th Year Academic Scores among All Doctors

To verify the seemingly positive relationship between the DTC scores and the 6th year academic scores of all 16 doctors, the Pearson correlation coefficient was computed. It was strong at 0.56, which is higher than 0.47 observed earlier with the 1-6th years academic scores. A much stronger relationship is observed between other measures (RUD) of the practice scores and the 6th year academic scores with the Pearson correlation coefficient at 0.69. When the STG scores are used, the correlation coefficient is weaker at 0.45, as when the 1-6th years academic scores were used.

The regression analysis also shows that variations in the DTC scores are explained by differences in the 6th year academic scores to a significant extent. The coefficient is 1.0 and is significant at the 5% level with the R squared value of 0.32 (prob.>F=0.023). Similar results are observed with the RUD and STG scores as a dependent variable <Table 10>. These results are similar to the ones obtained earlier by using the 1-6th years academic scores. The relationships seem to be a bit stronger in the case of the RUD score. We may therefore interpret that the relationship between academic scores and practice scores gets stronger when 6th year academic scores and RUD scores are used. In other words, 6th year academic scores may influence practice scores, especially the RUD scores, more than 1-6th academic scores.

<Table 10> Regression Analysis of DTC and 6th year Academic Scores Among All Doctors: 2010

Dependent Variable	DTC		RUD		STG	
6th Year Score for all 16 Doctors	Coeff.	1.00**	Coeff.	0.97***	Coeff.	1.02*
	t-value	2.56	t-value	3.58	t-value	1.91
Constant	5.11		5.30		4.92	
R-squared	0.32		0.48		0.21	
Adj. R-squared	0.27		0.44		0.15	
Prob > F	0.0229		0.0030		0.0775	

*, **, and *** denotes 1%, 5%, and 10% significance level, respectively.

iv. Relationship between DTC Data and 6th Year Academic Scores of Doctors with the Same and Different Experience

The positive relationship between practice scores (DTC, RUD, and STG) and 6th year academic scores were based on the data for all 16 doctors with different periods of practice experience pooled together. We need to verify whether this positive relationship exists among doctors with the same years of experience and between groups of doctors with different years of experience.

First, we find that the practice scores and 6th year academic scores of doctors in their first year practice were closely correlated. The Pearson correlation coefficient between the DTC and 6th year academic scores is 0.75, which is the same as the case when 1-6th year average scores are used. A similar situation is found with the STG scores with the coefficient at 0.62 (compared with 0.68 when 1-6th year academic scores were used). However, the Pearson correlation coefficient between RUD and 6th year academic scores is 0.90, which shows a much stronger correlation than the case when 1-6th year average scores were used (0.78). However, a similarly close correlation does not appear between the practice and 6th year academic score among doctors in their third year practice, as in the case with the 1-6th year academic scores.

The regression analyses also show that the variations in practice scores are explained by the differences in 6th year academic scores among doctors in their first year doctors to a much more significant extent than the case when all 16 doctors were pooled together. Higher are regression coefficients, R squared value, and the level of significance. These findings are similar to those observed when 1-6th year academic scores were used. An important difference is that the degree of positive correlation between practice scores and academic scores gets higher with the 6th year academic scores than with the 1-6th year scores. However, no significant relationship was observed between practice and academic scores among doctors in their third year.

<Table 11> Regression Analysis of DTC and 6th year Academic Scores between First and Third-Year Doctors: 2010

Dependent Variable	DTC		RUD		STG	
6th Year Score for eight 1st –year Doctors	Coeff.	1.22*	Coeff.	1.11***	Coeff.	1.33*
	t	2.82	t	5.00	t	1.96
Constant	4.22		4.70		3.75	
R-squared	0.57		0.81		0.39	
Adj. R-squared	0.50		0.77		0.29	
Prob > F	0.0305		0.0025		0.0975	

Dependent Variable	DTC		RUD		STG	
6th Year Score for six 3rd -Year Doctors	Coeff.	0.44	Coeff.	0.63	Coeff.	0.25
	t	0.54	t	0.96	t	0.25
Constant	6.90		6.48		7.32	
R-squared	0.07		0.19		0.02	
Adj. R-squared	-0.16		-0.02		-0.23	
Prob > F	0.6165		0.3924		0.8165	

*, **, and *** denote 1%, 5%, and 10% significance level, respectively.

Second, to explain the variations in DTC scores properly, besides variations in 6th year academic scores, variations in the number of practice years and the practice province (central or provincial hospitals) should also be considered. When DTC scores were regressed against multiple regressors (i.e., practice province and 6th year academic scores) among the first year doctors, the coefficient of provinces is significant at the 1% significance level. Moreover, the coefficient of the 6th year academic scores is also significant even at the 5% level, as shown below <Table 11-A>. Among the third year doctors, the coefficient of provinces is also significant at the 1% level, but the coefficient of 6th year academic scores is insignificant even at the 10% level <Table 11-B>.

<Table 11-A> Regression Analysis of DTC and Academic Scores of 8 First-Year Doctors: 2010

		DTC	RUD	STG
Province	coeff.	1.09***	0.49**	1.684***
	Std. err.	0.19	0.16	0.32
	p	0.002	0.025	0.003
GPA 6th	coeff.	0.58**	0.83***	0.341
	Std. err.	0.21	0.17	0.34
	p	0.039	0.004	0.367
Constant	coeff.	5.65***	5.341***	5.961***
	Std. err.	0.57	0.46	0.94
	p	0.000	0.000	0.001

	DTC	RUD	STG
Number of obs.	8	8	8
Prob > F	0.0008	0.0011	0.0026
R-squared	0.941	0.935	0.9077

*, **, and *** denote the 1%, 5%, and 10% significance level, respectively.

<Table 11-B> Regression Analysis of DTC and Academic Scores of Third-Year Doctors: 2010

		DTC	RUD	STG
Province	coeff.	1.288***	0.992**	1.58***
	Std. err.	0.13	0.22	1.88
	p	0.002	0.02	0.004
GPA 6th	coeff.	0.089	0.36	-0.1798
	Std. err.	0.17	0.28	0.24
	p	0.628	0.285	0.502
Constant	coeff.	7.29***	6.776***	7.8***
	Std. err.	0.49	0.81	0.70
	p	0.001	0.004	0.002
Number of obs.		6	6	6
Prob > F		0.0048	0.0337	0.008
R-squared		0.9715	0.8957	0.9601

*, **, and *** denote the 1%, 5%, and 10% significance level, respectively.

Third, when the DTC scores are regressed against multiple factors among all doctors with different years of practice experience and different practice locations, the 6th year academic scores did explain variations in DTC scores at even the 5% significance level. The coefficient of the practice province and experience was statistically significant at the 1% and 10% levels, respectively <Table 11-C>. This result is obtained partly because a substantial part of the variations in DTC is explained by variations in practice experience and province, and partly because the academic score also explained the variations in

DTC scores across the groups of doctors with different periods of practice experience. This result is different from the case when the 1-6th year academic score was used in the regression analysis and holds despite the fact that when no systematic relationship was found between the academic and DTC scores between the first year practice doctors group and the third year practice doctors group, separately. There was no statistically significant difference either in academic achievement scores, or in practice scores between the two groups of doctors. The average academic achievement scores of doctors with the same years of practice experience were as follows: 2.88 for the first year doctors; 2.98 for the third year doctors. Although the academic and practice scores are higher among doctors in their third year practice than among doctors in their first year doctors, these scores were not statistically different at the 10% significance level (p-value=0.6866) <Table 12>. The same findings were confirmed with the 1-6th year academic scores. Likewise, the average practice (DTC) scores for doctors with the same years of practice experience were as follows: 7.74 for the first year doctors; and 8.20 for the third year doctors. However, these two average practice scores were not statistically different at the 10% significance level (p-value= 0.2803) <Table 12>.

<Table 11-C> Regression Analysis of DTC and Academic Scores of All Doctors: 2010

		DTC	RUD	STG
Experience	coeff.	0.077*	0.060	0.095
	Std. err.	0.04	0.05	0.06
	P	0.083	0.24	0.125
Province	coeff.	1.179	0.72	1.639
	Std. err.	0.12***	0.15***	0.17***
	P	0.000	0.000	0.000
GPA 6th	coeff.	0.388**	0.592***	0.1837
	Std. err.	0.14	0.16	0.19
	P	0.016	0.004	0.364
Constant	coeff.	6.134***	5.913***	6.355***
	Std. err.	0.40	0.47	0.56
	P	0.000	0.000	0.000

	DTC	RUD	STG
Number of obs.	16	16	16
Prob > F	0.000	0.000	0.000
R-squared	0.932	0.863	0.9254

Further analyses were made to check any relationship between practice and academic scores across the groups of doctors with the first and third year practice experience. Each group of doctors with the first and third year practice experience was divided into two subgroups by the median 6th year academic score. And then the average academic score of the above median academic score group doctors in their first year (3.21) is compared with the average academic score of the below median academic score group doctors in their third year (2.66). Likewise, their DTC scores are compared between the above the median academic score group doctors in their first year practice and the below the median academic score group doctors in their third year practice (8.12 and 7.89, respectively) <Table 12>. The above median doctors in their first year practice appears to have achieved both higher average academic and practice scores than the below median doctors in their third year practice. It seems to be that the two scores of the two groups are positively correlated and the differences in the DTC scores can be explained by the variations in the academic scores of the two groups with different years of practice experience. The average academic scores of the two groups are statistically different at the 10% level (p=0.082) <Table 12>. However, the DTC scores of the two groups are not statistically different at the 10% significance level (p=0.6992). Therefore, we cannot state that the academic and practice scores of the two-group doctors are positively correlated. This is also the same finding that was confirmed with the 1-6th year academic achievement scores. Therefore, the experimental group of doctors, who will be taught by the UHS faculty members trained at the SNUMC under the aid project, will have to improve their academic scores substantially higher in order to exceeed the practice performance score (DTC) of the below average academic achievement group of the third year practice doctors in 2010.

<Table 12> DTC Data and 6th Year Academic Scores between First and Third-Year Doctors: 2010

No. of Obs.	1st Year Doctors				3rd Year Doctors			
	Academic score		DTC Score		Academic score		DTC Score	
	6th yr	Average	DTC	Average	6th yr	Average	DTC	Average
1	3.72	3.21	8.95	8.12	3.56	3.29	8.85	8.51
2	3.13		7.75		3.35		7.67	
3	3.05		7.31		2.97		9.00	
4	2.94		8.45					
5	2.91	2.54	8.40	7.36	2.96	2.66	7.40	7.89
6	2.63		6.87		2.66		8.70	
7	2.54		7.07		2.37		7.57	
8	2.09		7.10					
Average		2.88		7.74		2.98		8.20

7. Analysis of 2012 DTC Data

In 2012, DTC data (January-June) was collected for 106 doctors (about 50% of the total number of doctors) from 19 (4 central and 15 regional) hospitals across 12 different disease groups.

