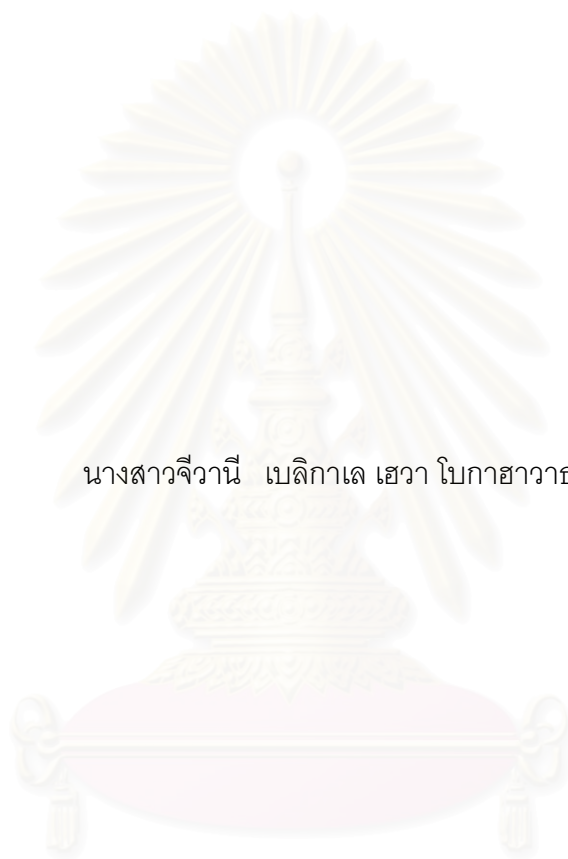


การวิเคราะห์ต้นทุนโปรแกรมการฝึกอบรมแพทย์เฉพาะทางในประเทศไทย



นางสาวจีวานี เบลิกาเล เฮวา โภกาฮาวาธาเก

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จุฬาลงกรณ์มหาวิทยาลัย
วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรมหาบัณฑิต

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ปีการศึกษา 2550

ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

COST ANALYSIS OF MEDICAL SPECIALTY TRAINING
PROGRAMME IN SRI LANKA

Miss Jeevani Beligalle Hewa Bogahawaththage

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

A Thesis Submitted in Partial Fulfilment of the Requirements
for the Degree of Master of Science Programme in Health Economics

Faculty of Economics

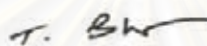
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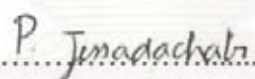
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จีวานี เบลิกาเล เฮวา โบกาฮาวาธาเท : การวิเคราะห์ต้นทุนโปรแกรมการฝึกอบรมแพทย์เฉพาะทางในประเทศศรีลังกา. (COST ANALYSIS OF MEDICAL SPECIALTY TRAINING PROGRAMME IN SRI LANKA) อ. ที่ปริกษาวิทยานิพนธ์หลัก: รศ .ดร .ศิริเพ็ญ ศุภกาญจนกันติ, 109 หน้า.

การศึกษานี้มีจุดมุ่งหมายเพื่อทำการวิเคราะห์ต้นทุนการผลิตแพทย์เฉพาะทางในประเทศศรีลังกา ต้นทุนทั้งหมดและต้นทุนของการผลิตแพทย์เฉพาะทางด้านจุลชีววิทยา (Microbiology) โดยได้วิเคราะห์การผลิตแพทย์เฉพาะทาง ซึ่งใช้เวลา 6 ปี เพื่อเป็นแพทย์เฉพาะทางด้านจุลชีววิทยา การแบ่งศูนย์ต้นทุนภายในสถาบัน Postgraduate Institute of Medicine (PGIM) ได้แบ่งศูนย์ต้นทุน (Cost center) ทั้งหมด 28 ศูนย์ และจัดเป็นส่วนบริหาร ส่วนการศึกษา และส่วนสนับสนุนการศึกษา และใช้แบบฟอร์มสำหรับรวบรวมข้อมูลเป็นเครื่องมือในการเก็บข้อมูลในปี 2550 ข้อมูลที่รวบรวมได้แก่ ค่าแรงงาน ค่าวัสดุ และทุน ซึ่งวิธีการจัดสรรต้นทุนได้ใช้วิธีการจัดสรรโดยตรง (Direct allocation method) เพื่อจัดสรรต้นทุนทั้งหมดในแต่ละศูนย์ต้นทุนตามกฎหมายการจัดสรร

ต้นทุนการผลิตทั้งหมดของ Postgraduate Institute of Medicine (PGIM) คือ SLR 53,873,222.57 โดยคิดเป็นค่าแรงงาน SLR 30,338,036.04 ค่าวัสดุ SLR 18,071,521.57 และทุน SLR 5,453,653.9 ต้นทุนการผลิตแพทย์เฉพาะทางด้านจุลชีววิทยาคือ SLR 5,436,914.9 ประกอบด้วย 3 ขั้นตอน สำหรับแพทย์ผู้ซึ่งต้องการเป็นแพทย์เฉพาะทางด้านจุลชีววิทยา ต้นทุนการผลิตของขั้นตอนแรก คือ Diploma in Medical Microbiology เป็น SLR 472,870 ในขั้นตอนที่ 2 คือ MD in Microbiology ต้นทุนการผลิตเป็น SLR 445,337 และต้นทุนการผลิตในขั้นตอน Board Certification เพื่อที่จะเป็นแพทย์เฉพาะทางด้านจุลชีววิทยา เป็น SLR 2,791,750 และต้นทุนส่วนใหญ่ถูกใช้ไปในการส่งแพทย์ออกไปฝึกประสบการณ์ในต่างประเทศเมื่อเปรียบเทียบกับขั้นตอนอื่น ๆ

จากการศึกษาพบว่า ส่วนใหญ่ (มากกว่า 50%) ใช้ไปในขั้นตอนการศึกษานอกประเทศ เมื่อเปรียบเทียบกับขั้นตอนอื่นๆ ของโปรแกรมการฝึกฝน การพัฒนานโยบายในอนาคตของ PGIM และรวมไปถึง Ministry of Healthcare & Nutrition ควรจะเน้นไปที่การปรับปรุงในขั้นตอนการศึกษานอกประเทศ โดยต้นทุนของขั้นตอนการศึกษานอกประเทศของโปรแกรมการฝึกฝนอาจจะถูกลดได้โดยหลายวิธี แต่ต้องระวังไม่ให้มีผลถึงคุณภาพในการฝึกฝน และอีกปัจจัยหนึ่งที่สำคัญคือ การสูญเสียบุคลากรของขั้นตอนการศึกษานอกประเทศ เนื่องจากผู้เข้าร่วมโปรแกรมไม่กลับมามีงานในประเทศ ดังนั้น PGIM และ Ministry of Healthcare & Nutrition ควรพิจารณาแก้ไขปัญหานี้ทั้ง 2 ประการอย่างจริงจัง

สาขาวิชา เศรษฐศาสตร์สาธารณสุข

ลายมือชื่อนิสิต.....

Jeevani

ปีการศึกษา 2550

ลายมือชื่ออาจารย์ที่ปรึกษาหลัก.....

[Signature]

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 SRI LANKA

JEEVANI BELIGALLE HEWA BOGAHAWATHTHAGE : COST
 ANALYSIS OF MEDICAL SPECIALTY TRAINING PROGRAMME IN
 SRI LANKA. THESIS PRINCIPAL ADVISOR: ASSOC. PROF. SIRIPEN
 SUPAKANKUNTI, Ph.D., 109 pp.

This study objective is to analyze the programme cost of the postgraduate medical specialty training in Sri Lanka. Total programme cost and the Programme cost for Medical Microbiology training (as an example of postgraduate training) were analyzed. The data for the analysis were collected from the information available at the Postgraduate Institute of Medicine (PGIM). Some of the data were available from the reports published by the PGIM, while others were collected through interviews with responsible officers. The cost of medical specialty training involves 6 years curriculum that is necessary to become a specialist in the field of Medical Microbiology. The units of Postgraduate Institute of Medicine (PGIM) divided into 28 cost centres and categorized as administration, education and education supporting units. The data collection forms were used as tools to collect the data in 2007. The information was compiled as labour cost, material cost and capital cost. Direct allocation method was applied to allocate all costs in each cost centre with using the allocation criteria.

Total cost of Postgraduate Institute of Medicine is SLR 53,873,222.57 for the year 2007. The total programme cost comprises of SLR 30,338,036.04 as labour cost and SLR 18,071,521.57 and SLR 5,453,653.90 as material cost and capital cost respectively. The programme cost for the Medical Microbiology training was SLR 5,436,914.90, consisted three stages in the field of Medical Microbiology. The cost for the Diploma in Medical Microbiology was SLR 472,870.00. In second stage of MD in Microbiology, cost was SLR 445,337.00. Cost for the Board Certification as a Specialist in Microbiology was SLR 2,791,750.00, this mainly involves overseas training component of the postgraduate programme.

The study found that the largest portion (more than 50%) was utilized for the overseas training when compared with other stages in the training programme. This should be an area for further policy development to be strongly be considered by the management of the PGIM, as well as by the Ministry of Healthcare & Nutrition. Cost of the overseas training of the postgraduate training may be reduced by many means and this has to be carefully considered not to compromise the quality of training. Lose of overseas trained medical postgraduates due to non-returning candidates is another important factor that need to be seriously considered by the PGIM and Ministry of Healthcare & Nutrition.

Field of study Health Economics

Student's Signature 

Academic Year 2007

Principal Advisor's Signature 

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ABBREVEATION

PGIM		Postgraduate Institute of Medicine in Sri Lanka
MOH	Ministry	of Healthcare & Nutrition in Sri Lanka
PGIM		Postgraduate Institute of Medicine in Sri Lanka
MD	Doctor	of Medicine
MS		Surgeon of Medicine
DC	Direct	Cost
IC	Indirect	Cost
LC	Labore	Cost
MC	Material	Cost
CC	Capital	Cost
U P F		University Provident Fund
E T F		Employment Trust Fund
U G C		University Grant Commission
MD	Doctor	of Medicine
MS	Sur	geon of Medicine
DC	Direct	Cost
IC	Indirect	Cost
LC	Labore	Cost
MC	Material	Cost
CC	Capital	Cost
WHO	W	orld Health Organization
WFME		World Federation for Medical Education

CHAPTER I

INTRODUCTION

1.1 Problem and its Significances

The health workforce crisis is increasingly prominent on the agendas of both developing and developed countries. The causes of these shortages are many-fold. There is a limited production capacity in many developing countries as a result of years of underinvestment in health education institutions. Moreover, the training output is poorly aligned with the health needs of the population. There are also "push" and "pull" factors that encourage health workers to leave their workplaces, mainly related to unsatisfactory working conditions, low salaries, and poor career opportunities. The migration of health workers to developed countries has dire consequences for the health systems in developing countries, which are already suffering the effects of years of neglect, poorly managed health care reforms and economic stagnation. In addition, human resource planning has not historically been a policy priority of health ministries in developing countries.

There is a clear correlation between the population density of health care providers and the levels of coverage attained with essential health interventions, such as immunization and skilled attendance at delivery. But many countries lack the human resources needed to deliver these interventions. World health report shows that there are more than 59 million health workers in the world, distributed unequally between and within countries.

This global crisis requires working in partnership and across sectors, actively engaging all stakeholders to implement and monitor effective strategies and policy interventions to develop a well-performing health workforce. World Health Organization's mandate is to support countries by providing tools and guidelines and by facilitating process aiming to develop health systems with universal coverage and effective public health interventions. According to that tools and methodologies to develop health workforce, such as human resource for health situation analysis, human resources for health policies, human resources for health planning, education and training and human resource for health management system.

Education and training is one of the tools to develop health workforce in the country. The World Federation for Medical Education (WFME) works to raise the global standards of medical education. They cover three phases of medical education in global standards, mainly basic medical education, continuing professional development of medical doctors and postgraduate medical education.

The report reveals an estimated shortage of almost 4.3 million doctors, midwives, nurses and support workers worldwide. The shortage is most severe in the poorest countries, especially in sub-Saharan Africa, where health workers are most needed. Focusing on all stages of the health workers' career lifespan from entry to health training, to job recruitment through to retirement, the report lays out a ten-year action plan in which countries can build their health workforces, with the support of global partners. (World Health Report, 2006)

The broad aim of the health policy of Sri Lanka is to increase life expectancy and improve the quality of life. This is to be achieved by controlling preventable diseases and by health promotion activities. The major concerns of address health issues such as inequities in health provision, care of elderly and disabled, non-communicable diseases, communicable diseases, accidents and suicides and substance abuse.

The Health Master plan/Sri Lanka provides the policy and strategic framework for the development of an innovative health system over the next decade, targeting the year 2016. According to that, to improve health status and reduce inequalities will be achieved by the five strategies, namely:

1. To ensure the delivery of comprehensive health services, which reduce the disease, burden and promote health;
2. To empower communities (including households) towards more active participation in maintaining their health;
3. To improve the management of human resources for health;
4. To improve health financing, resource allocation and utilization;

5. To strengthen stewardship and management functions of the health system

(Health Master Plan, 2007)

The following immediate objectives are identified to improve the management of human resources for health as a third strategy,

- 1) To expand functions and strengthen capacities of National and Provincial Ministries of Health in human resource development and management
- 2) To rationalize the development and management of human resources for health
- 3) To improve management, clinical and public health competencies of health staff

At present there are some disparities in the requirements and supply of several categories of health personnel, particularly nurses and paramedical personnel. Shortages of certain specialist categories cause inefficiency and ineffectiveness in the public and private delivery systems. On the other hand, the growing number of doctors will have serious cost and quality implications. These doctors may not be fully absorbed into the state health system, as the commitment to do so is only until 2010. Even if increasing numbers of doctors move into the private sector, a surplus of doctors practicing privately will cause an increase in supply-driven health consumption levels in urban areas. (Health Master Plan, 2007)

According to the Health Master Plan there is an unbalance of medical doctors and specialist categories in the health sector. The programme cost for medical specialty training will be helpful for the state sector in decision making, planning and budgeting indirectly.