(1) DTC Data by Hospital and Province

Unlike the 2010 DTC data, the 2012 DTC data confirms the sharp difference between central hospitals and provincial hospitals at the 1% significance level. The average DTC for central hospitals is 8.24, and that for provincial hospitals is 7.53 (p-value=0.0000) <Table 13>. A similar difference in RUD and STG is observed between central and provincial hospitals at the same level of significance. Therefore, the quality of health services in central hospitals must be better than that in provincial hospitals.

In addition, the average DTC scores among the regional hospitals have statistical differences at the 10% significance level. The DTC scores for the regional hospitals are: 7.65, 7.39, and 7.60 for central, northern, and southern province, respectively <Table 13>.

At the same time, DTC scores and the poverty level of each region are fairly inversely related, suggesting that the regional differences in DTC may be caused by the poverty level of each region. The Pearson correlation coefficient is -0.37. The negative relationship between the DTC scores and the poverty index across regions is getting stronger as the practice experience accumulates among doctors. The correlation coefficient between the poverty index and the DTC scores of the first-year practice doctors is extremely low at -0.09; however, the correlation coefficient among the third year practice doctors is moderately high at -0.48, and is strong among the fifth year practice doctors at -0.53.

<Table 13> Average DTC Data by Region and Poverty Level: 2012

	Hospitals	1st year		3rd year		5th year		DTC Avrg (Std.dev)	Poverty Level
		DTC	No. of Drs.	DTC	No. of Drs.	DTC	No. of Drs.		
Central Hospital	Mother and Child	8.52	3	9	1	8.42	3	8.24 (0.45)	1.33
	Setthatilath	7.49	2	8.5	2	8.62	9		
	Mahosot	7.68	2	8.44	2	8.41	4		
	Mitthaphab	7.74	2	8.06	1	7.97	4		
Central Provincial	Vientiane	8.05	1	8.28	1	8.39	1	7.74 (0.54)	1.73
	Khammouan	8.42	2	N.A.	0	6.53	3		2.00
	Savannakhet	7.69	2	7.62	2	7.44	2		1.38
	Bolikhamxay	7.65	2	7.66	2	7.43	2		2.20
Northern Provincial	Odomxay	7.25	2	7.43	1	7.22	3	7.38 (0.20)	
	Louangphrabang	7.64	2	7.49	1	7.55	1		1.78
	Xayabouly	6.88	1	7.56	2	7.39	2		1.67
	Luang Namtha	7.45	1	7.28	2	7.59	1		1.70
	Bokeo	7.12	2	7.21	1	7.17	1		2.14
	Houaphan	7.38	1	7.25	1	7.53	2		2.00
	Xien Khouang	7.43	2	7.74	2	7.43	1		2.43

	Hospitals	1st year		3rd year		5th year		DTC Avrg (Std.dev)	Poverty Level
		DTC	No. of Drs.	DTC	No. of Drs.	DTC	No. of Drs.		
Southern Provincial	Salavan	7.18	2	7.22	2	7.24	2	7.60 (0.27)	1.36
	Champasak	7.93	1	7.75	1	7.58	2		2.17
	Sekong	7.94	1	7.65	1	7.86	2		2.00
	Attapeu	7.59	1	7.75	1	7.48	2		1.86
Average (Std.dev.)		7.63 (0.42)	32	7.77 (0.50)	26	7.64 (0.52)	47		

See Table 1 for the footnotes.

(2) DTC Data and Experience of Practicing Doctors

As with the 2010 DTC data, 2012 data also confirm that the performance quality of practicing doctors appears to be positively correlated with the years of practicing experience. The average DTC scores of the third and fifth (or more) year doctors (7.77 and 7.64, respectively) are higher than that of the first year doctors (7.63) <Table 13>. However, as with the 2010 data, the DTC scores of the fifth (or more) year doctors appear to be lower than those of the third year doctors, although they are higher than those of the first year doctors. Moreover, as with the 2010 data, these seemingly different DTC scores among doctors with different practice lengths are not different statistically at the 10% significance level. This point is reconfirmed with a greater number of observations pooled over two years in a row. Therefore, it is more reliable that there are no statistically significant differences in DTC scores among practicing doctors with different lengths of practice, and practicing doctors do not improve their performance quality on the job or through in-service training over their career. The same pattern is observed with other measures (RUD and STG) of the practice performance of doctors with different lengths of practice experience <Table 14>. Since in-service training on-th-job is unrelated with the quality of doctors' practice performance, it seems important to ascertain in the future whether the improvement in the quality of the pre-service education at the UHS through training of the faculty members under the Dr. LEE Jong-Wook—Seoul Project improves doctors' performance quality on the job upon graduation from the UHS.

<Table 14> RUD and STG Data of Doctors with Different Lengths of Experience: 2012

Hospitals	RUD			STG			No. of Doctors
	1st year	3rd year	5th year	1st year	3rd year	5th year	
Mother and Child	8.46	9.00	8.17	8.58	9.00	8.67	7
Setthatilath	8.00	8.50	8.61	6.98	8.50	8.63	13
Mahosot	8.00	8.38	8.31	7.36	8.50	8.50	8
Mitthaphab	8.01	7.75	7.75	7.48	8.38	8.19	7
Odomxay	8.24	8.78	8.15	6.26	6.08	6.30	6
Vientiane	8.15	8.33	8.63	7.95	8.23	8.15	3
Khammouan	7.91	N.A.	6.61	8.93	N.A.	6.45	5
Savannakhet	7.76	7.71	7.56	7.63	7.53	7.32	6
Bolikhamxay	7.78	7.84	7.44	7.53	7.48	7.43	6
Louangphrabang	7.71	7.43	7.55	7.58	7.55	7.55	4
Xayabouly	7.15	7.80	7.69	6.60	7.33	7.10	5
Luang Namtha	7.33	7.59	8.18	7.58	6.96	7.00	4
Bokeo	7.60	8.08	8.23	6.63	6.33	6.10	4
Houaphan	8.00	7.13	7.75	6.75	7.38	7.30	4
Xien Khouang	7.88	7.59	8.00	6.99	7.89	6.85	5
Salavan	8.10	8.18	8.04	6.26	6.26	6.44	6
Champasak	8.00	8.25	7.71	7.85	7.25	7.44	4
Sekong	8.25	7.80	8.15	7.63	7.50	7.57	4
Attapeu	8.18	8.13	7.34	7.00	7.38	7.61	4
Average (Std.dev.)	7.92 (0.32)	8.01 (0.48)	7.89 (0.48)	7.35 (0.71)	7.53 (0.81)	7.40 (0.78)	105

(3) Comparison of DTC Scores between 2010 and 2012

Between 2010 and 2012, there is no statistically significant difference in the practice (DTC and its components) scores among doctors with the same length of practice experience. Between the 9 DTC and its components scores, only in one case (5th-year STG scores) can we reject the null hypothesis that there is no difference between 2010

and 2012 <Table 15>. On the basis of the evidence with the 2010 data that there were a close positive correlation between the practice (DTC) score and academic (GPA) score of doctors, especially among doctors with the first-year practice experience, we can infer that there was no statistically significant improvement in the academic score of the UHS graduates between 2010 and 2012. This point will have to be verified when the academic achievement data of 2012 is collected.

We can also infer that the on-the-job in-service training program was not effective in improving doctors' practice performance over the two- year period. As shown earlier, in both years, the practice performance scores between doctors with different years of practice experience were not different statistically at the 10% significance level.

<Table 15> DTC data by years of practice experience of doctors between 2010 and 2012

Practice experience	Year	DTC	RUD	STG
1st year Dr.	2010	7.78 (0.814)	7.89 (0.759)	7.67 (0.978)
	2012	7.63 (0.572)	7.92 (0.641)	7.34 (0.971)
	p-value	0.2881	0.7865	0.1047
3rd year Dr.	2010	7.96 (0.727)	8.12 (0.806)	7.80 (0.759)
	2012	7.78 (0.699)	8.01 (0.713)	7.54 (1.08)
	p-value	0.2501	0.5262	0.2461
5th year Dr.	2010	7.87 (0.675)	7.90 (0.622)	7.84 (0.835)
	2012	7.66 (0.668)	7.90 (0.738)	7.43 (0.977)
	p-value	0.2093	0.9995	0.0770

numbers in ( ) represent standard deviations.

8. Conclusions and Recommendations

In early 2011, the KDI School research team launched a real time evaluation of the UHS-Dr. LEE JONG-WOOK—Seoul Project. The project, which was agreed upon in 2010 to be implemented over the next three years, was financed by the Korea Foundation for International Healthcare (KOFIH) under the auspices of the Korean Ministry of Health and Welfare, and was executed by the Seoul National University College of Medicine as a means to improve the teaching and research personnel of the University of Health Sciences in the Lao PDR.

For this real time evaluation, the study team adopted three approaches. First, it evaluated the goals and objectives of the project against the government's national development and health sector policies and strategies. This allowed for the ownership of the project to be evaluated.

Secondly, it evaluated the design of the project against the aid programs and activities of other Korean and foreign donor agencies. In this way, the harmonization efforts of the project were checked.

Thirdly, it evaluated the effectiveness of the project against the intermediate outcomes of the project. This ensured that the results-based aid project management was assessed. Since a separate report (the first year interim research report) was prepared for the first and second approaches, this paper focuses on the third approach.

Since it is too early to assess the outcomes of the project, the evaluation team focuses on the establishment of a baseline data system. Together with the academic achievement records of the UHS, the disease treatment committee (DTC) data of each hospital is judged to be appropriate for the evaluation of the outcome of the project. This data system would not only help evaluate the outcomes of this project, but also assist the Ministry of Health in monitoring the effectiveness and efficiency of health investment programs/projects and the recurrent health service provisions to the population, especially at the local level.

However, the DTC data system has not yet been fully established administratively, and the Ministry of Health has not collected, compiled, and analyzed them yet. Moreover, although the DTC data are compiled on an individual doctor basis, only a few hospitals are providing the evaluation team with such individual doctor-based information. Therefore, the Ministry of Health should be encouraged to monitor more rigorously the data compilation system and analyze the data together with the evaluation team in a timely manner.

The preliminary analysis of the DTC data has led to the following findings. First, there are differences in DTC indices between central and provincial hospitals. Also, there are variations in DTC indices among individual hospitals, provinces, and regions. Although these differences were not statistically significant with the 2010 data, they were significant with the 2012 data.

Second, the DTC indices are somewhat negatively correlated with the poverty index of provinces and regions. This means that the hospitals in the poorer regions offer a poorer quality of health services.

Third, the DTC indices appear to be positively correlated with the service years of the practicing doctors. The doctors with a longer on-the-job experience appear to provide better health services. However, the difference in the quality of health services among doctors with different years of practice is statistically insignificant. This means that doctors do not improve the quality of their health service performances on-the-job or through in-service training in Lao PDR. This finding with the 2010 data has been reconfirmed with a greater number of observations obtained in 2012 in terms of disease types, hospitals, and doctors. Therefore, we can tentatively conclude that in order to improve the quality of health services in Lao PDR, improving the quality of the pre-service academic program in the UHS would play a more important role than the current on the-job in-service training programs in hospitals.

This tentative conclusion is reinforced by the findings based on the 2010 practice performance data and academic achievement data obtained in 2012. The doctors' practice performance level is positively correlated with their academic achievement

level. (This point will have to be verified next year with the collection of the academic achievement data for a greater number of practicing doctors.) This positive correlation is particularly stronger among doctors in their first year of practice. Evidence of the positive correlation at the statistically significant level is robust since it is supported even when different measures of practice performance (DTC, RUD, and STG scores) and academic achievement (1-6th years average and 6th year GPA) are adopted. Moreover, the positive correlation is reconfirmed by the regression analyses. The variations in practice performance of the first year practice doctors are explained by the variations in 6th-year academic achievement scores, as well as differences in provinces, at the 5% statistical significance level. Also, the variations in practice performance of all doctors with different years of experience are explained by the variations in 6th-year academic achievement scores, as well as differences in province and years of experience, at the 5% statistical significance level.

Therefore, it is of great interest to all those concerned whether the training programs of UHS faculty members at the SNUMC under the Dr. LEE Jong-Wook—Seoul Project in 2011-2012 and in the ensuing years would improve the academic achievement scores of the UHS students in the future. If the UHS faculty members trained at the SNUMC under the project do improve the future academic scores of the UHS students substantially, we can be reasonably optimistic that UHS graduates would provide better health services to Laotian people upon their graduation from the UHS, since their DTC scores would also become higher. We look forward to being able to confirm these points in 2014.

The evaluation team makes the following recommendations to the UHS and the Project financing and implementing agencies.

It is strongly recommended that the SNUMC measure the differences in medical knowledge and skills of the UHS faculty members before and after their training programs under the aid project more rigorously. These differences will serve as a useful predictor for the changes in the academic achievement level of UHS students taught by the faculty members trained at the SNUMC.

It is also recommended that some relevant UHS faculty members trained at the SNUMC be assigned to the new Children's Hospital financed by the KOICA as teaching physicians, and that the academic performance of the students being taught by the faculty members trained at the SNUMC in 2011-2012 be rigorously monitored by the UHS and SNUMC.

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Annex I. STG Indicators

N	Age	W	T	Illness History				Examination					Treatment given					
				Stool counted	Stool with Blood /mucus	Latest urinate	Treatment before	General status	Eye and Tongue dry	Skin contract	Frontal	Pouls	ORS	Liquid fruits /milk / rice	IV Fluid	Correctly quantity	Antibiotic used	Antispasmodic drug used
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
11																		
12																		
13																		
14																		
15																		
16																		
Total																		
Multiplied																		
Score																		
%																		
Total Score:								Divided by number of patients										

Annex II. RUD Indicators

	1	2	3	4	5	6	7	8			9	10
	Average Number of Drugs Used	Essential drug used	Written down generic name	Used drug available in Hosp.	Clearly and correctly written	Herbal used	Antibiotic used	% Reasonable used of antibiotic			Injected drug used	% Reasonable injected drug
								Quant	Durat	Reason		
1												
2												
3												
4												
5												
6												
7												
Total Drug Used												
Divided by	Number patients	Total Drug used	Total Drug used	Total Drug used	Total Drug used	Total Drug used	Total Drug used		Total antibiotic used		Total Drug used	Total injected drug used
Average %												
Score												

Annex III. Important and Frequent Diseases Selected for DTC

1 : Malaria
2 : Diarrhea
3 : Parasite
4 a: Pneumonia
4 b: Acerbity Pneumonia (In patient)
5 a: Dengue (In patient)
5 b: Dengue with blood (Out patient)
6 a: Tuberculosis 1
6 b: Tuberculosis2
7 a: Leprosy
8 a: Hepatitis A,B,C
9 : Typhoid
10 : Melioidosis
11 : Rickettsiosis
12 : Leptospirosis
13 : Chest pain
14 : Hypertension
15 : Abortion
16 : GEU
17 : Peritonite of pelvien
18 : Trauma cranien
19 : Hemorrhage digestive
20 : Stone Bladder
21 : Acute Kidney
22 : Meningitis
23 : Anemia
24 : Asthma
25 : Fracture in arm and leg

Chapter

03

Dr. LEE Jong-Wook—Seoul Project and the Performance of the UHS Medical Students

Dr. LEE Jong-Wook—Seoul Project and the Performance of the UHS Medical Students

1. Introduction

The goal of the Dr. LEE Jong-Wook—Seoul Project is to improve the quality of healthcare in Lao PDR by upgrading the capacity of faculty members at the University of Health Sciences (UHS), which is the sole institution for advanced medical education in the country. The project reflects the idea that focusing on the elites in the medical profession may be a highly effective strategy through the spill-over effects into primary and secondary health care and the reproduction of new medical doctors. This idea originates from the Korean experience of the Minnesota Project, in which the professors at the SNU, including those at the College of Medicine, received training at the University of Minnesota from 1954 to 1961 with the support of the US government. Even though no rigorous quantitative evaluation of the Minnesota Project has been produced, it is widely believed that the project played a crucial role in dramatically improving the capacity of the medical profession for teaching, research, and practice in Korea.

For the purpose of evaluating the impact of the project, this chapter focuses on UHS students' learning outcomes. Its objective is two-folded. First, it is to present the status of medical knowledge among students in UHS. This information is valuable in enough of itself, since there is no quantitative and objective assessment of students' learning performance. Second, it aims at estimating the impact of the project in the first two years on students' learning outcome. Although it is quite a challenge to verify the causal

relationship, the statistical analysis is presented and a few possible interpretations are discussed given the limits on data availability.

The academic performance of students at UHS is likely to serve as a key outcome measure under the Project. The desired eventual outcome would be the improvement in the healthcare service offered to the Lao public and overall improvement of their health status. However, if the faculty capacity building efforts do not lead to improved academic performance on the part of the students, it would be difficult to expect the Project to deliver the eventual outcome.

To assess the medical students' academic performance, it would be ideal to design a test battery from scratch in view of their curriculum and the prevailing health environment in the country. However, development of such a test battery would be too expensive. Instead, we adopted an existing test instrument for medical students in Korea. The battery is taken from the test bank developed and maintained by the Korean Medical Education Assessment Consortium (MEAC), an alliance of colleges of medicine in Korea. The performance gap detected through the battery between the UHS students and Korean medical students might be attributed to various factors such as differences in the curriculum and the field conditions for medical practice. An improvement in the academic achievement of UHS students over time should be captured by the battery. In addition, the performance records by Korean students should provide a useful benchmark against which we can compare the achievement level of the Lao students. Among other things, the test results and the changes thereof should help fine-tune the capacity building program for the participating UHS faculty members in the course of the Dr. LEE Jong-Wook—Seoul Project.

The rest of this chapter is organized as follows. Section 2 explains the framework of evaluation, and section 3 describes the intervention under the Dr. LEE Jong-Wook—Seoul Project. Section 4 explains the implementation of the Test of Medical Knowledge. Section 5 reports the results of the MEAC medical knowledge test, and section 6 performs a statistical analysis on the impact evaluation. Lastly, section 7 provides concluding remarks.

2. Evaluation Framework

The nature of the intervention of the Dr. LEE Jong-Wook—Seoul Project is to improve the capacity of faculty members at UHS in both teaching and research. It is expected that the project will directly advance the teaching skills and research capacity of trainees. Further, it is expected that the academic performance of students will improve. Ultimately, we can expect that the successful implementation of the project will contribute to upgrading the level of medical treatment offered at hospitals and improving the overall health of the Lao population.

<Table 16> Components in the Results Chain of Dr. LEE Jong-Wook—Seoul Project

Inputs	Outputs	Outcomes
• Training program for faculty members • Provision of medical equipments • Development of curriculum • Faculty consensus workshop	• Upgrade of research capability of the trainees • Improvement of students' performance	• Improvement of level of medical treatment • Improvement of overall health of Lao population

The characteristics of the Dr. LEE Jong-Wook—Seoul Project place the project in the category of the training-of-the-trainers model in medical education. The conventional evaluation method for these programs is the survey of trainees and students of the trainees. For example, Green et. al. (2005) and Levine et. al. (2007) conducted a survey at the end of the program for educators in podiatric and geriatric medicine, respectively, where participants were asked to rate their levels of competence for each category of skills before and after the program. Both of the studies also circulated the follow-up surveys among the trainees some time after the program. Stratos et. al.(2006) evaluated the faculty development program in end-of-life care using a survey of participants and their students at the seminar performed by the participants.

While a survey has the advantage of providing a direct measure of program effects, there is some limitation in employing a survey for the evaluation of the Dr. LEE Jong-Wook—Seoul Project in addition to the reasonable skepticism one might hold regarding subjective evaluation inherent in the approach. First, the curriculum of the program is not formalized yet, and perhaps more importantly, the program does not envision a single uniform curriculum to be applied to all participants. The purpose of the project is not to train a group of medical professionals in the same field. Rather, it is designed to provide training customized to each participant. In addition, the output of the project is not confined to medical knowledge, but it includes the motivation for teaching and research activity. Hence, it is not easy to specify a set of skills that all the participants are expected to learn. Secondly, the participants may have an incentive to overstate the effectiveness of the program, if they are afraid that a poor evaluation result might lead to an early termination of the program.

As an alternative to a self-reported survey, this report proposes to measure the impact of the project in terms of students' academic performance. In general, medical students' performance will be influenced by various factors including the teaching capacity of faculty members, the design of curriculum, the choice of textbook, physical environment, language for medical terms and students' motivation and ability.

Performanc e = f(Faculty, Curriculum, Textbook, Enviroment, Language, Ability, etc)

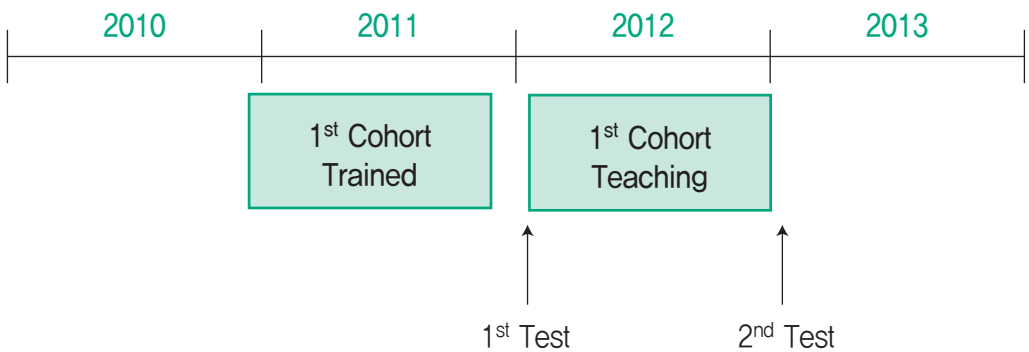
On the condition that the information on these factors, as well as performance, is obtained, we can estimate the relationship among them using a regression model. The detail of the specification is presented in Section 6 below.