Due to drastic change in the disease pattern in Sri Lanka, the increase in the incidence of non-communicable diseases has now become a major concern. In order to face the new challenges from epidemiological and demographic transitions need to prepare for the future. Table 1.1 shows that the disease pattern has been changed drastically last few years. Mortality due to non-communicable diseases such as

Ischemic Heart Disease, Stroke and Cancer is increasing,

Table 1.1 Hospital morbidity and mortality by disease groups in 2003

Disease Group	Total admissions*	Deaths
Intestinal infection diseases	131,923 431	
Tuberculosis	8,485	333
Other bacterial diseases	10,120	1,379
Viral diseases	170,849	459
Malaria	4,792	3
Diabetes mellitus	52,151	675
Mental and behavioral disorders	42,433 -	
Diseases of nervous system	49,204 -	
Disease of the eye and adnex	82,332 -	
Disease of the ear	18,979	-
Hypertensive diseases	90,016	767
Ischemic heart disease	69,598	3,762
Other chest diseases	27,989	-
Diseases of gastrointestinal tract	199,680 2,804	
Diseases of skin and subcutaneous tissue	116,378 -	
Diseases of the urinary system	135,533 1,272	

*Total = Number of Live Discharge + Deaths

Source: Ministry of Healthcare & Nutrition

With increasing the non-communicable diseases, partly caused by the dem and for speciality and subspecialty services, this will lead to increasing dem and and expectations by the public. To meet this demand of service, it is necessary to produce adequate specialty and subspecialty services to the country. Appendix I shows that the available services and the quantity of medical specialty and subspecialty categories. The study of the programme cost for medical specialty training will be able to analyze whether the postgraduate training is answering satisfactory level to the changing pattern of diseases in the country. There is a disparity between the dem and of specialty services and the production of specialties including subspecialties in the country.

The lack of medical specialists in many fields is one of the major problems faced by the health sector in Sri Lanka over last few decades leading to inefficiency in health services. Successive governments have taken several steps to improve efficiency and effectiveness of the health services. Government spends substantial amounts of funds, including much scarce foreign exchange in the country to train medical postgraduates. However, this important problem has not yet been resolved to a satisfactory level due to many crosscutting issues in the postgraduate medical education and in the health sector.

On the other hand lack of medical specialists in many subspecialties has been created some issues in the postgraduate medical education system in Sri Lanka. To become a medical specialist a postgraduate trainee must undergo period of supervised training at a center of excellence (in overseas) recognized by the PGIM as per the instruction by the board of study for that subspecialty. Cost of this overseas training is given by the Ministry of Healthcare as scholarship to the trainees. Hence postgraduate medical education has been a very costly affair for the public sector.

In early seventies an advisory committee was set up to look at the issues related to postgraduate medical education in Sri Lanka. Following is one of the major recommendations made by this committee. PGIM stated, "The advisory Committee on Postgraduate Medical Education recommended to the government in 1973 that a supervised in-service training period of 3 years followed by an examination should replace the existing scheme of training abroad" (PGIM, 2005, p.5). So it is opportune time look into reconsideration after 30 years.

Another major problem is that substantial number of postgraduate trainees may not either return to the country or may leave the government services after a short period of training (Appendix II). Further this results in heavy losses of much needed foreign exchange to the country. There are incidental costs have to bear in addition overseas training to the state sector as well as for the individual postgraduate trainees. These costs need to be analyzed quantitatively and qualitatively to understand the pattern of expenditure incurred by the individual trainees as well as by the government. Understanding costs at different levels provide an insight as to how one could either mitigate losses or improve the gains in the whole postgraduate

medical education system that's practiced in Sri Lanka at present.

Understanding of production cost of medical specialty training programme is becoming important to improve management of human resources in the health sector. This study focused on Medical Microbiology training programme as one of the specialty in medicine. Cost information of this training programme collected without much inconvenience. Moreover, structure of this training programme was easy to follow with fewer complications. Therefore, the postgraduate training programme of Medical Microbiology was selected as the unit of study in this analysis.

1.2 Research Question

What is the institutional expenditure for the postgraduate medical specialty training in Sri Lanka?

1.3 Research Objectives

1.3.1 General Objective

To analyze the programme cost for the postgraduate medical specialty training programme in the public sector in Sri Lanka.

1.3.2 Specific Objectives

- 1) To analyze the proportions of Labour cost, Material cost and Capital cost expenditure for the postgraduate medical specialty training programme.
- 2) To measure the programme cost for the medicine as a medical specialty training programme, taking Medical Microbiology training specialty as an example.

1.4 Scope of the Study

This study only focuses on programme cost of medical microbiology as one of the specialty and it will not focus on other subspecialty training costs.

Due to unavailability and inconsistency of reporting hampered the analysis of hospital cost; it was not possible in this study to analyze the hospital cost during the training of postgraduate trainees at the hospitals. It should be understood that there is no clear demarcation in the secondary hospitals in Sri Lanka in terms of training units and non-training units, due to free health and free education policy that has prevalent for many decades.

This study is emphasized instead to focus in-depth on allocation from Postgraduate Institute of Medicine and the Ministry of Healthcare where allocate funds for their overseas training as a fellowship.

The postgraduate trainees need to undergo minimum one year overseas training to complete the requirements to become Board Certified specialist in the current system and the study focused on this.

The programme cost of this study was analyzed with the assumption that all the postgraduate training programmes (including overseas training) followed in the routinely planned manner without any disruption.

1.5 Limitations

Due to limited time and page length this study focused on programme cost that is allocated during the training period. It also focused only on the institutional basis which the state sector need to spend as labour cost, material cost and capital cost.

There may be delays in the training period due to failures, personal issues of the trainee and unavoidable circumstances (such as trade union action) in the country. These situations may have implications on the total cost of the postgraduate training

programme and the study didn't consider such incidental costs as it is beyond this study.

1.6 Benefits of the Study

The health sector in many countries faced with severe resource constraints. It is necessary to use available resources as efficiently and effectively as possible.

Collection and analysis of data on medical specialty programme cost can be provided considerable useful information to Ministry of Healthcare, Postgraduate Institute of Medicine for planning and budgeting. Further they may be plan the training programme in such way to retain the cost for overseas training without sending trainees to overseas. It is questionable to provide overseas specialty training as against local training in the country in terms of effectiveness and benefits when you compare with postgraduate medical training in other countries such as Thailand. It is envisaged in this study to compare such costs and benefits with similar postgraduate programmes in other regional countries.

The comprehensive application of programme cost will be helpful, to develop the policy and strategic framework in Health Master Plan over the next decade, targeting the year 2016. It will gain clear and accurate information on resource flow and on the impact that resources have on the quality and performance of health sector. In addition medical education is one of the tool introduced by World Health Organization to develop the policy and strategic framework on improving the management of human resources for health.

CHAPTER II

GENERAL INFORMATION OF SRI LANKA

2.1 Country Profile

Sri Lanka is a small island with a land area of 65 610 km². It is situated in the Indian Ocean, close to the southern end of the Indian peninsula. Majority of the population is Sinhalese and most of them are Buddhist. The largest minority is Tamil. The economy is market-oriented, with manufacturing capacity taking over from former dependence on agriculture. Two decades of civil war destroyed infrastructure and impeded socioeconomic development in the north and east.

2.2 Current Health Statuses

As shown in table 2.1 the country's health indicators show a steady improvement over recent decades. The development of health services in Sri Lanka has occurred alongside development in a number of other related sectors such as education (particularly the education of women) and social welfare.

Table 2.1 Health Related Indicators in Sri Lanka in 2006

Population ('000)	20,743,000
Crude Birth Rate (per 1,000 population)	18.9
Crude Death Rate (per 1,000 population)	5.9
Life Expectancy For Males	70.7 years
Life Expectancy For Females	75.49 years
Literacy Rate of Males	91.1
Literacy Rate of Females	85.2
Infant Mortality Rate (per 1,000 live births)	11.2
Neonatal Mortality Rate (per 1,000 live births)	10.6
Maternal Mortality Rate (per 10,000 live births)	1.4
No of Married Women Per Midwife	576
No of Persons Per Medical Officer	2500
No of Pupil Per Teacher	22

Source: Ministry of Healthcare & Nutrition

The Maternal Mortality Ratio of 1.4 /1,000 live births was an exceptional achievement for a developing country. The improvement of these indicators is predominantly attributed to the Maternal and Child Care Programme implemented nationally as an integral component of the state health care system. Similarly, the Infant Mortality Rate of 11.2 per 1,000 live births has been achieved by effective and widely accessible prevention and primary health care strategies including treatment of minor infections.

2.3 Burden of Diseases

With the rapid ageing of the population and the success in combating the major communicable diseases, the disease burden has started shifting rapidly towards non-communicable diseases including mental diseases, accidents and injuries. Nutritional status has improved but remains a serious problem among the poorer and vulnerable communities and, even on average it doesn't show a satisfactory picture.

The leading causes of death (by percentage of total mortality) are ischemic heart disease (12.5), diseases of the intestinal tract (10.8%), cerebrovascular disease (9.1%), pulmonary heart disease and diseases of the pulmonary circulation (9.1%), and neoplasms (4.4%). Over time infectious and parasitic diseases have declined in importance, while cardiovascular diseases and homicides have increased in a proportionate manner. In 1996, violence (accidents, suicides and homicides) accounted for 22% of the deaths, while cardiovascular diseases and diabetes accounted for another 24%, which indicates that the epidemiological transition is also rapid (Health Sector Master Plan, 2007)

2.4 Health System

The government is committed to ensuring a quality, accessible, and sustainable health services for the people of Sri Lanka. The government continues support its long-standing policy of providing universal health services of good quality to all people in the country free of charge, at all government institutions. It has sustained a strong primary health care network that has been a pillar of strength for several decades. The health financing policy has been based on a universal tax-based model. Over time, the government has allowed the steady growth of the private sector, while increasingly focusing its own facilities on providing services to those who cannot pay and the less privileged. At the same time, the government seeks to ensure a reasonable balance between the private and the public sectors. Appendix III shows the type of public institutions all over the country.

2.5 Health Expenditure and Resource Allocation Pattern

There are significant achievements of the health sector in Sri Lanka, when compared with many developed and developing countries in the world. These can be considered remarkable taking the low per capita income and limited resources available for health in the country.

Total expenditure on health was SLR 480,495 M in 2005. This accounted to be about 4.2% of GDP. There is heavy reliance on taxation and out-of-pocket expenditure (approximately 84%) as financing sources. Government revenue is primarily from central taxation. Private expenditure is predominantly out-of-pocket expenditure; about 9% is paid by employers and individuals for private insurance, and is primarily spent on ambulatory care. Since 1990, total expenditure has been between 3-3.6% of GDP of which the Government's share was around 1.4- 1.7%. However, in the 4 years up to 2003 only 0.9% to 1.1% of GDP was spent on health by MOH. Appendix IV shows about the national expenditure on health in Sri Lanka.

2.6 Structure of Health Manpower

In the health sector manpower, numbers in most categories have increased. The government has made a decision to absorb all medical graduates passing out from the universities. Total number of medical officers rose from 6,999 in 1999 to 10,198 in 2005. Accordingly, doctors per population have increased. Medical officers per 100,000 population is 51.9 by 2005. The number of nurses per 100,000 population is 101.4. However, a shortage of qualified paramedical staff such as Pharmacists, Medical Laboratory Technicians, Radiographers, Physiotherapist and ECD Recordists still exists widely in the public sector.

There is a wide disparity in the regional distribution of health personnel in the country. The urban area has a high concentration of most categories of health personnel except public health staff. The distribution of specialists in curative services as in 2005 is presented in Appendix V. Of the specialists, 35 percent are concentrated in the urban areas. But the rural areas did not have single specialists in some areas. The absence of certain common specialists such as general medicine and surgery, obstetrics and pediatrics in some districts is also noteworthy.

2.7 Health Manpower Training

In 80s' Ministry of Higher Education estimated a figure of 1.2 million Rupees (\$13,400) to train a medical school graduate in the public university in Sri Lanka. By 2006 it has increased to 3.2 million Rupees (\$ 28,828).

Government of Sri Lanka has provided funds for the training of Medical Officers, Dental Surgeons, Assistant Medical Officers, Nurses and other Paramedical Personnel. The Medical Officers and the Dental Surgeons are trained at the universities. The Assistant Medical Officers, Nurses, Pharmacists and Medical Laboratory Technologists are trained at the universities and in other training institutions. All other paramedical personnel are trained at the training institutions coming directly under the purview of the Department of Health Services. The output of health personnel in each category are shown in Table 1.5

Table 2.5 Annual Outputs of Healthcare Personnel by 2005

Category	Duration of Training	Annual Output				
		2000	2001	2002	2003	2005
Medical Officers	5	936	610	861	889	10198
Dental surgeons	4 77		-	75	NA	NA
Nurses	3	1926	777	2958	2719	19934
Pharmacists	2	92	32	6	30	836
Medical Laboratory Technologists	2	61	34	82	37	884

2.8 Medical Education in Sri Lanka

The academic year of the Universities which follow the old system consists of three terms. The Universities which follow the semester system has two semesters per year. The date of commencement of the first term/semester of a particular academic year may vary from one institution to another or from one Faculty of an institution to another. It is planned to have a common academic year for all the universities commencing from March, in which case the academic year will be from March of a particular year to February of the following year.

According to medical education in Sri Lanka, after the entrance examination students are attached in all the universities as the conventional according to the merit scored in the entry exam (GCE Advanced Level). In the five year training period they are attached to the faculties of medicine. After completion the primary medical education in 5 years, the curriculum study in the OPD and IPD in the hospitals there is a compulsory internship of one year before full medical registration. Besides that minimum one year post intern experience is needed to sit any post graduate examination. Therefore, a new medical graduate need to be in the medical education (and practice) for minimum of seven years before engaging in any postgraduate

medical education programme. If there are any trade unions actions or civil disturbances in the country that can further prolong these time lines.

Medical education costs appear to vary widely than other university education. For all the local medical students the tuition fees and exam fees are born by the government for whole programme during their total study period of five years.

2.8.1 Postgraduate Medical Education

The Postgraduate Institute is responsible for the specialists training of all medical doctors in the country. It is a national institute which comes under the purview of the University of Colombo Sri Lanka. In addition doctors from Nepal, Moldives and Bhutan have their specialist training at the PGIM which also conducts the Diploma and MD in Family Medicine in India. In this respect it is the only education institute in Sri Lanka to conduct postgraduate examinations in a foreign country.

The Postgraduate Institute of Medicine works in close collaboration with the Ministry of Education, the Ministry of Health, Faculties of Medicine of the Universities and Professional Colleges. Administrative organization structure of Post Graduate Institute of Medicine is managed by the Board of Management which is the principal administrative and academic authority of the Institute. It is comprised 14 ex-officio members, 7 nominees from the Faculties of Medicine and 8 members appointed by the University Grants Commission.

All academic matters including preparation of prospectus formulating training programmes and standards of examinations etc. are determined by the respective Boards of study. Memberships of each board of study comprise the Director of the PGIM, 6 members elected by appropriate professional body and representatives of relevant faculties of medicine. There are 19 boards of Study conducted 63 study programmes in respect of Diplomas, Masters and Doctoral programmes.

2.8.2 Postgraduate Training

In Sri Lanka postgraduate training is conducted both locally and abroad. The Postgraduate Institute of Medicine follows the practice of awarding academic degrees, following the successful completion of the academic courses and the final examination. However, a further condition requires that a Board Certificate be obtained to ensure satisfactory professional completion. For this purpose, the trainees are granted fellowships, allowing them to undertake additional training abroad in recognized specialized institutions, depending on the specialty.

During the postgraduate training, examination fees, facilitation fee and the direct private costs should be borne by the trainees. Regulations and guidelines are different from one programme to another. However, in general, it can be divided into three parts in the training programme. The first two parts of training are done locally and the 3rd (or final stage) is the overseas training for Board Certification as a specialist in the respective specialty or sub-specialty.

Part One (1st year)

For all postgraduate training, students need to complete basic specialty training for part one examination before proceeding to other steps. Part one is a self-study period where the students need to study by themselves on the selected (or preferred) subject of choice and no formal courses are offered by the PGIM for this period. Prospective students need to do this part while doing their routine appointments/work and no study leave is granted by the MOH. Prospective students have to bear the total cost of the examination fees and if they fail the exam they can try again, for up to three attempts. The PGIM may give a mercy chance on their discretion for those who fail more than three attempts but no further attempts will be allowed. The same principles apply for the part two (clinical) examination. Amendments relating to the Part I examination or the syllabus are issued 6 months prior to the closing date for entry.

Part Two (2nd & 4th years)

Upon passing the part one (MD or MS) of any selected subject, the student will qualify to enter the part two training programme conducted by the PGIM, where the student will be attached to one of the teaching hospital units recognized by the PGIM for next three years. There are rotational clinical appointments before sitting their part two examination. During the three years period of clinical training the student has to work as a registrar in the attached units and the usual medical officers' salary will be paid by the MoH. The students have to be certified by the supervising lectures regarding their clinical appointments before the exam and they (students) need to provide a "case book" to the PGIM on the rotational appointments completed by them. Upon successful completion of the part 2 training programme students need to sit the final examination in the respective field (MD or MS).

Part Three (5th & 6th years)

After passing part two examination, post-MD training will consist 12 months local and overseas training. As same, it will take minimum one year period to find an overseas job or placement for the part three to do an overseas training. The overseas training period is a requirement of the postgraduate training by the PGIM in Sri Lanka to become a board certified specialist in the relevant field. Minimum duration for overseas training for part three is one year, but most trainees stay for two years (depending on the place & the county of training). Some trainees (the majority) will do a paid job during this period in the center they are attached, while others may follow the training without a paid job (only as a postgraduate attachment). Ministry of Healthcare undertakes to pay for the overseas training of all Ministry of Health doctors including monthly living allowance, return air ticket, book allowance and other incidental costs (such as insurance fees if required) which is provided as the scholarship package. However, Ministry of Healthcare allows maximum of two years period (on paid leave, for those who don't do a paid job), for the overseas training period, other than for some subspecialties where this period may be longer.

If someone get through all the exams and training periods without any delay, to complete postgraduate qualification (MD/MS) it will take minimum of six years.

CHAPTER III

LITRETURE REVIEW

3.1 Economics of Education

In economics view, education can be both consuming and investment. Education is regarded as an investment, as a resource for producing more products and services, or a better quality leading to increasing their income and better job selection (Smith, 1952). The literature review identified studies that found a direct link between the human capital and economic growth, whilst other studies produced inconclusive results (Haukka, 2005). In the recent presidential campaigns, both president Clinton and former president Bush emphasized the importance of improving the education and skills of American workers, from using the term "investment in human capital" to describe the process of improving the quality of the labour force (Baker, 1992).

3.2 Cost Theory

3.2.1 Definition of Costs

The cost of goods or services is the value of the resources spent for the acquisition of those goods or services, which may be expressed as a monetary or non-monetary value (Carrin and Evlo, 1995).

Economists define cost as the value of resources used to produce something, including a specific health service or a set of services (as in a programme) (Creese and Parker, 1991). There is a difference between economists and accountants in relation to the concepts of costs and profits. The data for decision making with respect to costs typically does not come from economists but from an accountant.

3.2.2 Classification of Costs

Expenditure by a health facility may be classified in two major economic categories: recurrent expenses and investment expenses. Recurrent expenses comprise expenditure on goods and services that do not last for more than one year, while

investment expenditure is for the acquisition of goods and services that usually last for more than a year (Carrin and Evlo, 1995).

3.2.3 Costs by activity

The total cost of the activities of a health facility is the sum of the costs incurred by all the departments of the health facility. It must be made between direct and indirect costs (Carrin and Evlo, 1995).

3.3 The Cost of Education

Several studies have found that the social rate of return is highest for primary education, followed by secondary and tertiary education (Psacharopoulos, 1994 cited by Gupta, 1999). At the same time, ample evidence suggests that allocations for tertiary education in many countries are inappropriately high (World Bank, 1995).

Allocations in favor of education and health can boost economic growth while promoting equity and reducing poverty. (Barro, 1991, Chu and others, 1995, and Tanzi and Chu 1998 cited by Gupta, 1999)

Many studies show that the relationship between public spending for education and measures of education attainment is weak. (Landau 1986, Noss 1991, Mingat and Tan 1992 and 1998, and Flug, Spilimbergo, and Wachtenheim 1998 cited by Gupta 1999).

3.4 The Cost for Medical Education

The costing methodology literature relevant to medical education is very limited and is almost entirely from the developed world (Smith et al. 1994 cited by Bicknell *et al.* 2001)). The overarching feature of these methodologies was an emphasis on determining, through analysis of the curriculum, the proportion of faculty hours dedicated to teaching medical students. One study clearly stated, 'all data were based on faculty contact hours (FCHs), the primary driver of cost (Rein *et al.* 1997). From review of the literature it is clear that there are no more than

a handful of medical education cost analysis reported from outside the United States and no more are recent (Bicknell *et al.* 2001).

There is recognition that education has a cost and resources are available from universities and hospitals to support the teaching activities of academic departments. To design, deliver and audit a teaching programme it is necessary to allocate specific responsibilities for education to both clinical and administrative staff. Provided that teaching quality proves to be adequate, the costs of implementing a teaching programme should be recoverable from the university and/or hospital. (Aittenhead, 2002)

In some countries the government pays money to teaching hospitals to compensate them for the costs of teaching undergraduate medical students; in the United Kingdom this payment known as SIFT (Special Increment for Teaching). For a large teaching hospital this sum may amount to several million euros annually. Academic departments should be able to bid for a proportion of this money to support the salaries of academic staff who play a major role in the organization and/or delivery of undergraduate teaching (Aittenhead, 2002).

3.5 The Analysis of Cost of Medical Education

Bicknell *et al.* (2001) studied the full costs of medical education in Thai, Binh medical school in Vietnam. They explained about the full cost per medical graduate in 1997 was 1 11 462 989 Vietnamese Dong (US \$ 9527). The relative expenditure per Vietnamese physician educated was 2.8 times the expenditure in the United States when adjusted for GNP per capita. Preliminary findings suggest that, within Vietnam, the cost to educate a physician is 14 times the cost of educating a nurse.

The economic returns of specialty training are often quite high. Just as can analyze the decision to enter medical school as an investment, so can we analyze the decision to specialize. Marder and Willke (1991), Burstein and Cromwell (1985), and Sloan (1970) have estimates of these economic incentives that are remarkably similar, despite the studies' reliance on data from quite different periods (pre-and post-Medicine). In essence, if a doctor goes immediately into private practice instead of

specializing, a certain expected path of income is achievable. If the doctor specializes, some added years of training take place, at reduced incomes (during the period of residency), and then the doctor can earn higher incomes. The internal rates of return for specialization substantially exceed competitive returns, particularly for the surgical specialties (Charles, 1997).

If expenditures on higher education are treated as an investment in human capital and the increment to earnings received in the job market as a return on that investment, the rate of return received on investments in higher education can be calculated. Utilizing that approach, Weeks *et al.* (1994) compare the rates of return on educational investments for various professionals, including physicians. According to their results, primary care physicians receive an annual rate of return of 15.9 percent on educational investments over a working life, while specialists receive a 20.9 percent return. As a point of comparison, the authors find that businesspeople and attorneys receive a 29.0 and 25.4 percent rate of return, respectively. These findings imply that physicians receive a rate of return on investments in education almost equal to, if not less than, that of other professionals (Neun & Santerre, 2007).

The common theme in the literature is the difficulty in determining how much of the work in the clinical facility can reasonably be recognized to the medical education function (Goodwin *et al.* 1997). The problem is not just that the teaching hospital is a separate institution, with separate overhead structures and staffing patterns, but also that much of the clinical work that is performed at a teaching hospital serves both a patient care function and an educational function. Rein *et al.* express it powerfully; Although it is indeed a wonderful aspect of medical education that both can be accomplished at the same time, for purposes of accounting it is necessary to try to assign the fraction of the time attributable to each endeavor separately (Rein *et al.* 1997).

3.6 Process in Analysis of Cost of Education

Many studies have analyzed about the cost of education. There are four steps involved in cost of education.

1. Cost centre identification and grouping
2. Direct cost determination of each cost center
3. Defining allocation criteria
4. Full cost and unit cost estimates

The details of each step as follows:

1. Cost centre identification and grouping

It is necessary to understand the organogram of the institute, structure and functions of all units.

- Administration Unit
- Education Unit
- Education Supporting Unit
- Curative Unit

2. Direct cost determination of each cost center

The total direct cost of each cost center consist of three components.

- Labour Cost (LC)
- Material Cost (MC)
- Capital Cost (CC)

3. Defining allocation criteria

Appropriate allocation criteria has to be defined and the allocation factors have to be collected in order to allocate the total direct cost. It should be noted that allocation criteria and allocation factors are more sensitive and significant to the final figure of the unit cost than the allocation technique (Boyles, 1982).

4. Full cost and unit cost estimates

In order to determine unit cost calculation, is the summation of direct cost and indirect cost divided by total number of outputs.

3.6.1 Allocation methods

There are four allocation methods for allocating shared (or overhead) costs are available, namely: Drummond,1998).

- (1) *Direct allocation* (ignores interaction of overhead departments). Each overhead cost (e.g. central administration, housekeeping) is allocated directly to final cost centers (e.g. programmes like day surgery; departments like wards or radiology). Programme X's allocated share of central administration is equal to central administration cost times. Note programme X's proportion is Programme X's paid hours divided by total paid hours of all final cost centers, not total paid hours for the whole organization. The latter method would underestimate the costs in all final cost centers;
- (2) *Step down allocation* (partial adjustment for interaction of overhead departments). The overhead departments are allocated in a stepwise fashion to all of the remaining overhead departments and to the final cost centers;
- (3) *Step down with iterations* (full adjustment for interaction of overhead departments). The overhead departments are allocated in a stepwise fashion to all of the other overhead departments and to the final cost centers. The procedure is repeated a number of times (about three) to eliminate residual unallocated amounts;
- (4) *Simultaneous allocation* (full adjustment for interaction of overhead departments). This method uses the same data as (2) or (3) but it solves a set of simultaneous linear equations to give the allocations. It gives the same answer as method (3) but involves less work.

3.7 Past Studies on Cost of Producing Healthcare Personnel

Data from the study of Ministry of University Affairs estimated a figure of 1.8 million Baht to train a medical school graduate in a public university, slightly lower for a dentist (1.62 million Baht), for a pharmacist 0.9 million Baht and 0.16 million Baht for a nurse while the cost of production in two private universities are 1.1 – 0.3 and 0.21 million Baht respectively. For the cost of producing one medical doctor, the government could produce twice as many pharmacists and eleven as many nurses (Wibulpolprasert 1997, cited in Vimolket 2001, p.11).

The cost to produce a doctor in Thai-Bia is 14 times more than the cost to produce a nurse in Hanoi at a secondary medical school and the expenditure per curriculum hours for a nurse is approximately \$0.34 versus \$1.63 for a physician (Bicknell *et al.* 2001). Costs for other allied health personnel such as x-ray and pharmacy technicians are similar to the costs of nursing education (Bicknell and Tham 1998).

Production cost of physician in pre-clinical level of Faculty of Medicine, Chulalongkorn University also studied by Chaimongkol. She has found that 29.5 percents of the Faculty budget was used by the pre-clinical level. The cost for the first year was Baht/71,676/person/year, the second year was Baht192,647/person/year and third year was Baht381,617/prson/year (Chaimongkol, 1996).

Cost of production a medical student at Chulalongkorn University studied by Thosporn Vimolket. The cost centers were categorized into administration unit, education supporting, education unit and hospital unit. The unit cost per enrolled student was Baht2,161,124 and Baht 8,217/Student Credit hours(SCH), while the unit cost per graduate was Baht 2,174,091 and Baht 8,267/SCH. The labour cost accounted for 69.46%, capital cost 26.42% and material cost, 4.12% are the total cost for production of medical student. The three most costly Departments were Medicine (13.24%), Obstetrics and Gynecology (11.73%) and Pediatrics (9.87%) (Thosporn Vimolket, 2000).

Charutsingha studied unit cost of production of physician at the clinical level of the faculty of medicine, Chulalongkorn University from the perspective of providers. All units of Faculty of Medicine were classified into four cost center categories: administration unit, education unit, curative and education supporting unit. The average cost of physician of the 4th, 5th and 6th academic years was Baht281,677/person/year. In practical part, the average cost of the 4th, 5th and 6th academic years were Baht 5,523/person/year, Baht22,275/person/year and Baht6,187/person/year respectively. The total cost of production a physician at clinical level was Baht784,182 (Charatsinhga 1996).

The United States experienced, a total of 353,742 physicians were in the United States in 1975. That number had increased by more than 120 percent to 871,535 by 2003. Almost 80 percent of all physicians, 691,873, were involved in direct patient care in 2003. The remaining 20 percent of the physicians were engaged in other activities such as medical teaching, administration, or research. It is apparent that the United States experienced a significant increase in physician labour over the last three decades. The increase outpaced the overall increase in the population and has led to a greater relative supply of labour, as measured by an increase in the physician-to-population ratio (Neun & Santerre, 2007).

3.7.1 Past studies on tuition fees of health care

According to the Ariyan 2000 cited by Vimolket 2000, P14, for tuition fees in the United States, most medical schools have been able to keep tuition at 4 to 6 percent of their budgets, these budgets have increased at a rapid pace over the past 25 years. Although it is admirable that tuition makes up only a small percentage of the annual budget of most medical schools, the actual dollars in tuition are significant because of a real and market increase in these budgets and are far in excess of the cost of inflation. Total tuition costs in the United States between 1970 and 1990 increased from \$63 million to \$840 million. The total cost of tuition and fees between 1990 and 1996 alone increased from \$11.1 million to \$16.6 million and increased by 50 percent.