3. Description of Intervention

The first cohort of trainees under the Dr. LEE Jong-Wook—Seoul Project started a year-long program in November of 2010, and were engaged in teaching in 2012 after returning to UHS. The first stage of the project has the duration of three years with

possible renewal for up to 6 years. The first round of Test of Medical Knowledge was implemented in January of 2012, and the second round in January of 2013. The official academic year at UHS starts in September, and runs until June the following year. However, due to internal reasons, the academic years had been delayed. That is, the Year 2010-2011 ended in December of 2011, and Year 2011-2012 ended in December of 2012. Therefore, the timing of each round of the test coincided with the end of the academic year. Since the two rounds of tests allow us to analyze the consequence of only the first cohort of trainees, we focus on the first cohort in this chapter.

[Figure 5] Timing of Dr. LEE Jong-Wook—Seoul Project and Test of Medical Knowledge



In the UHS, the Faculty of Basic Science covers the curriculum of basic medicine and the Faculty of Medicine covers that of clinical medicine. There were a total of 8 trainees in the first cohort with 5 of them in Faculty of Basic Science and 3 in Faculty of Medicine. The scale of the project can be measured by the share of teaching delivered by the participants. We obtained the list of instructors for each course and their teaching hours, as well as the topic. The topic of lecture by each instructor is categorized according to the classification used for Test of Medical Knowledge so that subject and field later in the analysis can match the size of the intervention with the test scores.

<Table 17> reports the ratio of teaching hours performed by the trainees to the hours by all the instructors for the courses offered at Faculty of Basic Science in Year 2011-

2012. For example, the total teaching hours in the course of anatomy is 334 hours, of which 18 hours were delivered by the trainees. Therefore, the share of teaching by the participants in anatomy is 0.05. The scale of the project is measured for all the courses in grade one to three and for the whole academic year including 1st and 2nd semesters. In the area of basic medicine, the size of intervention is the largest in pathology at 23%, and lowest in biochemistry and parasitology at zero.

<Table 17> Scale of Intervention by Subject in Basic Medicine for Year 2011-2012

Grade	Subject	No. of Teaching Hours		
		All	Trainees	Share
1~3	1. Anatomy	334	18	0.05
	2. Biochemistry	105	0	0
	3. Physiology	134	10	0.07
	4. Pathology	91	26	0.29
	5. Parasitology	24	0	0
	6. Microbiology	56	10	0.18
	7. Pharmacology	87	20	0.23
	8. Preventive Medicine	98	0	0

Note: The number given to each subject is identical to those in the summary of the Test of Basic Medicine by subject. The information on those courses directly related to medical knowledge is presented here. The subject of 'Preventive Medicine' is a category in the Test of Clinical Medicine. The list of all the courses offered at the Faculty of Basic Science is shown in Annex 2.

In <Table 18>, the categories of subject ramify into the fields in basic medicine. The highest share of teaching by the participants is observed in the fields of 'Circulator' (49%), 'Respirator' (25%), 'Reproductive System' (22%) and, 'Blood & Blood Forming Organ' (21%), while no intervention is made in the fields of 'Inheritance', 'Immunity', 'Genesis & Differentiation', 'Human Response', 'Musculoskeletal System', 'Endocrine System', 'Kidney & Urinary Tract', 'Health Care Management' and 'Health Promotion and Disease Prevention.'

<Table 18> Scale of Intervention by Field in Basic Medicine for Year 2011-2012

Grade	Field	No. of Teaching Hours		
		All	Trainees	Share
1~3	1.Metabolism	77	5	0.06
	2.Inheritance	35	0	0
	3.Cell & Tissue	103	10	0.10
	5.Infection	35	2	0.06
	6.Immunity	16	0	0
	7.Genesis & Differentiation	23	0	0
	8.Human Response	22	0	0
	9.Musculoskeletal System	32	0	0
	10.Nervous System	105	7	0.07
	11.Blood & Blood Forming Organ	39	8	0.21
	12.Circulator	45	22	0.49
	13.Digestive System	62	2	0.03
	14.Respirator	57	14	0.25
	15.Endocrine System	66	0	0
	16.Kidney & Urinary Tract	51	0	0
	17.Reproductive System	63	14	0.22
	18.Health care management	14	0	0
	19.Health promotion and disease prevention	84	0	0

Note: The number given to each field is identical to those in the summary of the Test of Basic Medicine by field. The information on those courses directly related to medical knowledge is presented here. The fields of `Health Care Management', and `Health Promotion and Disease Prevention' are the categories in the Test of Clinical Medicine. The list of all the courses offered at Faculty of Basic Science is shown in Annex 2.

The scale of the project is quite small in the area of clinical medicine compared to basic medicine as there were only participants engaged in teaching in Year 2011-2012.[2] According to <Table 19>, the share of teaching by trainees in the courses for 4th and 5th grade students is positive in the subject of 'Internal Medicine' and 'Obstetrics &

2 The participant of the Dr. LEE Jong-Wook—Seoul Project in endocrinology did not teach courses in Year 2011-2012.

Gynecology', but they are 1% and 2%, respectively. Among the fields presented by <Table 20>, the share of teaching hours is 27% in the field of 'Clinical Test', 3% in 'Gestational, Puerperal, and Postpartum Disease' and zero in all other fields. It is clear that the scale of intervention is small, especially compared to the Minnesota Project.[3] However, one should bear in mind that our primary interest is to estimate the consequence of the change under the project rather than the total size of the change.

<Table 19> Scale of Intervention by Subject in Clinical Medicine for Year 2011-2012

Grade	Subject	No. of Teaching Hours		
		All	Trainees	Share
4~5	1. Internal Medicine	385.5	3	0.01
	2. Surgery	95.9	0	0
	3. Pediatrics	84.5	0	0
	4. Obstetrics & Gynecology	111	2	0.02
	5. Psychiatry	48.9	0	0
	6. Other Fields	23.3	0	0
	7. Preventive Medicine	45	0	0

Note: The number given to each subject is identical to those in the summary of the Test of Clinical Medicine by subject. Those courses that are not directly related to medical knowledge including French language are not presented. The participant of the Dr. LEE Jong-Wook—Seoul Project in endocrinology did not teach courses in Year 2011-2012.

3 Refer to Chapter 4 of the 1st year report of this volume or Lee (2006) for scale of the intervention under the Minnesota Project.

<Table 20> Scale of Intervention by Field in Clinical Medicine for Year 2011-2012

Grade	Field	No. of Teaching Hours		
		All	Trainees	Share
4~5	1.Normal structure and function of the Human body	2	0	0
	2.Normal development, growth, and aging	20	0	0
	4.Major symptom and pathophysiology	90.4	0	0
	5.Physical examination and diagnosis	36.6	0	0
	6.Clinical test	11.3	3	0.27
	7.Treatment and complication	2	0	0
	8.Health promotion and disease prevention	17.5	0	0
	9.Health care management	29	0	0
	11.Nutritional and Digestive disease	64.5	0	0
	12.Injury and intoxication	4.5	0	0
	13.Neoplasm	13.5	0	0
	14.Blood and hematopoietic disorder	34	0	0
	15.Cardiovascular disease	40.0	0	0
	16.Musculoskeletal system and connective tissue disease	45.7	0	0
	17.Nervous system disease	61.5	0	0
	18.Allergic and Immune disorder	6	0	0
	19.Respiratory disease	43.8	0	0
	20.Infection and parasitic disease	20.3	0	0
	21.Endocrine and metabolic disease	28	0	0
	22.Kidney, Urinary, Male genital disease	52	0	0
	23.Genetic disorder and congenital deformation	14	0	0
	24.Perinatal and neonatal disease	15.5	0	0
	25.Dermatologic disease	12.8	0	0
	26.Disease of ear, nose, and throat	4.5	0	0
	28.Female genital disease	24	0	0
	29.Gestational, puerperal, and postpartum disease	61	2	0.03
	30.Psychiatric disorder	48.9	0	0

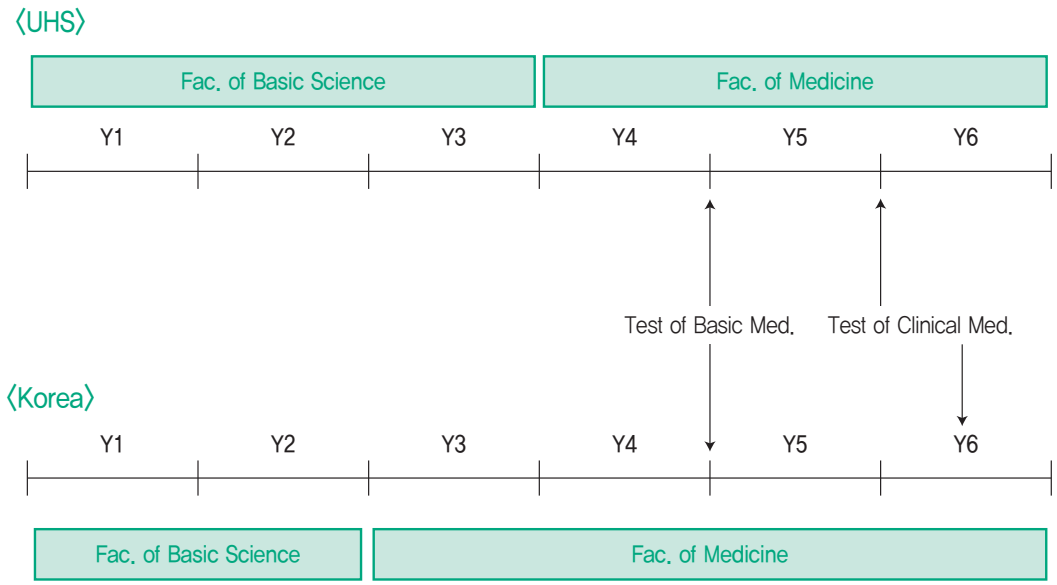
Note: The number given to each field is identical to those in the summary of the Test of Clinical Medicine by field. Those courses that are not directly related to medical knowledge including French language are not presented. The participant of the Dr. LEE Jong-Wook—Seoul Project in endocrinology did not teach courses in Year 2011-2012.

4. Implementation of the MEAC Medical Knowledge Test

The test of medical knowledge administered by the Medical Education Assessment Consortium (MEAC) in Korea was employed as a standardized test. The MEAC implements a test of basic medicine for 2nd-year students in medical college, and a test of clinical medicine for 4th-year students. The level of the test questions is similar to the national exam for license and is designed to be comparable from year to year. The students at the UHS were given the full set of the test in every round.

The first round of the test was conducted on the 17th-19th of January, 2012, and the second round on the 26th-27th of January, 2013. In both years, the test dates were in the registration period for the new academic year. The 2010 test and 2011 test of MEAC were taken as test questions for the first and second round, respectively. The test of basic medicine was given to 5th year students who completed 4 years at the UHS, and the test of clinical medicine to 6th year students who completed 5 years at the UHS. As can be seen in [Figure 6], the students taking the test in UHS are comparable to those in Korean universities in terms of curriculum. The test was conducted in the same manner as the one for Korean students in terms of time, and students were given both the English version and the Lao version of the test questions.