Most physicians in the United States continue their training beyond that required by law to obtain a license to practice medicine. Most doctors continue for further training in order to become eligible to take voluntary certification examinations offered by specialty boards, that is, organizations that administer advanced tests in special areas of medical competence. Board certification adds many years to a doctor's period of training. Almost all specialty boards require at least three years of training beyond the four years of medical school. Some complicated surgical (such as neurosurgery) have requirements extending for seven or more years beyond medical school. Some doctors still further training in fellowships to learn specific techniques or to become more adept in an area of research (Phelps, 1997).

This specialty training takes place in residency programs in hospitals throughout the United States. Almost all of these residency programs have some affiliation with a medical school, although in many programs the affiliation is quite weak and the residency training is provided "on a voluntary basis" by the doctors on the hospital's medical staff, rather than by full-time medical school faculty. Each specialty board approves the corresponding residency program, and successful completion of such an approved residency is a prerequisite to taking the final specialty board qualifying examination (Phelps, 1997).

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CHAPTER IV

RESEARCH METHODOLOGY

4.1 Research Design

This is a descriptive study using the secondary data to analyze the programme cost of the medical specialty training programme of the Postgraduate Institute of Medicine for the year 2007. The data were collected from the hard copies and database from the Postgraduate Institute of Medicine and the Ministry of Healthcare and Nutrition. Cost information's were collected starting from January to December 2007. Cost analyzing was focused on provider perspective as Postgraduate Institute of Medicine, Ministry of Health care and the trainee. This study analyzed the cost of Medical Microbiology training programme as one of the medical specialty training conduct by the Postgraduate Institute of medicine.

4.2 Population and Sample

The population of this study was 28 cost centers of the Postgraduate Institute of Medicine. It was categorized as follows,

General administration unit	Lecture hall I
Lecture hall II	Confidential room
Computer Unit	Laboratory
Academic Division	Auditorium
Examination Division	New Board room
Finance division	Stores
Library	Reception area
Conference room (Exam.)	Lobby area
Conference room (Gen.)	Postal section
Old Board room	Machine room
Tutorial I	Maintenance room
Tutorial II	Canteen
Tutorial III	Cleaning section room
Medical Education Resource Center (MERC)	
Security section room	

* Hospital unit was not included due to the difficulties in obtaining data.

4.2.1 Data collection

Permission was obtained from the Director of the Post graduate Institute of Medicine before going for the data collection. Secondly got some view of functions of each cost center from the relevant administrative officers attached to each cost centers. Finally the following officers from the each unit were interviewed;

Academic & Examination Division:

Deputy Registrar, Senior Asst. Registrar
 Officer in- charge of Medical Microbiology programme
 Officer in-charge of Medical Paracitology programme
 Officer in-charge of General Medicine programme
 Officer in-charge of Board of Study in Medical Microbiology
 Officer in-charge of the Board of Management
 Officer in-charge of conduct annual examinations for Medical Microbiology programme
 Officer in-charge of overseas training programme
 Officer in -charge Core Group meetings in Board of Study in Microbiology

General Administration Division:

Assistant Registrar
 Officer in-charge of capital items for all units
 Officer in-charge of bills for water, electricity, telephone, internet etc.
 Officer in-charge the data base at the computer unit
 Officer in-charge Medical Education Resource center

Finance Division:

Deputy Bursar, Assistant Bursar
 Officer in-charge of salaries for the institute
 Offer in-charge the expenditure reports (Book Keeping)
 Officer in-charge the stores

Library Services:

Senior Asst. Librarian
 Officer in-charge the journals in Library
 Officer in-charge the books in Library

Ministry of Healthcare & Nutrition:

Officer in-charge the overseas training programme for postgraduate medical training at the medical services Unit in the Ministry of Health care & Nutrition

Other:

Trainee who is following the Medical Microbiology programme
 Trainee who has completed the Anesthesiology programme
 Trainee who has completed the Radiology programme

4.2.2 Data collection tools

Data collection forms were used as tools for this study for each cost and respective center as follows:

- Data collection form for salaries and other allowances
- Data collection form for water, electricity, telephone, internet
- Data collection form for vehicles, photocopy machines, fax machine, computers & accessories, furniture, air conditioner etc.
- Data collection form for traveling claim
- Data collection form for Lecturers fee
- Records of number of postgraduate trainees
- Regulations and guidelines pertaining to the study programmes
- Microsoft Excel programme for analysis

4.2.3 Source of data:

The following records were used as source of data

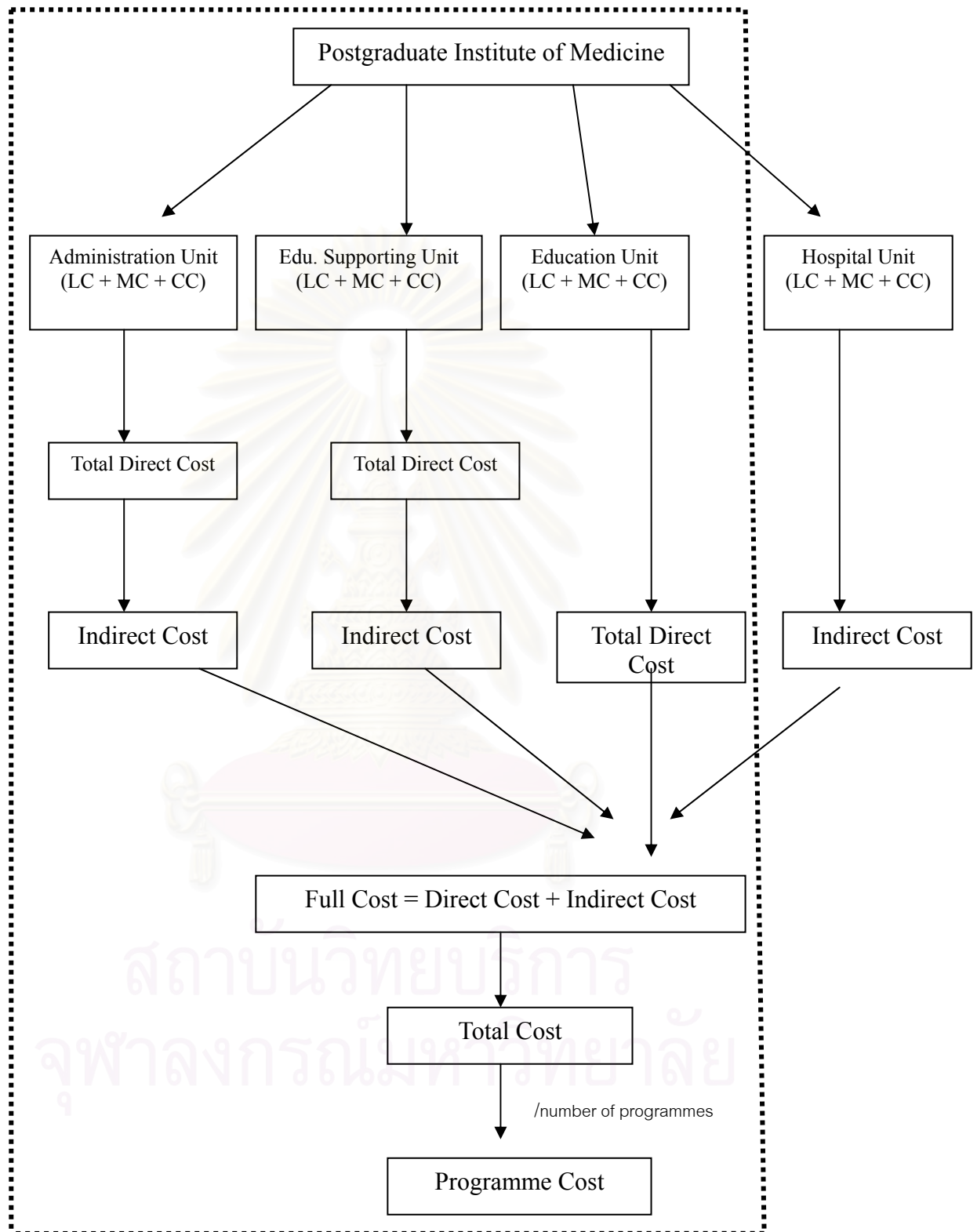
- The organization structure and the functions of each division in the institute.
- Annual recurrent expenditure by objects in 2007
- List of the administrative staff in each unit of the institute
- Labour cost information obtained from the finance division.
- Capital cost information obtained from the general administration unit from their data base.
- Number of medical specialty training programmes, number of study programmes and the course outline received from the academic division
- Regulations and prospectors pertaining to the Medical Microbiology programme obtained from the academic division.
- Information about the examination fee, registration fee, procedure for overseas training, core-group meetings, etc. collected from the examination division.
- Information about the traveling and the subsistence collected from the academic division and examination division

- Information about the lecture fee, coordinator fee and the fee for external (foreign) examiner obtained from the examination division and the academic division
- Information of Board of Management and Board of Study in Medical Microbiology and their responsibilities obtained from the academic division
- Cost for the library books obtained from the main library from their annual expenditure.
- Cost of the text books for the Microbiology programme obtained from the trainee is following the programme currently.
- Expenditure for the overseas training obtained from the medical services unit of the Ministry of Healthcare
- The number of trainees enrolled per year and the number of specialist Board Certified in different specialties obtained from the institutional data base and the general administration unit.
- The number of trainees not returning to country after the overseas training and their field of specialized obtained from the general administration unit.
- The allocation criteria defined after observing the functions and activities in respective unit in the institute.

4.3 Conceptual Framework

Figure 4.1 presents the conceptual framework of this study relates the costing methodology of the study. The costing study was carried out according to the direct allocation method. First part shows about the analysis of the institutional organization structure followed by the cost centre identification and compiling of total direct cost of each cost centre. The total direct cost of administration unit and education supporting unit pass towards to education unit and hospital unit according to an allocation criteria where by full cost of each cost centre of education unit and hospital unit are determined and programme cost can be obtained at the end of analysis. However, this study didn't analyze the cost of hospital unit other than the other three cost centers; administration unit, education supporting unit and education unit

Figure 4.1 Conceptual Framework



LC = Labour Cost

MC = Material Cots

CC = Capital Cost

DC = Direct Cost

IDC = Indirect Cost

4.4 Methodology

The methodology of the study based on programme cost, using direct allocation method. There are four main steps to involve in the standard costing methodology (Tisayaticom *et al.* 2007).

First Step -Cost Centre Identification and Grouping

Cost centre identification is the primary and important step of cost analysis of the institute. An analysis was based on institutional or organizational structure and functions of all units in the institute (Figure 4.2). This was done after careful observation of institutional organization structure and discussion with the academic personnel, administrative officers and non-academic staff. Each unit of the institute was classified into cost centres according to its functions, responsibilities, use of resources and output. According to that, all the units in the institute were classified into four groups: (Table 4.1)

1. Administration Unit

These cost centres were responsible for the management and supporting functions of the remaining cost centres. There were 13 cost centres that can be included in this category. These centres do not generate tangible revenue to the institute, other than to assist the functions and activities of the institute.

2. Education Unit

The cost centres included in this category provide educational and supplementary service to the trainees. These cost centres are producing income to the institute by collecting fees directly from the trainee. Whilst all these centres do not collect fees for all services from the trainee as the institute being a public institute. According to that this centre can be called as revenue producing cost centre. It can be included academic division, examination division, confidential room, laboratory and conference room to this group of cost centre.

3. Education Supporting Unit

This cost centre is responsible for academic authority and the administrative authority in the institute. They offer service to both academic and non-academic personnel. They provide service directly to the academic section with developing regulations and guidelines pertaining to the study programmes. Ultimately, they make available service to the hospital unit.

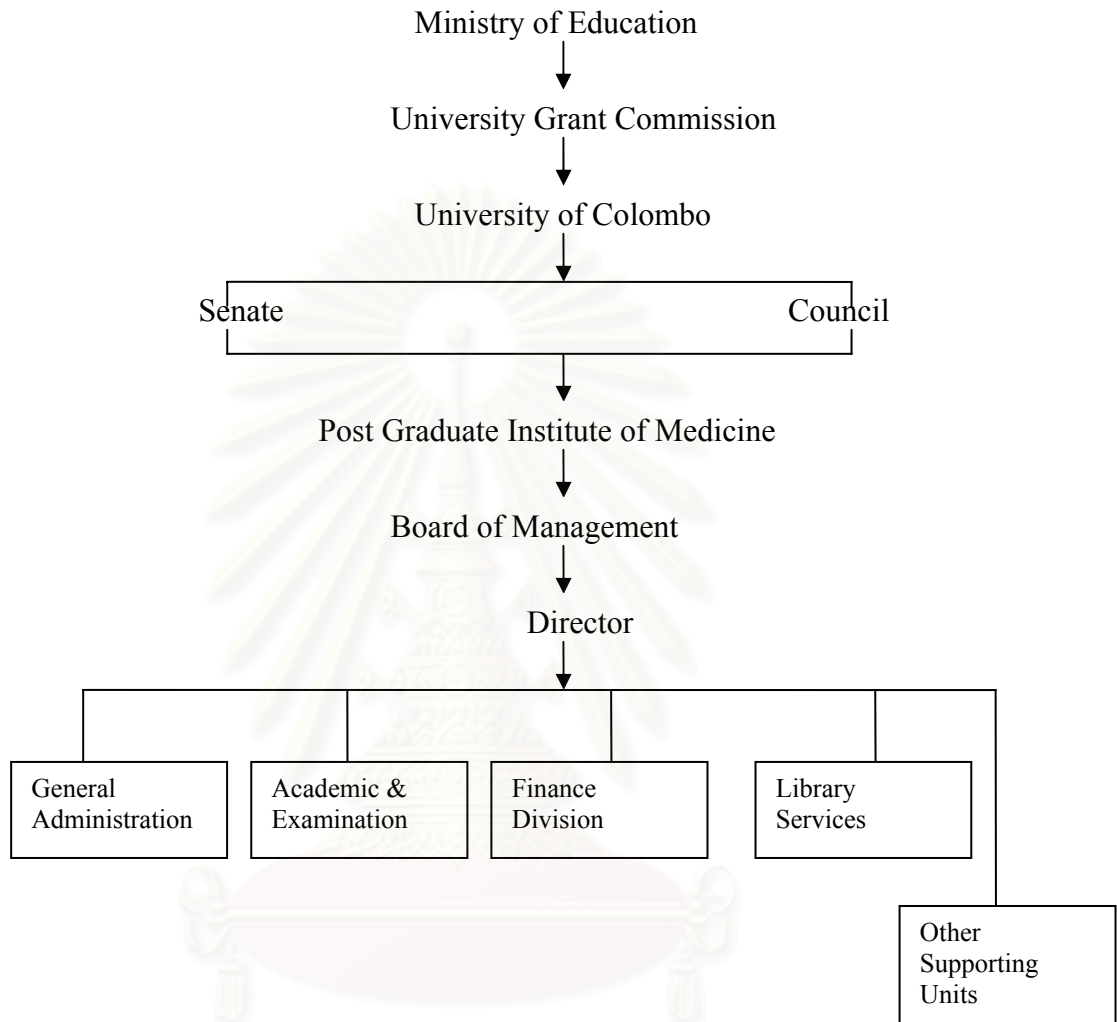
4. Hospital Unit

This cost centre can be divided into two groups as outpatient department and inpatient departments. As a trainee provide service directly to the patients during their training period. This study does not analyzed the hospital cost during the training of postgraduate trainees at the hospitals.



สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Figure 4.2 Organization Structure of Postgraduate Institute of Medicine



สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Table 4.1 Categories of Cost Centres in the PGIM

Category	Name of the Cost Centre	
Administration unit	General administration unit	
	Reception area	
	Auditorium	Finance division
	Conference room	Lobby area
	Postal section	Maintenance room
	Machine room	Canteen
	Stores	Security section
	Cleaning room	
Education Unit	Academic Division	Examination Division
	Confidential room	Conference room
Education Supporting Unit	New Board room	Old Board room
	Tutorial I	Tutorial II
	Tutorial III	Lecture hall I
	Lecture hall II	Library
	Laboratory	
	Computer unit	
	Medical Education Resource Center (MERC)	
Hospital Unit		

Second Step - Direct Cost Determination of Each Cost Centre

In the second step the direct cost was calculated in each cost centre separately. There are three main types of cost involved in the total direct cost of each cost centre. Cost was categorized as labour cost, material cost and capital cost. For each cost center, labour cost, material cost and capital cost was compiled respectively. With summation of all three costs determine as the total direct cost.

Due to data limitations, the term of “cost” is used through out of this study but it should be interpreted as “expenditure”.

Labour cost:

List of the personnel working in the institute was obtained from the finance division to compile the labour cost for the year 2007. They were categorized into academic staff and the non-academic staff. Majority of the personnel comprised to the non-academic staff and few personnel included to the academic staff as the

permanent staff of the institute. Salaries and wages of personnel in each division were collected for the year 2007. Other than the salaries they acquire several allowances and other fringe benefits according to their profession and the seniority. Academic personnel get academic allowance and non-academic personnel get language professional allowance. In addition to that all the staff obtains cost of living allowance per month. Few of non-academic personnel acquire acting pay for working more than one cost centre. As same non-academic staff get overtime in addition to other allowances.

Material cost:

Material cost of each cost centre collected as supplies, services, maintenance and other. Whilst material cost was included all the cost incurred other than the labour cost and capital cost.

Supplies

It was included stationery and office requisites, mechanical and electrical goods, uniform and tailoring charges. Expenditure for stationery and office requisites for each cost centres collected from the finance division. Store distributes all the stationery and office requisites to other cost centres. It is responsible to send all the supplies whenever needed urgently. Cost of the fuel and lubricants obtained from the expenditure reports. Expenditure was divided respective cost centres in proportion to calculate total expenditure equivalent. Institutional recurrent expenditure reports make used to obtain the cost information of annual expenditure in the institute.

Services

Expenditure for the electricity and water was collected from the general administration unit and calculated for the whole year. Then it was divided among cost centres according to the floor area in square meter in each cost centre. Total floor area of the institute collected from the general administration unit. Due to the difficulties in obtaining the plan in the institute, total square meters were divided in proportion among the respective cost centres. There were only two buildings in the institute, one was four storey building and another one was two storey building which was very old building. However, when measure the common areas such as, lobby area, reception

are, walk ways, car park and garden also included to the total cost as all the cost centres use those general space area in same manner.

After calculation the utility cost for one square meter and it was multiplied by the total square meter in each cost centre.

$$\text{Utility cost for a Square Meter} = \frac{\text{Total Utility Expenditure for the year}}{\text{Total Floor Area (m}^2\text{)}}$$

$$\text{Utility Cost for Respective Cost Centre} = \frac{\text{Utility cost for square meter} \times \text{Floor area of respective cost centre (m}^2\text{)}}{\text{Floor area of respective cost centre (m}^2\text{)}}$$

Cost information for the telecommunication and the postal charges for respective cost centre collected directly from the annual recurrent expenditure reports. Expenditure for the transport services, tax to local authority, cleaning services and security services divided in proportion in respective cost centres to calculate total expenditure.

Maintenance

Expenditure for maintenance of vehicles, buildings and structures obtained from the recurrent expenditure reports and divided in proportion among each cost centre to calculate total expenditure. Expenditure for maintenance of plant, machinery and equipment in respective cost centres was obtained directly from the annual expenditure reports.

Other

Expenditure for traveling and subsistence, staff development, Newspapers and Magazine and convocation in respective cost centre was obtained directly from the annual expenditure reports.

Capital Cost

Capitals are considered as equipment, vehicles, furniture, building and library books. There were two separate buildings in the institute. One was four storey building and another one was two storey building which is very old building. Building cost was based on the proportion of floor area occupied in each cost centre. Annual cost for building was calculated with using annualization factors. Cost for the two story building was not calculated as it was built more than 30 years ago. Only the finance unit was housed in that old building.

Cost information of the vehicles, computers and accessories were obtained from the general administration unit and the database in the institute. According to the price and the purchasing date, it was calculated annual cost for each item with using annualization factors. In the calculation of furniture cost, the furniture in public area, lobby area and reception area also included to the programme cost with using the annualization factors.

After observing the expenditure for the library books, it was able to find the cost for journals in different medical specialty training programmes. Whilst it was difficult to find the cost of books in different medical specialty training programmes for each programme due to unavailability of records and most of books received as donation. Cost of the books and journals for Medical Microbiology training was able to get after having discussion with the trainee who is following the programme currently.

When calculating the annual cost for each capital items, it was used the annualization factors with 5 percent discount rate was used.

Building	30 years (Tisayaticom et al, 2007)
Vehicle	10 years (American Hospital Association, 1978)
Office furniture	15 years (American Hospital Association, 1978)
Computers & accessories	5 years (American Hospital Association, 1978)
Air Conditioner	5 years (American Hospital Association, 1978)

The following formula applied to estimate the cost for capital items.

$$E = \frac{C}{A(y,r)}$$

E = equivalent annual costs

C = current value

A = annuity factor

y = life span of the capital

r = discount (interest) rate

Third Step – Allocation Criteria

The allocation criteria based on the service of administration and education supporting unit provide to other cost centers. Therefore a appropriate portion of cost was allocated to education unit and the hospital unit from the administration and education supporting unit. Table 4.4 shows the allocation criteria for each cost centers

Table 4.4 Allocation criteria of Postgraduate Institute of Medicine

Cost Center	Allocation Criteria	Source of Data
General Administration	Number of Personnel and Students	Retrieve from statistic electronic data
Computer unit	Number of Personnel and Students	Retrieve from statistic electronic data on students and study programmes
Finance Division	Number of Personnel	Annual recurrent expenditure by objects.
Library Services	Number Students and Personnel	List of medical specialty training programmes
Supporting Units	Number Students and Personnel	List of students and study programmes

Forth Step – Full Cost and Programme Cost Allocation

The allocation of cost from administration unit and education supporting unit to the education unit and hospital unit was done by direct allocation method.

$$\text{Total Cost} = \text{Labour cost} + \text{Material cost} + \text{Capital cost}$$

The total cost was divided by the number of specialty training programmes to calculate programme cost for one specialty training programme.

$$\text{Programme Cost for one Medical Specialty Training} = \frac{\text{Total Cost}}{\text{Number of Programmes}}$$

However, to determine the programme cost for Microbiology training, the programme cost of one programme which was estimated for each medical specialty training programme was summed up with the direct cost of Microbiology training programme.

4.5 Programme Cost for Medical Microbiology programme

Postgraduate Institute of Medicine conducted 44 medical specialty training programmes among 1456 trainees in 2006. Out of that Medical Microbiology programme is one of the medical specialty training programme conducted by the institute. It is a 3-part training programme with 6 years curriculum conducted by the Board of Study in Microbiology. Diploma in Medical Microbiology is the first stage of this training programme

Selection examination for Diploma in Medical Microbiology

Selection examination is the acquisition of the Diploma in Medical Microbiology training programme. Cost information of the examination was obtained from the examination division. The cost for selection examination includes examination fee, registration fee, expenses incurred to conduct the examination, for the advertisement and the relevant text books for the selection examination. In this

stage cost has to be borne by the trainee as well as the institute for the selection examination.

Diploma in Medical Microbiology

Diploma in Medical Microbiology is the first stage of a 3-part training programme conducted by the Board of Study in Microbiology (Appendix VIII) Academic division provided the regulations and prospectors pertaining to the training programme and the programme outline. Information about the course fee which have to pay by the trainee, obtained from the person who was handling the Medical Microbiology programme in the academic division. Cost of the text books for the Diploma in Medical Microbiology training obtained from the trainee who is following the course currently.

The Diploma in Medical Microbiology examination conducts at the end of the training programme. It consists of a written examination, a practical examination and an oral examination. Examination division provided the cost information of examination including cost for traveling and subsistence which the cost has to be borne by the institute. Trainee also has to pay the examination fee and the registration fee for this examination.

MD in Microbiology

MD in Microbiology is the stage 2 of a 3-part training programme in the field of Microbiology (Appendix IX). Regulations and guidelines obtained from the academic division. It was included dissertation and the 3 years in-service training programme for verification of satisfactory bench work. Course fee obtained from the academic division for MD in Medical Microbiology training. Trainee has to pay the course fee for 3 years. Academic division provided the schedule for practice bench skills during the 3 years in-service training period in different hospitals. In this study hospital cost was not analyzed due to unavailability and inconsistency.

MD in Medical Microbiology examination is held after completing the 3 years in-service training. The trainee should be submitted a report on the research project in the form of a dissertation at least six months before the MD examination. Trainee has to pay the registration fee, examination fee and the dissertation assessment fee for this

examination. Cost for the text books for this examination obtained from the trainee who is following this training currently. Foreign examiner need to participate for this examination and cost information obtained from the examination division from the officer in-charge the Medical Microbiology programme.

Board Certification as a Specialist

After completing the MD examination, Board Certification is the final and third stage of a 3-part training who wishes to become a specialist in the field of Medical Microbiology. It is consisted 12 months of training locally as a Senior Registrar and 12 months of training at a recognized center overseas approved by the PGIM. Center overseas supervisor is required to send progress report on the trainee (Appendix X). Regulations and guidelines for the overseas training obtained from the examination division. Cost information for the overseas training acquired from the medical services division in the Ministry of Healthcare.

Board of Management

The Board of Management consists of the Secretaries of the Ministry of Health, Ministry of Education, representatives of the Ministry of Finance, the Chairman/UGC, the Director General of Health Services, Deans of all Faculties of Medicine and eight nominees by the University Grant Commission from among the distinguished professionals in the country. Seven selectees from Faculties of Medicine and Faculty of Dental Sciences from among Heads of Departments. General Regulations and guidelines pertaining to the study programmes approved by the Board of Management and the University of Colombo Senate and Council. Board of Management distributes their service among all the Boards of Study and the training programmes. 29 members are included for the Board of Management and the meeting is held once a month. Cost information for the meeting obtained from the academic division. It was included per-diem for members, conference room facilities, traveling and subsistence (Appendix XIII).

Board of Study in Microbiology

Diploma in Medical Microbiology and MD in Microbiology conduct by the Board of Study in Microbiology. It develops regulations and prospectuses pertaining to the field of study in Microbiology training programme. 20 members are included for this Board of Study with a designated chairman and secretary. Board of Study meets once a month. Cost for these meetings obtained from the academic division. It was included per diem for members, conference room facilities, traveling and subsistence for board members (Appendix XIII and Appendix XIV).

MCQ Core Group meeting in Board of Study in Microbiology

MCQ Core Group meeting is held by Board of Study in Microbiology once a month among 12 members. It is responsible to develop Multiple Choice Questions (MCQ) with meeting once a month. Members are paid for preparing MCQ in these meetings. Cost information obtained from the examination division including payments for MCQ, conference room facilities and traveling and subsistence for members.

Sensitivity Analysis

To calculate the adjusted programme cost with 10% and 15% of rate of exclusion of non-returnees after overseas training, the following formula was used.

For 10 percent;

$$AC = TC / 1-NR$$

TC = Total Cost per Programme

NR = Non-returnees (10% non-returnees)

AC = Adjusted Cost

For 15 percent;

$$AC = TC / 1-NR$$

TC = Total Cost per Programme

NR = Non-returnees (15% non-returnees)

AC = Adjusted Cost

CHAPTER V

RESULTS AND DISCUSSION

In the previous chapter, programme cost and cost for medical microbiology training were developed. The average cost and proportion of each cost have been identified among the cost centers. This chapter provides the result of the analysis of programme cost for postgraduate medical education. Moreover, the programme cost of the medical microbiology programme as one of the medical specialty training programme. Cost analyzing was focused on provider perspective as Postgraduate Institute of Medicine, Ministry of Healthcare and the trainee.

5.1 General Data

Postgraduate Institute of Medicine is responsible for the specialist training of all medical doctors in Sri Lanka. The cadre of the PGIM consisted of 115 posts for the year 2005. Whilst in the year 2007 total number of 74 staff worked in the institute with remaining vacant posts. Majority of the staff attached to the non-academic staff and few officers attached to the academic staff as the permanent staff. Table 5.1 shows that the categories of staff attached to the Postgraduate Institute of Medicine. Other than the permanent personnel, local and foreign examiners and lecturers participated as resource persons for workshops and examinations conducted by the institute. Their contribution was most important to complete the postgraduate medical education fruitfully. Foreign examiners comprised of 37 from UK, 4 from India, 3 from Australia, one each from Malaysia, Singapore, Pakistan and New Zealand were invited for the MD and MS examinations during the year under review.