[Figure 6] Test of Medical Knowledge in UHS and Korean Universities



In the first round of tests, there were 260 questions for basic medicine and 480 questions for clinical medicine. In the test of clinical medicine, the field of health regulation (20 questions) was discarded since it is not relevant in the case of Laos. It is highly likely that some of the questions are not relevant for students at the UHS due to the differences in curriculum, learning environment or the general pattern of diseases between two countries. Therefore, we asked the faculty members at the UHS to review the questions to sort out those questions not relevant to students. As presented in <Table 21>, 78% of questions in Test of Basic Medicine and 89% in Test of Clinical Medicine were deemed as appropriate in the 1st round of tests. It is notable that the share of irrelevant questions was highest for biochemistry and pathology in basic medicine. The same group of professors also reviewed the test questions in the second round, and the percentages of relevant questions were similar to those in the first round. Although all the questions were given to students, only relevant questions were counted in the score for the analysis below.

In addition to test scores, the information on students' grades in the previous academic year was collected from Faculty of Medicine at the UHS. At the end of the test, a short survey was conducted in order to collect information of students' demographic, socioeconomic, and academic backgrounds.

<Table 21> No. of Relevant Questions in the Test of Medical Knowledge

Test	Subject	Wave 1		Wave 2	
		All	Relevant	All	Relevant
Basic Medicine	1.Anatomy	60	51	60	49
	2.Biochemistry	35	16	35	17
	3.Physiology	35	31	35	31
	4.Pathology	45	28	45	37
	5.Parasitology	15	13	15	14
	6.Microbiology	35	34	35	33
	7.Pharmacology	35	30	35	27
	Total	260 (100%)	203 (78%)	260 (100%	208 (80%)
Clinical Medicine	1.Internal Medicine	237	227	155	153
	2.Surgery	70	63	70	53
	3.Pediatrics	45	42	62	60
	4.Obstetrics & Gynecology	35	30	63	52
	5.Psychiatry	45	40	34	33
	6.Other Fields	9	0	12	10
	7.Preventive Medicine	39	25	34	32
	Total	480 (100%)	427 (89%)	430 (100%)	393 (91%)

The participation rates in the first round were 36.4% for 5th-year students, and 52.4% for 6th-year students as shown in <Table 22>. The relatively low rates of participation may be due to the fact that the dates of the test were in the registration period before the beginning of the academic year (Therefore, some students did not return to campus yet). In the second round, the participation rate among 5th-year students rose to 89.7%,

but that of 6th-year students fell to 24.5%.[4] It seems that the low participation rate among 6th –year students is partly due to the fact that they take more clinical training at hospitals than 5th –year students.

<Table 22> Participation Rate of Test

Type	Year	Wave 1			Wave 2		
		Enrollment	Participants	Participation Rate (%)	Enrollment	Participants	Participation Rate (%)
Basic Medicine	5	385	140	36.4	351	315	89.7
Clinical Medicine	6	238	120	50.4	368	90	24.5

Note: The participation rate calculated as the percentage of students who completed the test.

A large difference in participation rates over two waves suggests that there is likely to be a sample selection issue. That is, the students in the first round may not be similar to those in the second round in terms of characteristics, including ability or motivation. In order to gauge the degree of selection, the grades in the previous academic year between test participants and nonparticipants are compared. According to <Table 23> that covers 5th-year students, not surprisingly, the GPA of test participants is higher than nonparticipants and the difference is statistically significant in both waves. The question is whether the difference became larger or not. The last column in <Table 23> suggests that in fact the difference is larger in the second wave by 0.25 and that the difference-in-differences is significantly different from zero at 5% level. Therefore, it is inferred that the improvement in Test of Basic Science among 5th-year students over two waves is partly due to the difference in the sample. In most of the specific courses, the difference-in-differences is not significantly different from zero, which implies that the grades of a student are correlated with each other.

4 In the second wave, the percentage of those who took the test was 54.3% among 6th–year students, but that of those who completed the test was 24.5%.

<Table 23> Difference in GPA among 5th-year students for wave 1 and 2

	Wave 1				Wave 2				
	Total	T=0 (A)	T=1 (B)	B-A (C)	Total	T=0 (D)	T=1 (E)	E-D (F)	F-C
No. of Students	400	260	140		363	51	312		
GPA	2.71	2.61	2.89	0.28**	2.22	1.76	2.29	0.53**	0.25*
1. Community (3)	1.97	1.88	2.14	0.26**					
2. Clinical skill (3)	1.93	1.80	2.18	0.38**	2.10	1.98	2.12	0.15	-0.23
3. General CP (3)	1.77	1.64	2.00	0.35**	1.75	1.41	1.81	0.40**	0.05
4. Cardiovascular System (4)	1.93	1.77	2.23	0.46**	1.56	1.30	1.60	0.31*	-0.15
5. Research Methodology (3)					2.32	2.09	2.35	0.26	
6. Blood System (4)	1.89	1.77	2.11	0.34**	1.75	1.34	1.80	0.46**	0.12
7. Respiratoty System (4)	2.16	2.09	2.29	0.20*	1.80	1.66	1.82	0.16	-0.04
8. Gastrointestinal System (5)	2.36	2.19	2.65	0.45**	2.01	1.80	2.03	0.23	-0.23
9. Renal System (5)	2.19	2.12	2.30	0.18*	2.18	1.72	2.25	0.53**	0.35**
10. Social Science (1)	3.55	3.45	3.74	0.28**	3.22	3.01	3.24	0.23	-0.05
11. French Language II (1)	2.00	1.73	2.48	0.75**	2.67	2.38	2.71	0.32*	-0.43*
12. Practice Internal Medicine (2)	2.78	2.68	2.96	0.28**	3.06	2.64	3.13	0.49**	0.21
13. Practice Surgery (2)	3.39	3.24	3.66	0.41**	3.35	2.80	3.44	0.63**	0.22
14. Practice Pediatrics (2)	2.90	2.78	3.13	0.35**	2.72	2.36	2.77	0.41**	0.06
15. Practice OB-GYN (2)	2.95	2.82	3.18	0.36**	2.81	2.50	2.86	0.36**	0.00
16. Practice District Hospital (2)	3.64	3.54	3.83	0.28**	3.45	3.21	3.49	0.28*	0.00

Note: The number of credits for each course is in parentheses. T is an index for participating in the Test of Medical Knowledge. The p-values for the hypothesis that the grades are the same for the two groups are presented with asterisks; * $p<0.05$; ** $p<0.01$.

On the other hand, although it is still the case that test participants performed better than the nonparticipants in grades among 6th -year students in both waves, the difference did not change much over time. <Table 24> suggests that difference-in-differences in GPA is 0.12 among 6th –year students and that it is not statistically different from zero. Therefore, it seems that the sample selection issue is less serious in the Test of Clinical Medicine.

<Table 24> Difference in GPA among 6th-year students for wave 1 and 2

	Wave 1				Wave 2				
	Total	T=0 (A)	T=1 (B)	B-A (C)	Total	T=0 (D)	T=1 (E)	E-D (F)	F-C
No. of Students	252	133	119		383	293	90		
GPA	2.22	2.09	2.36	0.27**	2.10	2.01	2.40	0.39**	0.12
1. Social Science (1)	3.99	4.00	3.99	-0.01	2.44	2.43	2.48	0.05	0.06
2. Musculo Skeletal System 1(3)	1.69	1.60	1.79	0.19*	2.10	1.98	2.48	0.50**	0.31*
3. Musculo Skeletal System 2(2)	1.69	1.60	1.79	0.19*	1.84	1.74	2.12	0.38**	0.19
4. Endocrinology (3)	2.28	2.17	2.41	0.24*	2.19	2.07	2.58	0.52**	0.28
5. Neurology 1 (3)	2.12	1.78	2.48	0.70**	1.76	1.67	2.05	0.38**	-0.32*
6. Neurology 2 (3)	2.12	1.78	2.48	0.70**	1.87	1.76	2.21	0.44**	-0.26
7. Reproductive system 1 (3)	1.93	1.89	1.98	0.09	1.51	1.42	1.77	0.35**	0.26*
8. Reproductive system 2 (3)	1.93	1.89	1.98	0.09	1.38	1.33	1.53	0.20**	0.11
9. Mental Health (2)	2.62	2.57	2.66	0.09	3.27	3.21	3.49	0.29**	0.20
10. Public Health (3)	2.12	2.09	2.14	0.05	2.46	2.38	2.69	0.31**	0.26**
11. Human Development 1 (3)	1.92	1.75	2.11	0.36**	1.92	1.84	2.19	0.35**	-0.01
12. Human Development 2 (2)	2.03	1.84	2.23	0.39**	1.97	1.91	2.14	0.23*	-0.16
13. French language 1+2 (1)	2.56	2.38	2.77	0.39**	2.00	1.83	2.56	0.73**	0.33*
14. Medical Imagery (1)	2.47	2.42	2.53	0.10	2.65	2.58	2.91	0.33**	0.23*
15. ENT (1)	2.77	2.63	2.93	0.30**	2.33	2.27	2.53	0.26**	-0.04
16. Mental Health (1)	3.44	3.32	3.58	0.26**	3.00	2.92	3.26	0.34**	0.08
17. Dermatology (1)	3.76	3.71	3.83	0.12	2.88	2.81	3.09	0.28*	0.16
18. Rehabilitation Medicine (1)	2.99	2.92	3.07	0.15**	2.22	2.17	2.38	0.21**	0.06
19. Ophtalmology (1)	3.44	3.39	3.49	0.10*	3.36	3.37	3.33	-0.03	-0.13*
20. Laboratory (1)	3.10	3.00	3.20	0.19*	2.55	2.48	2.77	0.29**	0.10
21. Emergency (1)	3.26	3.16	3.37	0.21**	2.69	2.66	2.80	0.14	-0.07

Note: The number of credits for each course is in parentheses. T is an index for participating in the Test of Medical Knowledge. The courses of 'Musculo Skeleton System 1 & 2 (Orthopedics, Muscle and Dermatology Disease)' were combined as one course in year 2010-2011 (wave 1), and are treated as two courses with the same grade in order to be compared with the courses in wave 2. The same case applies to 'Neurology 1 & 2' and 'Reproductive system 1 & 2.' The p-values for the hypothesis that the grades are the same for the two groups are presented with asterisks; * $p<0.05$; ** $p<0.01$.