Table 5.1 The Distribution of Different Staff Categories in the Postgraduate Institute of Medicine

Nu	mber
Director	1
Academic Staff	2
Academic Supporting Staff	1
Administrative Officers	7
Clerical Staff	46
Office Assistant	14
Drivers	3
Total	74

PGIM is the only national institute specialist training of all medical doctors in Sri Lanka. General Regulations of the PGIM were revised and approved by the Board of Management and the University of Colombo Senate and Council. The academic authority of the PGIM is the Senate of the University of Colombo and the administrative authority is the Council of the University of Colombo. In this respect PGIM conducts 51 medical specialty trainings under 19 Boards of Study (Appendix VI). Boards of Study continued to plan and execute study programmes in respect of Diplomas, Masters and Doctoral programmes. Enrollment of trainees is different one from the other specialty training. The Boards of Study is responsible for selection the number of trainees in each specialty training. 19 Boards of Study in different specialties continued their meetings once a month and 11 meetings were held for Board of Study in Microbiology. As same as MCQ Core Group Meetings were held by different Boards of Study and 10 meetings were held for Board of Study in Microbiology. Ten meetings (10) of the Board of Management were held in 2007.

PGIM arranges the training programmes according to the curriculum and guidelines and conduct the examinations on time as the national institute. Eighty five examinations were conducted in 21 specialties in respect of Diplomas, Masters and Doctoral programmes during the year. The trainee has to contribute amount of cost as registration fee, examination fee, facilitation fee, personnel expenses etc. during

his/her local training. After completing the local training, Ministry of Healthcare facilitates for overseas training to get the board certification.

According to the institutional information, 5170 postgraduate trainees have been trained in different medical specialties under different study programmes starting from 1980 to 2006. 1504 trainees were Board Certified as specialists in different medical specialties by 2006. 153 trainees have not come back to the country after the overseas training (Table 5.2).

Table 5.2 Number of Trainees Trained in Different Specialties from 1980-2006

Details	
No. of Specialty training programmes	51
No. of Boards of Study	19
No. of trainees trained from 1980-2006	5170
No. of trainees Board Certified as specialist from 1980-2006	1504
No. of trainees not come back after overseas training from 1980-2006	153

This study only focused on 44 specialty training programmes according to the number of specialists Board certified from 1980-2006 (Appendix I). Regulations and guidelines are different pertaining to each and every specialty training programme one from the other. It was difficult to obtain all the data for all medical specialty training programmes or several programmes. Due to limited time and page length this study analyzed the cost of Medical Microbiology training as one of the medical specialty training programme. Hospital cost was not included due to the difficulties in obtaining data during the training of postgraduate trainees at the hospital. 49 specialists Board certified in Medical Microbiology from 1980-2006. Data were collected from the statistical records in hard copies as well as soft copies from the training center (PGIM) and the Medical Services Unit in the Ministry of Healthcare.

The Institute is included two buildings. The main building is a four storey building and another one is two storey building which is very old building. Table 5.3 shows that the operation area of the institute and the area occupied by the each cost center.

Table 5.3 Operating area of the Postgraduate Institute of Medicine

	Area Used (m ²)	Percentage
Administration unit	1,425	50
Education Unit	570	20
Education Supporting unit	855	30
Total	2,850	100

5.2 Total Direct Cost of Cost Centres

Cost analysis, we summarized as labour cost, material cost and capital cost which bear by the administration unit, education unit and education supporting unit with direct allocation method.

Table 5.4 presents the total labour cost of Postgraduate Institute of Medicine is SRL30,338,036.04. It consists of SRL 24,643,599.91 (81.2 percent) as salaries and wages. It was 81.2 percent from the total labour cost. Rest of 20 percent includes for all other allowances and benefits of the staff in the institute. The large portion of labour cost was given to the education unit (Table 5.5). It was 41.3 percent from the total labour cost. Further 18.7 percent was given to the education supporting unit and it was the least amount among other cost centres.

Table 5.4 Labour cost of Postgraduate Institute of Medicine in 2007

Labour Cost	SLR	Percentage
Salaries & Wages	24,643,599.91	81.2
Academic Allowance	314,530.06	1.0
Cost of Living Allowance	1,732,822.58	5.7
Acting Pay	75,580.64	0.2
Overtime	2,325,757.39	7.6
Holiday Payments	129,345.33	0.4
Language Prof. Allow.	251,508.84	0.8
Other Allow.	864,891.29	2.8
Total	30,338,036.04	100

Table 5.5 is shown in labour cost shared by different categories of cost centres at the Postgraduate Institute of Medicine. Largest portion of 41.3 percent has given to the education unit as labour cost.

Table 5.5 The Distribution of the Labour Cost Across Cost Centres of the PGIM

Cost Centre	Labour Cost(Rs.)	Percentage
Administration Unit	12,122,420.24	39.9
Education Unit	12,529,996.37	41.3
Education Supporting Unit	5,695,630.31	18.7
Total	30,338,036.04	100

Table 5.6 and 5.7 show the institutional material cost for each item for the year 2007. Total material cost of the institution was SRL 18,071,521.57. Education unit has utilized largest portion of the material cost SRL 9,209,743.66. Least amount of material cost was used by the administration unit and it was SRL 4,310,415.28. It was 23.8 percent from the total material cost.

Table 5.6 The Distribution of Comparison of Material Costs Between Cost Centres of the PGIM

Adm	Administration Unit	Education Unit	Education Supporting Unit
Stationery & office requisites	579,047.29	2,091,893.74	587,057.35
Uniform & tailoring charges	21,910.27	750	22,660.27
Postal charges	131,802.50	365,984	62,090.50
Telephone & internet	512,131.17	367,858.07	570,466.05
Electricity	1,009,140.56	576,651.74	1,124,470.83
Water	139,156.33	99,397.38	155,059.91
Tax to local Authority	6,932.25	4,621.50	6,932.25
Security services	352,046.40	234,697.00	352,046.4
Cleaning services	213,345.45	142,230.00	213,345.45
Newspapers & magazine	65,140.08	62,850.00	73,638.38
Staff development	104,275.00	200,743.50	34,075.00
Maintenance (Plant, Machinery & Equipment)	417,508.83	180,824.00	485,420.39
Vehicle maintenance	150,536.97	100,357.98	150,536.97
Maintenance (building & other)	132,003.42	88,002.28	132,003.42
Mechanical & electrical goods	69,934.35	46,622.90	69,934.75
Convocation	----	216,944	----
Fuel & Lubricants	337,782.13	222,521.42	337,782.13
Traveling & Subsistence	71,721.5	4,062,719.92	177,843
Total	4,310,415.28	9,209,743.66	4,551,362.63

Table 5.7 The Distribution of Total Material Costs Shared by Each Cost centres of the PGIM

Cost Centre	Material Cost(Rs.)	Percentage
Administration Unit	4,310,415.28	23.8
Education Unit	9,209,743.66	50.9
Education Supporting Unit	4,551,362.63	25.1
Total	18,071,521.57	100

Table 5.8 presents the different kind of capital costs shared by each cost centres in 2007. When compare with other capital cost, institute had to bear more than 50 percent for equipments, such as computers, air conditioner and photocopy machines. Annual building cost was 36 percent from the total capital cost. However, education supporting unit has utilized the 37.9 percent from the total capital cost and it was SLR 2,068,741.38 (Table 5.9). Cost for library books was not included as difficulties in obtaining data accurately. Capital cost would be increased by 3-4 times if it was able to include library books.

Table 5.8 The Distribution of Comparison of Capital Costs Between Cost Centres of the PGIM

Ad	ministrati on Unit	Education Unit	Education Supporting Unit	Total %	
Computer	543,714.25	445,533.15	537,373.30	1,526,620.70	27.9
Accessories	88,326.97	300,970.20	97,996.87	487,294.04	8.9
Air conditioner	131,437.28	101,455.30	237,592.28	470,484.86	8.6
Photocopy machine	69,842.65	154,785.35	69,842.65	294,470.65	5.3
Furniture	134,879.78	136,003.84	161,395.83	432,279.45	7.9
Vehicle	99,331.01	66,220.67	99,331.01	264,882.69	4.8
Building	618,006.75	494,405.40	865,209.45	1,977,621.60	36.2
Total	1,685,538.68	1,699,373.91	2,068,741.38	5,453,653.9	100

Table 5.9 The Distribution of Capital Cost Shared by Each Cost Centres of the PGIM

Cost Center	Capital Cost(Rs.)	Percentage
Administration Unit	1,685,538.68	30.9
Education Unit	1,699,373.91	31.1
Education Supporting Unit	2,068,741.38	37.9
Total	5,453,653.9	100

Table 5.10 presents categories of costs shared by each cost centres. Largest portion of labour cost and material cost has utilized by the education unit. Education supporting unit has utilized the large portion of capital cost. When taken as a whole education unit has utilized the largest portion of cost than other cost centres. It was 43.5 percent from the total cost.

Table 5.10 The Distribution of Total Cost Shared by Cost Centres of the PGIM

Cost Center	Labour Cost(SLR.)	% Material Cost(SLR.)	% Capital Cost(SLR.)	% Total Cost (SLR)				
Admin. Unit	12,122,420.23	39.9	4,310,415.22	23.8	1,685,538.83	30.9	18,118,374.32	33.6
Education Unit	12,529,996.34	41.2	9,209,743.65	50.9	1,699,373.93	31.1	23,439,113.93	43.5
Education Supporting Unit	5,695,630.31	18.7	4,551,362.62	25.1	2,068,741.33	37.9	12,315,734.32	22.8
Total	30,338,046.9	100	18,071,521.57	100	5,453,654.0	100	53,873,222.57	100

5.3 Total Cost of the Postgraduate Institute of Medicine

Table 5.1 1 presents the total direct cost of PGIM is SLR 53,873,222.57 compiling labour cost, material cost and capital cost. Institutional labour cost is SRL 30,338,046.92. The cost for material and capital is SRL 18,071,521.57, SRL 5,453,654.08 respectively . Largest portion of 56.3 percent is utilized as labour cost and least amount has utilized as capital cost (10.1 percent).

Table 5.11 The Distribution of Total Cost of PGIM for the Year 2007

Total Direct Cost	SLR	Percentage
Labour cost	30,338,046.92	56.3
Material cost	18,071,521.57	33.5
Capital cost	5,453.654.08	10.1
Total cost	53,873,222.57	100

5.4 Programme Cost of the Postgraduate Institute of Medicine

The total programme cost of the PGIM is SLR 53,873,222.57 for the year 2007 (Table 5.1 1). The programme cost of services was estimated according to the number of medical specialty training programmes. 44 medical specialty training programmes is conducted by the institute among 1,456 trainees in 2006. It was assumed that each and every cost distributing among number of medical specialty training programmes conducted by the institute. Respective cost center has a contribution to the total cost of all programmes. Administration unit is contributed SLR 41 1, 781.23 for one programme. Education unit and education supporting unit contributed SLR 532,707.13 and SLR 279,903.05 respectively . Whilst, the highest programme cost is contributed by the education unit and the least contribution from the education supporting unit. However , the programme cost for one training programme is SLR 1,224,391.4 with the contribution from all cost centres in the institute (Table5.12).

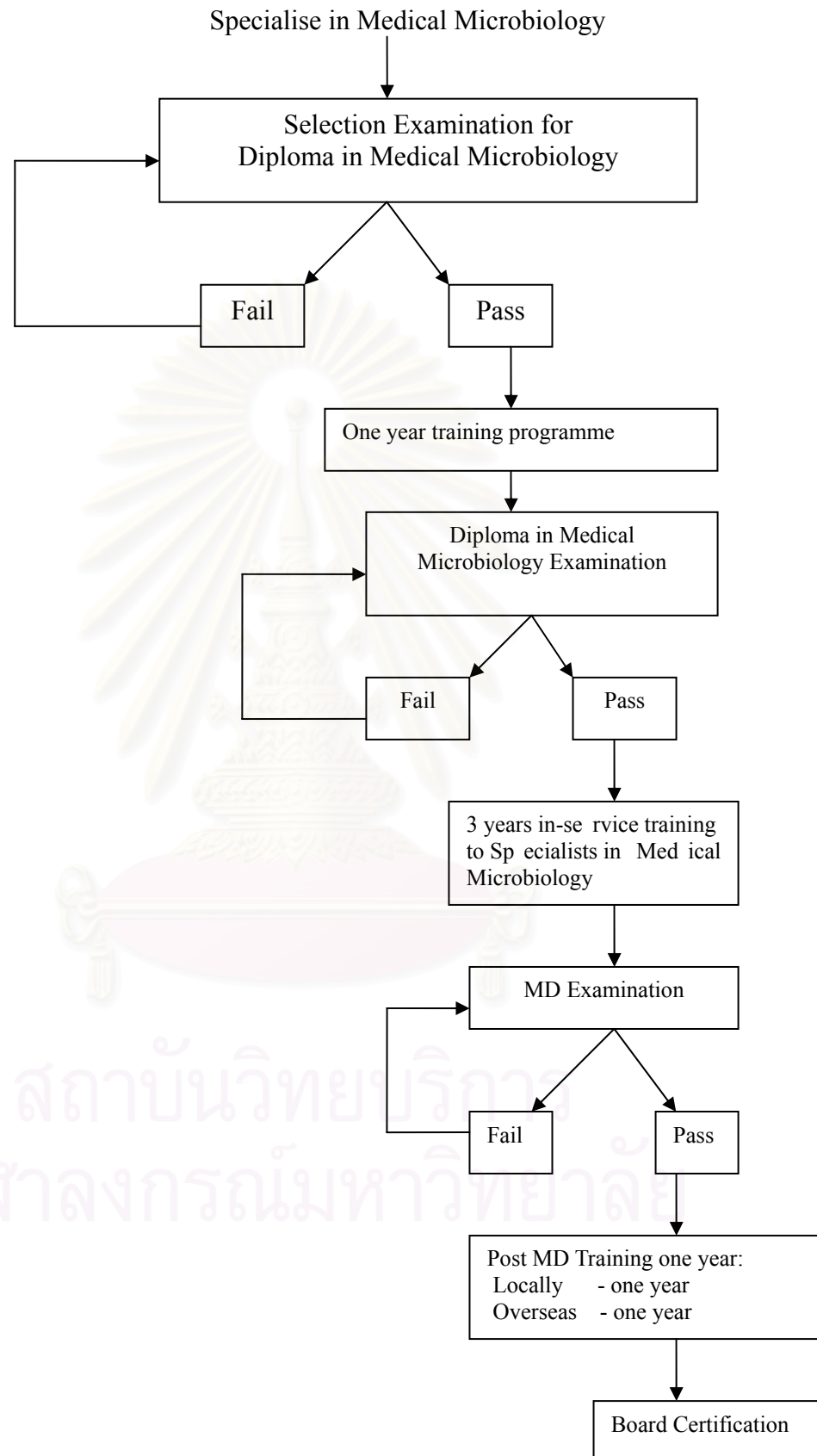
Table 5.12 Programme Cost of the PGIM for the Year 2007

Cost Center	Total Cost (SLR)	Percentage	Programme Cost
Administration Unit	18,118,374.32	33.6	411,781.23
Education Unit	23,439,113.93	43.5	532,707.13
Education Supporting Unit	12,315,734.32	22.8	279,903.05
Total	53,873,222.57	100	1,224,391.4

5.5 Programme Cost of Medical Microbiology Programme

Medical Microbiology training programme is one of the medical specialty training programme conducted by the institute. Figure 5.1 shows that the 3 stages to become a medical specialist in Microbiology programme. It is a 3-part training programme with 6 years curriculum conducted by the Board of Study in Microbiology. Diploma in Medical Microbiology is the first stage of this training programme. Selection examination is the starting point of the acquisition of the Diploma in Medical Microbiology. MD in Microbiology is the second stage of this programme and Board Certification is the final and third stage of a 3-part training who wishes to become a specialist in the field of Microbiology. Table 5.13, 5.15 and 5.16 are shown the cost has to take place for Microbiology programme during the local training period. It includes the cost for the course fee, examination fee, registration fee, facilitation fee, text books etc born by the trainee as well as the institute. In third stage, Ministry of Healthcare financially assists under scholarship scheme for the overseas training required for Board Certification as a Specialist.