5. Results from the MEAC Medical Knowledge Test

5.1. Test of Basic Medicine

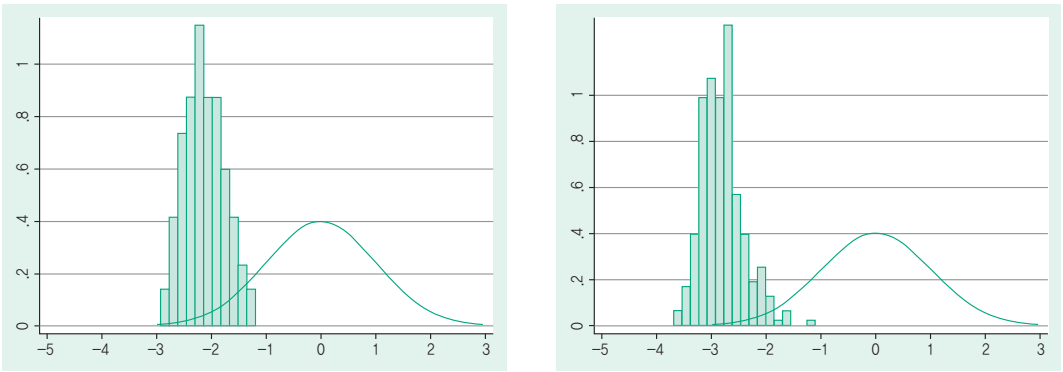
The results of Test of Basic Medicine by subject in both waves are shown in <Table25>. The percentage score declined slightly from 24.6% in wave 1 to 23.1% in wave 2. In order to adjust for the difficulties in each round of tests, the test scores are standardized using the mean and the standard deviation in the distribution of Korean students' score. The reference group for Test of Basic Medicine is the 2nd-year students in medical colleges in Korea participating in the MEAC test in both waves. The standardized score in wave 1 was -2.12 and declined to -2.82 in wave 2. The performance by subject fluctuates over time. In wave 1, biochemistry exhibited the highest performance, whereas the highest score was achieved in microbiology. In terms of the change over two waves, the score in pathology improved the most, while biochemistry fell the most.

<Table 25> Results of Test of Basic Medicine by Subject

Subject	Wave 1			Wave 2			Diff.
	Points	Percent Score	Std. Score (A)	Points	Percent Score	Std. Score (B)	(B-A)
1. Anatomy	51	25.7	-1.72	49	21.7	-2.71	-0.98
2. Biochemistry	16	24.5	-1.21	17	26.9	-2.29	-1.08
3. Physiology	31	24.0	-1.44	31	24.0	-2.45	-1.01
4. Pathology	28	25.1	-2.24	37	25.8	-2.13	0.11
5. Parasitology	13	22.0	-1.52	14	20.6	-1.95	-0.43
6. Microbiology	34	29.2	-1.60	33	22.0	-1.79	-0.19
7. Pharmacology	30	19.1	-1.52	27	21.4	-2.00	-0.48
Total	203	24.6	-2.12	208	23.1	-2.82	-0.69

The density distribution of score of basic medicine is displayed in [Figure 7]. Compared to that in wave 1, the distribution moved to the left in wave 2, and dispersed more than in wave 1.

[Figure 7] Distribution of Test Scores in Basic Medicine



(a) Wave 1 (b) Wave 2

Note: The red curve indicates the density of standard normal distribution. The test scores by the UHS students are standardized with the mean and standard deviation of the score distribution by Korean students.

According to the results by field in <Table 26>, the highest performance is observed in 'inheritance' and 'blood & blood forming organ' in wave 1, while it is observed in 'inheritance', 'neoplasm' and 'genesis & differentiation' in wave 2. The highest improvement over two waves is detected in 'neoplasm,' 'cell & tissue' and 'immunity.'

<Table 26> Results of Test of Basic Medicine by Field

Field	Wave 1			Wave 2			Diff.
	Points	Percent Score	Std. Score (A)	Points	Percent Score	Std. Score (B)	(B-A)
1. Metabolism	13	23.0	-1.29	15	28.8	-2.19	-0.90
2. Inheritance	3	31.2	-0.32	1	14.9	-0.42	-0.10
3. Cell & Tissue	8	19.5	-2.12	13	25.6	-1.76	0.37
4. Neoplasm	5	20.3	-1.58	7	26.3	-1.02	0.57

Field	Wave 1			Wave 2			Diff.
	Points	Percent Score	Std. Score (A)	Points	Percent Score	Std. Score (B)	(B-A)
5. Infection	43	26.5	-1.82	39	20.6	-2.17	-0.36
6. Immunity	7	25.0	-1.46	11	23.3	-1.14	0.31
7. Genesis & Differentiation	4	37.5	-0.74	3	20.6	-1.06	-0.32
8. Human Response	17	23.3	-1.18	16	26.3	-2.12	-0.94
9. Musculoskeletal System	11	20.1	-2.08	11	19.6	-1.81	0.26
10. Nervous System	28	22.3	-1.58	26	20.3	-2.24	-0.65
11. Blood & Blood Forming Organ	6	33.8	-0.44	7	19.5	-1.35	-0.92
12. Circulator	11	22.9	-1.07	12	24.1	-2.03	-0.95
13. Digestive System	10	25.6	-1.30	8	23.3	-1.39	-0.09
14. Respirator	9	21.4	-1.72	8	22.1	-1.69	0.03
15. Endocrine System	9	33.3	-1.63	11	28.4	-1.84	-0.21
16. Kidney & Urinary Tract	8	23.0	-1.40	10	19.1	-2.55	-1.15
17. Reproductive System	11	23.4	-1.33	10	26.5	-1.94	-0.61
Total	203	24.6	-2.12	208	23.1	-2.82	-0.69

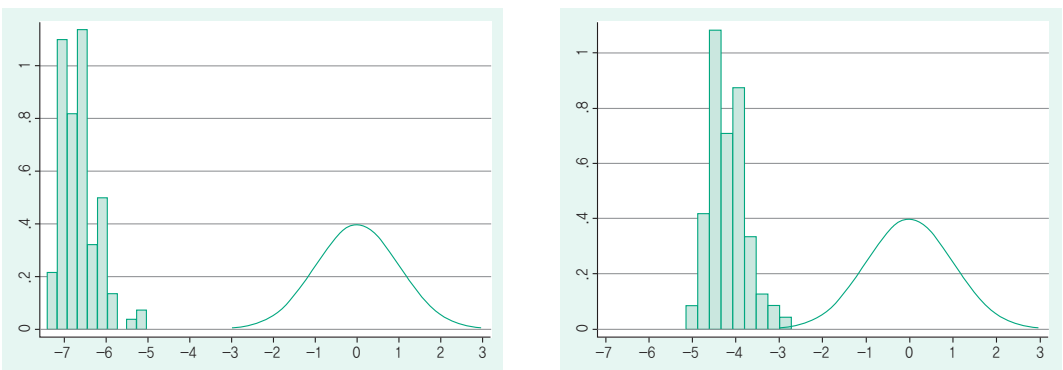
5.2. Test of Clinical Medicine

The results of Test of Clinical Medicine are presented in <Table 27>. The percentage scores are slightly higher than those in Test of Basic Medicine and did not change much with 25.4% in wave 1 and 24.9% in wave 2. However, in terms of the standardized score, the average score increased substantially from -6.66 in wave 1 to -4.20 in wave 2 by 2.47 standard deviation. The highest improvement is observed in 'internal medicine' and 'obstetrics & gynecology.' In [Figure 8], it is clear that that the density distribution of test scores moved to the right with a slightly larger dispersion.

<Table 27> Results of Test of Clinical Medicine by Subject

Subject	Wave 1			Wave 2			Diff.
	Points	Percent Score	Std. Score (A)	Points	Percent Score	Std. Score (B)	(B-A)
1. Internal Medicine	227	25.8	-6.69	153	25.6	-3.52	3.17
2. Surgery	63	26.9	-5.23	53	24.2	-4.06	1.17
3. Pediatrics	42	25.5	-4.57	60	26.0	-3.50	1.07
4. Obstetrics & Gynecology	30	15.9	-5.85	52	27.2	-3.01	2.84
5. Psychiatry	40	27.2	-4.86	33	20.2	-3.95	0.91
6. Other Fields	0			10	31.1	-2.04	N/A
7. Preventive Medicine	25	26.5	-4.52	32	20.5	-4.15	0.37
Total	427	25.4	-6.66	393	24.9	-4.20	2.47

[Figure 8] Distribution of Test Scores in Clinical Medicine



(a) Wave 1 (b) Wave 2

Note: The red curve indicates the density of standard normal distribution. The test scores by the UHS students are standardized with the mean and standard deviation of the score distribution by Korean students.

The summary of test scores of clinical medicine by field is shown in <Table 28>. In wave 1, the highest score is found in, 'Neoplasm' and 'Nervous system disease.'[5] On the other hand, the highest performance in wave 2 is observed in 'Normal development, growth, and aging', 'Disorders of eye and adnexa', 'Occurrence of disease and death' and 'Treatment and complication' and 'Neoplasm.' The largest improvement over two waves is also detected in 'Treatment and complication' and 'Normal structure and function of the Human body.'

<Table 28> Results of Test of Clinical Medicine by Field

Subject	Wave 1			Wave 2			Diff.
	Points	Percent Score	Std. Score (A)	Points	Percent Score	Std. Score (B)	(B-A)
General Medicine							
1. Normal structure and function of the Human body	23	20.9	-7.08	21	19.6	-2.67	4.41
2. Normal development, growth, and aging	13	25.4	-4.45	7	31.4	-0.62	3.83
3. Occurrence of disease and death	3	29.2	-4.16	2	42.8	-1.04	3.12
4. Major symptom and pathophysiology	36	17.1	-5.47	18	14.1	-2.98	2.49
5. Physical examination and diagnosis	9	33.9	-3.17	7	24.9	-2.28	0.89
6. Clinical test	6	21.0	-4.89	4	38.6	-1.41	3.48
7. Treatment and complication	28	20.6	-6.69	2	32.2	-1.11	5.57
8. Health promotion and disease prevention	15	27.0	-3.66	23	20.9	-3.29	0.37
9. Health care management	5	24.7	-3.81	9	19.4	-3.79	0.01
10. Industrial environment	5	26.7	-3.10	0			N/A
Special							

5 In wave 1, the fields of 'Gestational, puerperal, and postpartum disease' and 'Genetic disorder and congenital deformation' are not discussed because the numbers of questions in those fields are quite small.

Subject	Wave 1			Wave 2			Diff.
	Points	Percent Score	Std. Score (A)	Points	Percent Score	Std. Score (B)	(B-A)
11. Nutritional and Digestive disease	71	28.4	-6.28	44	28.2	-4.12	2.16
12. Injury and intoxication	7	19.5	-3.39	7	15.9	-1.60	1.78
13. Neoplasm	6	26.9	-1.99	2	31.1	-1.19	0.80
14. Blood and hematopoietic disorder	19	25.4	-4.71	15	24.0	-2.12	2.59
15. Cardiovascular disease	30	28.1	-5.83	29	29.4	-2.69	3.15
16. Musculoskeletal system and connective tissue disease	11	24.2	-3.69	14	22.3	-2.45	1.24
17. Nervous system disease	11	23.4	-2.36	14	24.1	-2.93	-0.57
18. Allergic and Immune disorder	6	24.4	-3.53	9	30.0	-2.28	1.25
19. Respiratory disease	20	23.5	-3.75	21	29.2	-2.59	1.15
20. Infection and parasitic disease	18	17.9	-3.20	18	25.3	-3.27	-0.07
21. Endocrine and metabolic disease	21	23.5	-4.16	23	24.2	-3.57	0.59
22. Kidney, Urinary, Male genital disease	33	33.3	-5.93	14	21.2	-2.92	3.01
23. Genetic disorder and congenital deformation	1	7.5	-0.93	5	19.1	-2.80	-1.87
24. Perinatal and neonatal disease	1	25.8	-2.14	8	27.2	-2.49	-0.36
25. Dermatologic disease	0			4	31.4	-1.81	N/A
26. Disease of ear, nose, and throat	0			4	23.6	-1.35	N/A
27. Disorders of eye and adnexa	0			2	45.6	-0.75	N/A
28. Female genital disease	0			18	23.2	-2.63	N/A
29. Gestational, puerperal, and postpartum disease	1	62.5	-0.92	24	32.1	-2.40	-1.49
30. Psychiatric disorder	28	31.2	-4.00	25	20.0	-3.59	0.41
Total	427	25.4	-6.66	393	24.9	-4.20	2.47

6. Estimating the Effect of THE Dr. LEE Jong-wook—seoul Project on Test Scores

6.1. Statistical Model

Based on the discussion on the production function of the academic performance in Section 2, the following regression model was considered:

$$Y_{i,j,t} = \alpha + \rho D_{i,j,t} + \beta X_{i,j,t} + \mu_i + \theta_j + \eta_t + \varepsilon_{i,j,t}$$

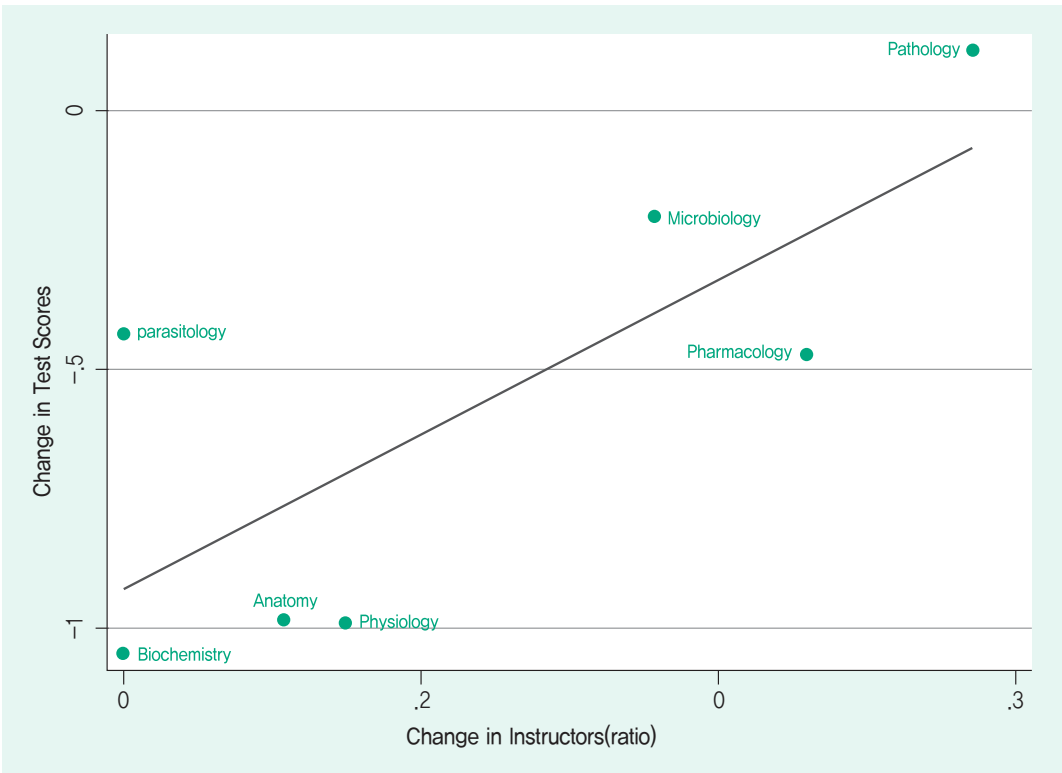
The dependent variable, $Y_{i,j,t}$, is the academic performance of an individual i at time t measured with a score in a standardized test for medical knowledge in subject j. The treatment variable, $D_{j,t}$, measures the scale of the intervention, that is, the share of the trainees among all instructors in subject j. A set of explanatory variables, $X_{i,t}$, includes all other observable characteristic of school and individuals. The unobserved individual-specific factors like ability or motivation is represented by μ_i. In addition, the subject-specific and time-specific factors are denoted by θ_j and η_t, respectively. Lastly, idiosyncratic noise is included as an error term $\varepsilon_{i,j,t}$.

In this statistical model, the treatment effect is measured by the estimate of the coefficient ρ. The major challenge is the measurement of both the performance and educational factors, and the potential correlation between the regressors and the unobserved individual characteristics, μ_i. Given the sample selection, the coefficient ρ may not be consistently estimated. With this limitation, we first estimate the equation for the whole set of subjects with subject fixed-effects removed. Then, we examine how sensitive the estimate is to the inclusion of various individual characteristics like GPA and household income.

6.2. Test of Basic Medicine

Our empirical strategy is essentially to examine whether the test scores improved in subjects with more trainees as instructors. As a descriptive analysis, [Figure 9] presents a scatter plot between changes in the share of teaching by trainees and changes in test scores for seven subjects in Basic Medicine. The positive correlation in [Figure 9] suggests that there may be a positive impact of the project on the test scores. In order to verify the relationship, a regression analysis was conducted.

[Figure 9] Change in Instructors and Change in Test Scores by Subject in Basic Medicine



The data are constructed at student-subject level. Therefore, one student contributes to data with seven observations on the scores in each subject. The summary statistics on 5th-year students is provided in <Table 29>. The standardized test score is -2.03 and the share of trainees among all the instructors in each subject is 0.08 on average. The average age is 23.2 years, and 53% of students are female. The share of the special students is 45%. Foreign language proficiency is in order of Thai, English and French. The proportion of students who reported to have the level of language normal or above is 68% for Thai, 46% for English and 13% for French. The majority ethnic group is Lao, and 79% of students have mothers from Lao. Regarding the mother's education level, 9% of mothers have no schooling. The share of those with primary education and secondary education is 22% and 29%, respectively. Further, mothers with vocational training take up 19%, and those with university degree 20%. The average household size is 7.4 persons. As for the monthly household income, 33% of students answered that it is above 2 million kip, where as 13% of them answered that it is between 1.5~2 million kip. On the other hand, 33% of the students responded that they do not know.

<Table 29> Summary Statistics of Test of Basic Medicine by Subject (N=2,737)

	Mean	Std. Dev.	Min	Max
Test score (standardized)	-2.03	0.75	-4.56	0.71
Share of teaching by trainees (ratio)	0.08	0.10	0	0.29
Wave 2	0.72	0.45	0	1
GPA	2.46	0.49	1.37	4.13
Age	23.16	4.50	19	49
Female	0.53	0.50	0	1
Special Students	0.45	0.50	0	1
English: normal or above	0.46	0.50	0	1
French: normal or above	0.13	0.33	0	1
Thai: normal or above	0.68	0.47	0	1
Mother's ethnic group: Lao	0.79	0.41	0	1
Mother's education: No schooling	0.09	0.29	0	1
Mother's education: Primary	0.22	0.41	0	1

	Mean	Std. Dev.	Min	Max
Mother's education: Lower secondary	0.16	0.37	0	1
Mother's education: Higher secondary	0.13	0.34	0	1
Mother's education: Vocational	0.19	0.39	0	1
Mother's education: University	0.20	0.40	0	1
Household size	7.43	4.56	2	36
log own expenditure (mth)	13.42	0.90	10.13	17.91
HH inc.: below 0.5 mil. Kip (mth)	0.04	0.20	0	1
HH inc.: 0.5~1 mil. Kip (mth)	0.07	0.26	0	1
HH inc.: 1~1.5 mil. Kip (mth)	0.09	0.29	0	1
HH inc.: 1.5~2 mil. Kip (mth)	0.13	0.34	0	1
HH inc.: above 2 mil. Kip (mth)	0.33	0.47	0	1
HH inc.: do not know	0.33	0.47	0	1

The results of the regression analysis are presented in <Table 30>. The basic specification in column (1) suggests that the share of trainees among instructors increases the test scores and that the effect is statistically significant at the conventional level. Specifically, the estimate implies that the full change from zero to one in the share of trainees would increase the test scores by 2.98 times standard deviation. In the sample, the share of trainees increased from zero in wave 1 to 0.118 in wave 2. Therefore, the increase in test scores attributed to the project is 0.352 (=0.118×2.984) standard deviation, which is not trivial compared to the total change in the test scores between two waves (-0.573).

The main result remains the same as more individual characteristics are controlled as an explanatory variable in column (2), (3) and (4) of <Table 30>. GPA turns out to be a strong predictor of performance on the Test of Basic Medicine. One more grade in GPA is expected to increase the test score by 0.27 of standard deviation. Older students tend to have lower scores than their younger counterparts. And special students tend to perform worse than regular students. Proficiency of French language turns out to be a good predictor of academic performance. On the other hand, own expenditure

is found to be negatively correlated with test scores. The overall results in <Table 30> suggest that the effect of the Dr. LEE Jong-Wook—Seoul Project on test scores in Basic Medicine is significantly positive and fairly stable.

<Table 30> Effect of Intervention on Test Score of Basic Medicine by Subject

	(1)	(2)	(3)	(4)
Change in instructors (ratio)	2.9836 (0.2615)**	2.9836 (0.2577)**	2.9836 (0.2556)**	2.9836 (0.2555)**
Wave 2	-0.9240 (0.0413)**	-0.7552 (0.0448)**	-0.7481 (0.0447)**	-0.7332 (0.0459)**
GPA		0.2746 (0.0305)**	0.2794 (0.0313)**	0.2840 (0.0318)**
Female			-0.0424 (0.0247)	-0.0449 (0.0251)
Age			-0.0066 (0.0028)*	-0.0076 (0.0032)*
Special Students			-0.1221 (0.0248)**	-0.1138 (0.0258)**
English: normal or above			0.0267 (0.0259)	0.0344 (0.0265)
French: normal or above			0.0830 (0.0388)*	0.0979 (0.0400)*
Thai: normal or above			-0.0809 (0.0264)**	-0.0775 (0.0275)**
Mother's ethnic group: Lao				-0.0357 (0.0324)
Mother's education: Primary				0.0251 (0.0494)
Mother's education: Lower secondary				-0.0279 (0.0532)
Mother's education: Higher secondary				-0.0054 (0.0560)
Mother's education: Vocational				-0.0363 (0.0529)
Mother's education: University				-0.0041 (0.0543)