Figure 5.1 Route map to become a specialist in Medical Microbiology



Selection examination is the acquisition of the Diploma in Medical Microbiology training programme. Qualifications will be required as Medical Officer with at least one year after internship or Bachelor of Dental Science/Bachelor of Veterinary Science with a service. There is no limited attempt to sit for this selection examination. Examination consists of MCQ, Essay Questions and an oral examination. Table 5.13 shows the cost for the selection examination.

Table 5.13 Cost of Selection Examination for Medical Microbiology programme

	Cost (SLR)	Total cost (SLR)
Selection Examination		
• Examination fee	5,000.00	
• Registration fee	1,000.00	
• For text books	3,000.00	
• To conduct the examination	15,000.00	
• For advertisement	11,000.00	35,000.00
Total		35,000.00

5.5.1 Diploma in Medical Microbiology

Diploma in Medical Microbiology is the first stage of a 3-part training programme conducted by the Board of Study in Microbiology for those who wish to specialize in the field of Medical Microbiology. The training programme leading up to the Diploma consists mainly of laboratory and practical work, and also includes lectures, seminars, tutorials and assignments. It is an intensive, full-time course of 12 months duration, conducted by designated trainers in several centers approved by the Board for this purpose. The programme is organized into 9 modules, each module varying in length from 2 to 12 weeks (Table 5.14).

Table 5.14 Programme outline for Diploma in Medical Microbiology
by Allocated time per subject

Module	Duration (weeks)
1. Orientation	3
2. General Bacteriology	8
3. Systematic Bacteriology	12
4. Virology	8
5. Mycology	4
6. Parasitology	4
7. Sexually Transmitted Infections	2 4
8. Immunology	2
9. Molecular Biology	
Total 47	

The Diploma in Medical Microbiology examination, conducted at the end of the training programme. It consists of a written examination (both MCQ and Essay Questions), a practical examination (with several components) and an oral examination. After four attempts trainee is not allowed to sit this examination again. Table 5.15 shows the cost for examination and the course of Diploma in Medical Microbiology.

Table 5.15 Cost for the Course and Examination of Diploma in Microbiology Shared by the Trainee & PGIM

Course T	Examination			
	Trainee	PGIM	Trainee	PGIM
Course fee	33,000.00			
Lecture fee	238,200.00			
Coordinator fee	12,000.00			
For text books	11,000.00			
For Stationery	5,000.00			
For refreshments		2,000.00		
Registration fee			2,000.00	
Examination fee	17,250.00			
To conduct the examination	81,362.00			
Consumables for practical				71,058.00
Total	301,200.00		171,670.00	

5.5.2 MD in Medical Microbiology

MD in Medical Microbiology is the stage 2 of a 3- part training programme those who wish to specialize in the field of Medical Microbiology. For this stage of the training can be applied only for medical officer who is Diploma holder in Medical Microbiology. A Diploma holder is entitled to work in a Medical Microbiology laboratory only under the supervision of a Consultant Microbiologist as a Registrar. Trainers will be required to send progress report on the trainees. These will include verification of satisfactory bench work. It is 3 years in-service training programme, including Dissertation to become a specialist in Microbiology.

Appendix XI and Appendix XII show the schedule for trainees have to practice bench skills during their 3 years in-service training period in different hospitals. In this study hospital cost was not estimated due to unavailability and inconsistency of reporting hampered the analysis of hospital cost during the training of postgraduate trainees at the hospitals.

Trainee can apply for the MD in Medical Microbiology examination after completing the three years in-service training. The report on the research project must be submitted in the form of a dissertation at least six months before the MD examination. The trainee may be questioned on the dissertation at the viva voce examination. Examination will be included essay type papers, practical examination, viva voce examination and MCQ paper may be set if considered necessary. Trainee is allowed to sit four attempts for this examination. Cost for the course and examination for MD in Medical Microbiology is shown in Table 5.16. Foreign examiner need to be participated for this examination as an external examiner. Examiner is paid \$100 per day during the examination other than the cost for air ticket, transport, health insurance etc. Examiner from Malaysia has come for the MD in Medical Microbiology for the year 2007.

Table 5.16 Cost for the Course and Examination of MD in Medical Microbiology Shared by the Trainee & PGIM

		Course fee	Coordinator Fee	Text books	Stationery	Registration fee	Exam fee	Dissertation assessment	To conduct the examination	Consumables for practical examination	External examiner	Total
Course PG	Trainee	66,000		51,000	10,000							127,000
	IM		36,000									36,000
Examination PG	Trainee					2,000	23,000	1,000				26,000
	IM								88,517	50,000	117,820	256,337
												445,337

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5.5.3 Board Certification as a Specialist in Medical Microbiology

This is the stage 3 of the Medical Microbiology training programme for those who wish to become a specialist in the field of Medical Microbiology. Post-MD training in Microbiology will consist 12 months local and foreign training. Local training can be done before or after the period of overseas training as a Senior Registrar for 12 months duration. Another 12 months needs to be trained at a recognized centre overseas approved by the Institute. The center overseas can be selected in any country in the world. If the overseas training institution requires payment of a bench fee, the trainee may seek approval of the Board of Study to reduce the overseas training period to 9 months, and request the Institute to pay the bench fee. In such cases, the stipulated period of local training will be increased from 12 to 15 months. Center overseas can be placement for training or sponsorship for jobs for the mandatory period of overseas training of specialists before the Board Certification. Board Certification will be the date of passing MD examination plus period of specified post-MD local and foreign training.

The following documents are required when trainee seek approval for overseas training placement.

1. The document with regard to the offer of the placement (letter or email)
2. A clear statement of the status of the placement offered to the trainee with regard to
 - a) The job
 - b) The job on completion of orientation
 - c) The attachment, if on PGIM scholarship
 - d) Observer states, if relevant
3. A letter from the Board of Study that progress reports of local training have been satisfactory.
4. The IELTS certificate – it is a PGIM requirement that all trainees must have at least a “Band - 7” pass in the IELTS irrespective of the country they plan to do their overseas training.
5. The duration of the orientation, if any (documentary evidence has to be submitted).

6. a) The name of the hospital and supervisor overseas.
 - b) Hospital profile down loaded from the internet is sufficient
 - c) Short CV of the overseas supervisor
 - d) The job profile contract including unit case load
7. Date of proposed commencement of appointment
8. Trainee's contact details overseas
 - a) Telephone - Residence/ Office/ Mobile
 - b) E-mail address
9. Present place of work in Sri Lanka
10. Whether any other document is required and who will help you obtain those Eg:

a) GMC Registrations	d) Indemnity Insurance
b) Statutory Registrations	e) Work permit
c) Medical Health Insurance	f) Other

The Ministry of Healthcare undertakes to pay the expenses of all doctors from Ministry of Health during their overseas training maximum of two years period. During this period trainee is privileged with paid leave, monthly living allowances and other allowances depending on the place and the country of training. Such as personnel maintenance allowance to UK is 1000 Pound, Australia AUS\$1665, Singapore SIN\$1200 and India IR 50,000 etc.

The following financial assistance granted under the scholarship scheme, will consist of;

- a) A return passage for travel on least economy air fare to the country of destination.
- b) Personal maintenance allowance of 1000 Pound per annum for one year for the training.
- c) Medical Board Registration fee, if required;
- d) Healthcare Insurance if required;
- e) Warm cloth allowance
- f) Reimbursement of visa fee, embarkation fee on departure/arrival allowances, subject to submission of receipts.
- g) Book allowance of US\$1000 subject to submission of documents.

All the above allowances are entitled if trainee does not undertake paid leave during the tenure of the scholarship. Centre overseas supervisor is required to send progress reports on the trainee during the training period. Table 5.17 shows the cost of main allowances for overseas training for doctors attached to the Ministry of Healthcare.

Table 5.17 Cost for Overseas Training Shared by Ministry of Healthcare

Cost		Total Cost SLR (per year)
Foreign Training		
• Monthly allowance	1000 pound	2,520,000.00
• Book allowance	\$1000	106,000.00
• Warm cloth allowance	75 pound	15,750.00
• Air ticket	\$ 1,500	150,000.00
Total		2,791,750.00

Board of Management

Post graduate Institute of Medicine is managed by the Board of Management which is the principal administrative and academic authority of the institute. It is comprised of 29 members and meet once a month. Guidelines and prospectors pertaining to the programmes are revised and approved by the members of Board of Management. When compare with other meetings, rate of per-diem which is paid to members higher than other meetings. Table 5.18 shows the cost for Board of Management per year.

Table 5.18 Cost for Board of Management of PGIM

	Cost per month (SLR)
Per-diem	27,000.00
Refreshments	4,000.00
Total	31,000.00
Cost per year	372,000.00,
Cost per programme	8,454.54

Board of Study in Microbiology

Board of Study in Microbiology continued to plan and execute the study programmes in respect of Diploma and MD programmes. 21 members are included for this Board and they meet once a month. Table 5.19 shows the cost for holding Board of Study in Microbiology per year. It was included per-diem for professionals and members, conference room facilities, traveling and subsistence

Table 5.19 Cost for Board of Study in Medical Microbiology per Year

	Cost per month (SRL)
Per-diem	10,600.00
Refreshments	2,000.00
Total	12,600.00
Cost per year	151,200.00

MCQ Core Group Meeting in Microbiology

MCQ Core Group meetings are held by different Boards of Study. There are 12 members comprised for MCQ core group meeting in Board of Study in Microbiology. Members of the meeting develop MCQ with meeting once a month. Generally 3 MCQ are developed by each member of the meeting. Table 5.20 shows the cost for developing the MCQ and the per-diem for professionals. In addition to that cost for traveling and subsistence for members come from outside the Colombo.

Table 5.20 Cost for MCQ Core Group meeting in Microbiology per Year

	Cost (SLR)
Per-diem	3,600.00
Payments for MCQ	7,200.00
Refreshments	6,000.00
For Traveling	11,192.00
Total	27,992
Cost per year	307,912.00

Table 5.21 shows that the programme cost for each stage in Microbiology training programme. When compare with each stage of training programme, cost for the Board Certification is the highest cost than other stages in programme.

Table 5.21 Cost for Medical Microbiology Programme in Different Stages.

Cost	(SLR)
Selection Examination	35,000.00
Diploma in Medical Microbiology	472,870.00
MD in Medical Microbiology	445,337.00
Board Certification	2,791,750.00
MCQ Core Group Meeting	307,912.00
Board of Study in Medical Microbiology	151,200.00
Board of Management	8,454.54
Total	4,212,523.54

5.5.4 Total Programme Cost of Medical Microbiology Training

The programme cost for the Medical Microbiology programme presents in table 5.22 for the year 2007. Total programme cost in Medical Microbiology programme is SLR 5,412,914.9. Programme cost of one programme was estimated according to the number of specialties (44) in different Boards of Study (Table 5.12).

Table 5.22 Total programme Cost for Medical Microbiology Training

Cost	(SLR)
Programme cost for one programme	1,224,391.4
Cost for Medical Microbiology Programme	4,212,523.54
Total	5,436,914.94

The programme would have increased if land value was included in the capital cost. The programme cost could have increased in SLR 8,904,951.94 and the cost for Microbiology programme could have increased in SLR 13,093,475.4. It will be 1.5 times higher than study estimation. (the land value was SLR 118,577.07/square meter) (Department of Valuation in Sri Lanka, 2000).

5.5.5 Cost comparison

Foreign students are admitted to almost all academic programmes of the PGIM. Table 5.23 shows that the fees charged from foreign students under three categorized countries.

Table 5.23 Fees have to Pay in Different Stages During Training by the Foreign Trainee

Particulars	Non-SAARC US\$	SAARC US\$	Bhutan & Maldives US\$
Qualifying examination for all examinations	320 150		50
Diploma & MSc*	7,000 (all inclusive)	6,000 5,000	
Subsequent examination attempts (if repeated)	500 500		170
Orientation (6 months) prior to MD/MS course	500 500		170
MD/MS course	7,000 (per year)	6,000 (per year)	5,000
Subsequent examination attempts (if repeated)	500 500		170

Source: Postgraduate Institute of Medicine

* A bench fee will be charged for some Diploma and M Sc. courses

According to the fees charged from the foreign students, programme cost can be calculated as shown in the table 5.24. Programme cost for the student come from Non-SAARC countries has to pay SLR 3,088,840. As same student come from SAARC countries programme cost will be SLR 2,628,800. Student come from Bhutan and Maldives the programme cost is SLR 2,148,620.

Table 5.24 Total Programme Cost of Foreign Students for Three Categorized Countries

Particulars	Non-SAARC US\$	SAARC US\$	Bhutan & Maldives US\$
<i>For Diploma course</i>			
Qualifying examination for all examinations	320	150	50
Diploma & MSc* (all inclusive)	7,000	6,000 5,000	
<i>For MD course</i>			
Orientation (6 months) prior to MD/MS course	500	500	170
MD/MS course (for 3 years)	21,000	18,000	15,000
Qualifying examination for all examinations	320	150	50
Total US\$	29,140	24,800	20,270
Total SLR	3,088,840	2,628,800	2,148,620

1 US dollar = SLR 106

Table 5.25 presents the programme cost for each country. Bench fee for Non-SAARC, SAARC, Bhutan and Maldives per year is US\$7,000, US\$ 6,000 and US\$ 5,000 respectively. It is the hospital cost of the total programme cost. According to that estimation, programme cost for Sri Lanka is higher than other countries. The reason behind this could be the cost for overseas training is included for programme cost in Sri Lanka even though it was not included the hospital cost for the total programme cost.