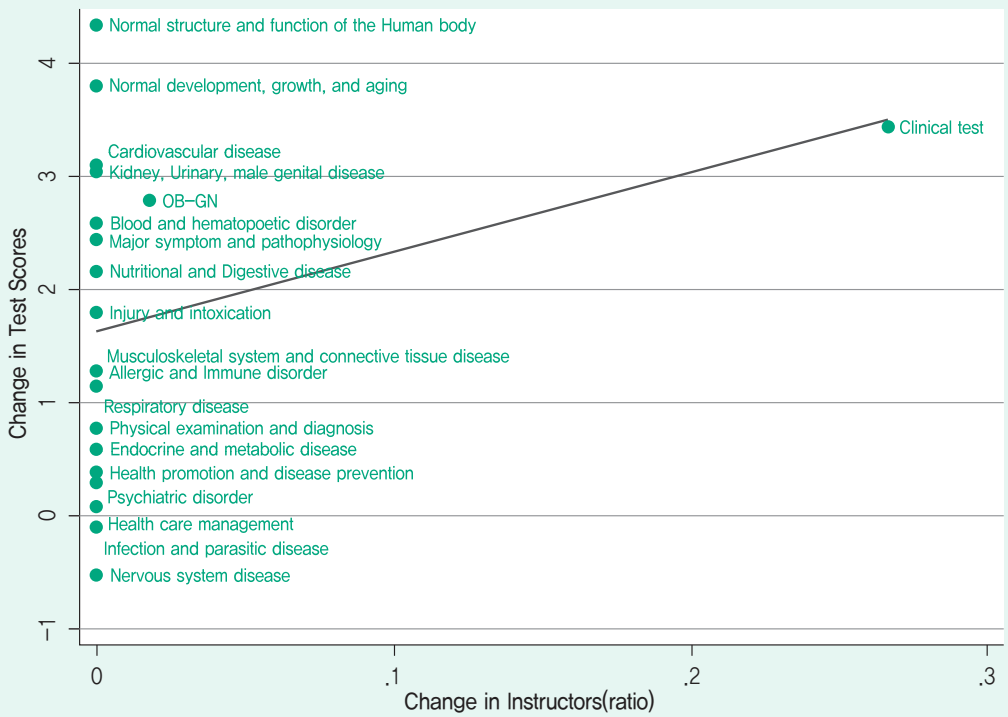
	(1)	(2)	(3)	(4)
log own expenditure (mth)				-0.0300 (0.0141)*
R2	0.25	0.27	0.28	0.29
No. of observations	2,737	2,737	2,737	2,737

Note: All models include the subject dummies as explanatory variables, and Model (4) additionally includes household size and household income dummies. Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

6.3. Test of Clinical Medicine

Next, the Test of Clinical Medicine is examined. There are a total of 30 fields in the Test of Clinical Medicine. The share of teaching hours by trainees among the courses offered at the Faculty of Medicine in UHS is matched with the test score for each field, and those fields with at least 4 questions in the Test in both waves are considered in the analysis. As before, the descriptive scatter plot between the change in the share of teaching by trainees and the change in the test scores by field is shown in [Figure 10]. [Figure 10] exhibits a positive correlation between the two variables, which suggests that the test scores of those fields with a benefit from the project increased more compared to the average of other fields.

[Figure 10] Change in Instructors and Change in Test Scores by Field in Clinical Medicine



The summary statistics of the sample for the regression analysis are presented in <Table 31>. The mean of standardized test scores of clinical medicine is -3.64, and increased by 0.46 from the 1st wave to the 2nd wave. The mean value of teaching share of the participants is 0.007. The general characteristics of the student sample are similar to those in <Table 29>.

<Table 31> Summary Statistics of Test of Clinical Medicine by Subject (N=2,912)

	Mean	Std. Dev.	Min	Max
Test score (standardized)	-3.64	1.58	-9.36	0.92
Share of teaching by trainees (ratio)	0.007	0.040	0.00	0.27
Wave 2	0.46	0.50	0	1
GPA	2.40	0.39	1.56	3.63
Age	22.90	2.29	20	39
Female	0.62	0.49	0	1
Special Students	0.47	0.50	0	1
English: normal or above	0.59	0.49	0	1
French: normal or above	0.29	0.45	0	1
Thai: normal or above	0.76	0.43	0	1
Mother's ethnic group: Lao	0.77	0.42	0	1
Mother's education: No schooling	0.06	0.24	0	1
Mother's education: Primary	0.27	0.45	0	1
Mother's education: Lower secondary	0.12	0.33	0	1
Mother's education: Higher secondary	0.10	0.31	0	1
Mother's education: Vocational	0.20	0.40	0	1
Mother's education: University	0.24	0.42	0	1
Household size	6.71	3.30	2	23
log own expenditure (mth)	13.40	0.77	10.82	17.07
HH exp.: below 0.5 mil. Kip (mth)	0.07	0.25	0	1
HH exp.: 0.5~1 mil. Kip (mth)	0.08	0.27	0	1
HH exp.: 1~1.5 mil. Kip (mth)	0.09	0.28	0	1
HH exp.: 1.5~2 mil. Kip (mth)	0.10	0.31	0	1
HH exp.: above 2 mil. Kip (mth)	0.40	0.49	0	1
HH exp.: do not know	0.27	0.44	0	1

The results of the regression estimation are shown in <Table 32>. According to column (1), the share of trainees among instructors indeed increases the test scores, and the effect is statistically significantly at the conventional level of significance. The

point estimate suggests that the change in the share of trainees out of instructors from 0 to 1 leads to the increase of test scores by 7.0 standard deviation. The magnitude of the effect is larger than expected, but this should be interpreted as a marginal effect. Since the share of trainees increased by 0.014 over two waves, the change in the test scores due to the project is estimated to be 0.098(=7.024×0.014) standard deviation. Given that the average test score increased by 1.73 standard deviation in wave 2 over wave 1, about 6%(=0.098/1.730) of the total increase in the test score is attributed to the project. The main result stands as more explanatory variables are included in the model. Most other regressors do not have any significant effect on test scores. The only exception is GPA. The test score is found to increase by roughly 0.4 of standard deviation as grade increases by one.

<Table 32> Effect of Intervention on Test Score of Clinical Medicine by Subject

	(1)	(2)	(3)	(4)
Change in instructors (ratio)	7.0240 (0.5982)**	7.0240 (0.5904)**	7.0240 (0.5902)**	7.0240 (0.5902)**
Wave 2	1.6298 (0.0358)**	1.6299 (0.0353)**	1.6265 (0.0357)**	1.6206 (0.0369)**
GPA		0.4311 (0.0438)**	0.3622 (0.0525)**	0.3599 (0.0540)**
Female			-0.0122 (0.0358)	0.0023 (0.0369)
Age			0.0001 (0.0080)	0.0010 (0.0090)
Special Students			-0.0468 (0.0374)	-0.0310 (0.0408)
English: normal or above			0.0024 (0.0402)	0.0019 (0.0408)
French: normal or above			0.0612 (0.0434)	0.0853 (0.0471)
Thai: normal or above			0.0885 (0.0432)*	0.0979 (0.0442)*
Mother's ethnic group: Lao				-0.0897 (0.0493)

	(1)	(2)	(3)	(4)
Mother's education: Primary				0.0696 (0.0862)
Mother's education: Lower secondary				0.0690 (0.0974)
Mother's education: Higher secondary				0.0412 (0.1007)
Mother's education: Vocational				0.0077 (0.0906)
Mother's education: University				0.0934 (0.0905)
log own expenditure (mth)				-0.0102 (0.0249)
R2	0.57	0.58	0.58	0.58
No. of observations	3,640	3,640	3,640	3,640

Note: All models include the field dummies as explanatory variables, and Model (4) additionally includes household size and household income dummies. Standard errors are in parentheses. *** p<0.01, ** p<0.05, * p<0.1

7. Concluding Remarks

This chapter presents the analysis based on the two rounds of Test of Medical Knowledge among students at the UHS. It hypothesizes that the Dr. LEE Jong-Wook—Seoul Project will improve the teaching capability of participants and that it will thus enhance the student's medical knowledge. The main finding is that the teaching performance of the trainees of the Dr. LEE Jong-Wook—Seoul Project seems to have improved in the areas of both basic and clinical medicine. The estimates indicate that the first cohort of trainees in the project accounts for the increase in the test scores of basic medicine by 0.352 standard deviation in case of basic medicine and 0.098 standard deviation in case of clinical medicine. The magnitude of the impact is equivalent to 57% and 6% of the total change in the test scores between two waves in absolute values, respectively in basic medicine and clinical medicine.

While the results are encouraging, one needs to be cautiously optimistic in interpreting them given the degree of the sample selection over two waves. The participation rate of the test increased from 36.4% to 89.7% between waves for 5th year students, while it decreases from 50.4% to 24.5% for 6th year students. However, the selection issue seems to be less concerned to the extent that the estimate is not sensitive to the inclusion of various individual characteristics.

Another issue is related to the timing of the program. Since the Test of Basic Medicine is taken by those students who completed four years of education, it needs at least two years to measure the program effect if a trainee teaches 3rd year students upon her return to UHS. In this regard, the results on the Test of Clinical Medicine seem to be more relevant for the current analysis. Nevertheless, we believe that the results on the Test of Basic Medicine are also informative to the extent that there are likely to be spillover effects among instructors at UHS.

Last but not least, one should note that the scale of the Dr. LEE Jong-Wook—Seoul Project is quite limited so far. This implies that the results could be sensitive to some unobservable characteristics of trainers, trainees or medical subject-specific characteristics. While this issue is a fundamental problem of this project, it is expected to estimate a more robust impact as time lapses. In fact, the 3rd round of Test of Medical Knowledge is scheduled in 2014. Further, it is worth investigating whether the measure of intervention could be pinned down to the individual level. Also an alternative measure of academic performance, including grades, could be useful in establishing robust results.

Appendix. Schedule for 1st Round Test of Medical Knowledge at UHS

The schedule of the Test of Medical Knowledge at UHS is identical to that of MEAC in Korea.

<Table A1> Test of Basic Medicine (1st and 2nd Round)

Class	Time	No. of Questions
Orientation	08:30 - 09:00	
Class 1	09:00 - 10:10	60
Class 2	10:30 - 11:55	70
Lunch	11:55 - 12:55	
Class 3	13:10 - 14:20	60
Survey	14:40 – 15:00	
Class 4	15:00 - 16:25	70

<Table A2> Test of Clinical Medicine

Day	Class	1st Round		2nd Round	
		Time	No. of Questions	Time	No. of Questions
Day 1	Orientation	8:30 - 9:00		8:30 - 9:00	
	Class 1	9:00 - 10:30	75	9:00 - 10:20	60
	Class 2	11:00 - 12:10	55	10:50 - 11:50	45
	Lunch	12:10 - 13:10		11:50 - 12:50	
	Class 3	13:20 - 14:45	60	13:00 - 14:35	65
	Class 4	15:15 - 16:40	60	15:05 - 16:40	65

Day	Class	1st Round		2nd Round	
		Time	No. of Questions	Time	No. of Questions
Day 2	Orientation	8:30 -09:00		8:30 - 9:00	
	Class 5	9:00 - 10:20	58	9:00 - 10:35	65
	Class 6	10:50 - 12:10	56	10:50 - 12:25	65
	Lunch	12:10 - 13:10		12:25 - 13:25	
	Survey			13:25 - 13:45	
	Class 7	13:20 - 14:40	58	13:45 - 15:30	65
	Survey	15:10 – 15:30			
	Class 8	15:30 - 16:50	58		

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