Table 5.25 Programme Cost for Respective Country

	Programme cost in SLR	Programme cost in US\$
Non-SAARC	3,088,840.00	29,140
SAARC	2,628,800.00	24,800
Bhutan & Maldives	2,148,620.00	20,270
Sri Lanka	5,436,914.90	51,291.65

5.5.6 Sensitivity Analysis

Prospective trainees have to bear the cost for the course fee, examination fee and registration fee and if they fail the examination they can try again. Trainee is given to sit any attempts in selection examination. However, trainee is allowed to sit for Diploma and MD examination up to three attempts. The PGIM may give a mercy chance on their discretion for those who fail more than three attempts but no further attempts will be allowed. PGIM doesn't want to spend extra cost, if trainee sits for the exam more than one attempt. Only trainee has to pay for the course fee, examination fee and the registration fee. Table 5.26 shows that the total cost of the programme from the 1st attempt (base case) to 4th attempt. The cost in 1st attempt (base case) was SLR 5,436,914.90 and it was increased to SLR 5,933,064.94 by final attempt (4th attempt). Total programme cost increased due to the extra cost has to be borne by the trainee for the selection examination, Diploma and MD examinations.

Table 5.26 Total Cost of the Programme from 1st attempt (base case) to 4th Attempt

1	1 st Attempt (Base Case)	2nd Attempt	3rd Attempt	4th Attempt
Selection Examination	35,000.00	41,000.00	47,000.00	53,000.00
Diploma in Medical Microbiology	472,870.00	530,120.00	587,370.00	644,620.00
MD in Medical Microbiology	445,337.00	547,337.00	649,537.00	751,737.00
Board Certification	2,791,750.00	2,791,750.00	2,791,750.00	2,791,750.00
MCQ Core Group Meeting	307,912.00	307,912.00	307,912.00	307,912.00
Board of Study in Medical Microbiology	151,200.00	151,200.00	151,200.00	151,200.00
Board of Management	8,454.54	8,454.54	8,454.54	8,454.54
Prog. Cost for one programme	1,224,391.40	1,224,391.40	1,224,391.40	1,224,391.40
Total programme cost for Medical Microbiology	5,436,914.90	5,602,164.94	5,767,614.94	5,933,064.94

Sensitivity analysis with 4 scenarios of attempts with 10% and 15% of rate of exclusion of not-returns after overseas training and the results indicated that significant changes in the cost of program.

Table 5.26 shows that adjusted programme cost for additional attempts, with exclusion of 10% and 15% of trainee who does not return back after overseas

training. The programme cost in 1st attempt (base case) was SLR 5,436,914.90 and the adjusted cost with exclusion of 10% and 15% of trainee was SLR 6,041,016.60 and SLR 6,396,370.52 respectively. By 4th attempt the programme cost was SLR 5,933,064.94 and the adjusted cost increased to SLR 6,592,294.37 and SLR 6,980,076.40 with exclusion of 10% and 15% respectively.

Table 5.27 Sensitivity Analysis for Four attempts with 10% and 15% non-returnees to the Country after Overseas Training

	1st Attempt	2 nd Attempt	3 rd Attempt	4th Attempt
Total programme Cost	5,436,914.90	5,602,164.94	5,767,614.94	5,933,064.94
Adjusted programme Cost ratio of 10%	6,041,016.60	6,224,627.71	6,408,461.04	6,592,294.37
Adjusted programme Cost ratio of 15%	6,396,370.52	6,590,782.28	6,785,429.34	6,980,076.40

5.6 Discussion

This study describes the analysis of the cost of medical specialty training in the Postgraduate Institute of Medicine in 2007. It is the national institute for the specialty training of all medical doctors in Sri Lanka. The study was able to generate cost profile and the programme cost in the institute. According to the results of the study estimation of total programme cost is higher than the annual budget allocation of SLR42.2M for the institute in 2007. Whilst annual expenditure should be higher when observed with the other expenditure in the institute. This study did not include institutional entertainment expenses, awards and indemnities and special services as annual expenditure. However, according to study results more than 50 percent of the total budget was utilized as labour cost (Table 5.11).

Majority of the workforce of the PGIM comprised to the non-academic staff as the permanent employee. The largest proportion of labour cost was utilized for their salaries and other allowances. However, institutional labour cost would have further

increased if it included per diem for members of meetings, workshops symposium and examinations etc. relevant to each training programme.

The total material cost of the institute accounted for 33.5 percent from the total programme cost. Academic division and examination division utilized the largest portion of material cost was accounting for 50 percent from the total material cost (Table 5.10). The reason behind this could be the high utility cost for stationery & office requisites especially for the division of academic and division of examination. The high utility cost for electricity could be because of utilizing number of equipment in respective cost centres. It follows that the maintenance cost for plant, machinery and equipment also higher to the institute. Maintenance cost for building is higher even though building cost for the 2 storey building depreciated to zero cost. Out of the material cost significant amount was utilized for traveling and subsistence (Table 5.6). This is mainly because of the majority of the professionals in each Board of Study and the lecturers for MCQ core group meetings come from outside the Colombo. In addition, the number of members in 19 Boards of Study and core group meetings. Moreover, more than 20 members comprise in each Board of Study as same more than 10 members in each core group meetings.

Institutional capital cost accounted for 10 percent from the total programme cost. Cost for the equipment was higher due to number of equipment used by respective cost centres. It was 50.7 percent from the total capital cost (Table 5.8). Only 4 storey building was considered as the institutional building cost and it may not given the clear picture about the building cost due to zero cost for the 2 storey building. As a result institutional building cost only accounted for 36 percent from the total capital cost. The capital cost would have been increased if the land value included for the total programme cost. The land value may cause an increase of 3-4 times of the estimated programme cost in the institute. In addition, cost for library books and journals were not calculated as capital cost due to difficulties in obtaining cost accurately. According to the institutional information most of the library books were received as donations. However, cost can be calculated even books are donated according to availability of price in books. Institute allocates specific amount of funds for journals and books for the library from the annual budget.

Estimation of Medical Microbiology programme

This study only focused on cost of Medical Microbiology training programme as one of the specialty training programme conducted by the institute. According to the results of the study total programme cost for the Medical Microbiology programme is SRL 5,436,914.94 (Table 5.22). Analysis of the cost included each part of the training in Medical Microbiology programme, the cost of the selection examination which is the starting point of this programme to acquisition of Diploma in Medical Microbiology as the first stage of a 3-part training programme. It also includes cost of course fee, registration fee, examination fee which have to be born by the trainee and the institute. MD in Medical Microbiology is the second stage of the programme. This include three years in-service training programme. In this stage, cost has to be born by the trainee as well as the institute. This cost expected to be increased if you include the cost for three years in-service training at the hospitals. At least one foreign examiner need to participate for the MD and MS examination as an external examiner. Foreign examiners may come from UK, India, Australia, Malaysia, Singapore, Pakistan and New Zealand as per invitations for the MD and MS examinations in different medical specialties under review. Examiner is paid \$100 per day during the examination other than the cost for air ticket, transport, health insurance etc. cost of which have to be born by the institute. It is questionable whether cost for foreign examiner is an additional expenditure to the institute. However, it is necessary to evaluate and analyze factor affecting the programme cost and try to reduce cost accordingly with alternative method such as taking that external examiner's service from local expertise as much as possible.

Board Certification as a Specialist, is the stage 3 of the training programme. Large portion of cost goes for overseas training when compare with other stages in the training programme. From the total programme cost more than 51 percent goes for overseas training programme (Table 5.21). Ministry of Healthcare undertakes this cost for all Ministry of Health doctors. So Ministry of Healthcare has to allocate considerable amount of funds as foreign currencies for postgraduate trainees attached

to the Ministry. As same Ministry of Education has to undertake the cost of overseas training for all doctors attached to the faculties of medicine in each universities. Therefore, it is essential to analyze this factor very carefully in terms of cost effectiveness and possible alternative methods.

According to the Appendix II significant amount of trainees has not come back to the country after overseas training programme. Specially most of trainees who has done sub-specialization did not return and their services are lost to the country. It is controversial whether these skilled professionals gone away from the country because of the overseas training included in the curriculum. As a result, “you cannot deliver health care if the staff you trained at home are working abroad” (Dr.Margaret Chan/WHO).

On the other hand by sending trainees for overseas training, they can identify the international standards in health system. Further, they gain valuable work experiences with international expertise. In addition, they acquire the knowledge about the new equipment and how to operate them in the health system as same to search out the new diseases can be happened in the future.

When concerned about the hospital costs, the programme cost will be further increased if the hospital cost were included in the analysis. Hospital cost consists of labour cost, material cost as well as capital cost with contribution from different departments in the hospitals. Some studies have used proportion (10% or 30%) to calculate the hospital cost. But still it is controversial about the interpretation of fairness in the amount of proportion when the hospital cost for departments in the hospital is calculated. However this argument would not apply if the hospital cost is used as the proxy for the programme cost since hospital cost consists of all costs as labour, material and capital. In some countries the government pays money to teaching hospitals to compensate them for the costs of teaching under graduate medical students; in the United Kingdom this payment known as SI FT (Special Increment for Teaching). For a large teaching hospital this sum may amount to several million euros annually. Academic departments should be able to bid for a proportion

of this money to support the salaries of academic staff who play a major role in the organization and/or delivery of undergraduate teaching (Aittenhead, 2002).

The obvious limitation of this study was the difficulties in obtaining the hospital cost due to the way of health systems and services are run in the country. The National Policy of Sri Lanka has throughout been governed by the principle of commitment to provide free education as well as free health to the entirety of its population. The Government of Sri Lanka provides free education to all citizens from primary education to tertiary education. In other words most education facilities in Sri Lanka are operated through public funding. Medical education costs appear to vary widely than other university education. For all the local students the tuition fees and most part of exam fees are borne by the government for whole programme during their total study period.

The Ministry of Health is accountable for policy decisions, medical education, teaching hospitals and medical institutions. According to that it is responsible to provide training facilities for undergraduate medical students as well as postgraduate trainees in the government hospitals free of charge. The Postgraduate Institute works closely with the Ministry of Health in producing the number of specialists required for the Health Services. The hospital cost when calculated the cost for medical education is very complicated due to these factors. Therefore, it is difficult to apply the hospital cost in the analysis because of the policies and the systems in the country. The common theme in the literature is the difficulty in determining how much of the work in clinical facility can reasonably be recognized to the medical education function. (Goodwin *et al.* 1997) The problem is not just that the teaching hospital is a separate institution, with separate overhead structures and staffing patterns, but also that much of the clinical work that is performed at a teaching hospital serves both a patient care function and an educational function. (Rein *et al.* 1997)

When highlighted the output, 5170 postgraduate trainees have been trained from 1980- 2006. Out of that 1504 trainees were Board Certified as specialists in different medical specialties during that period. Of the total above, 153 trainees have not come back to the country after the overseas training. When one observes the list of

Board Certified specialists in different specialties (Appendix I) it is doubtful whether limited specialties, other than Anaesthesiology, General Medicine, Paediatrics, Obstetrics & Gynaecology, General Surgery and Community Medicine, are popular among the trainees. Very few trainees were Board Certified as Specialists in other specialties and sub-specialties. This controversial due to significant changes in the disease pattern occurred in Sri Lanka in the last few decades. The increase in the incidence of non-communicable diseases has now become a major concern. According to the institutional information, when the requirement list of specialists is given to the trainees to select the sub-specialization the selection process has hindered producing specialists in desired numbers in certain specialties which are deemed not very popular among trainees.

The different accuracy of cost replication between local students and foreign students when calculate the total programme cost with compiling in each stage of the training programme. Apparently there is no calculation of cost for overseas training for foreign students. Significant amount was estimated (\$ 7,000/per year) for bench fee as hospital cost during the training in different hospitals. Specific amount was charged for examination fee and the amount for orientation programme. Therefore the estimation of programme cost may be reasonably used to predict the cost of postgraduate training in different specialty training relatively in each stages of the programme.

Programme cost of medical specialty training was based on only one year's cost components including several limitations. However, programme cost is not remaining same. This study analyzed the institutional programme cost only for the year 2007. There are number of independent variables which have direct effect on the programme cost in the institute. Such as number of trainees drop out the training, failure rate, exchange rate, trade union action etc. Attempts, which the trainee sit for each examination (more than first attempt), and it affects the programme cost in an indirect manner.

The programme cost of 1st attempt (base case) was SLR 5,436,914.90 and it was increased to SLR 5,933,064.94 by 4th attempt (Table 5.26). The cost was increased due to the cost has to bear by the trainee as examination fee for the selection examination, Diploma and MD examinations.

After sensitivity analysis with for 4 scenario of four attempts with exclusion of drop outs (non-returnees) after training with a rate 10 % & 15% , it resulted in a significant change of total cost of program (Table 5.27). The adjusted programme cost with a rate of 10% was increased from SLR 6,041,016.60 to SLR 6,592,294.37 by fourth attempt. As same the adjusted programme cost with a rate of 15% was increased from SLR 6,396,370.52 to SLR 6,980,076.40. According to the institutional information, 15 – 20 percent of postgraduate trainees not return to the country after completion the overseas training. It may be due to the unsatisfactory working conditions, low salaries and poor career opportunities in home country. As a result they may be fond of staying in comfortable working area in developed countries.

In terms of the fairness of distribution of medical specialists in the country there is a wide disparity in the regional distribution of medical specialists. The urban area has a high concentration of most categories of medical specialists. Table 1.4 is shown the distribution of specialists in curative services in the country. Of the specialists, 35 percent are concentrated in the urban areas. Some of the rural areas did not have single specialists, and the absence of certain common specialists such as general medicine and surgery, obstetrics and pediatrics in some districts is a serious health problem with regards to fair distribution of medical specialists in the country.

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CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

In the previous Chapter, the total programme cost and the total cost for Medical Microbiology training programme were estimated and discussed. Direct allocation method was generally satisfactory in describing the cost allocation and expenditure pattern of the Postgraduate Institute of Medicine. This Chapter discusses the findings of the study, which will be followed by policy implications and recommendations derived from the overall study.

6.1 Conclusions

Cost analysis of programme cost can provide insights into the cost behavior of the Postgraduate Institute of Medicine. The main objective of the study was to analyze the programme cost for medical specialty training programme in the public sector and explore the production cost of medical specialist by the institute. According to the results of the study government needs to find a solution for shortage of specialist categories in the health sector. Shortages of certain specialist categories cause inefficiency and ineffectiveness in the public and private healthcare delivery systems. This should be prompt by doing by research, administration, reorganization the specialties and sub-specialization in order to provide medical services an efficient way.

The cost information from 28 cost centres of the Postgraduate Institute of Medicine were collected and compiled as labour cost, material cost and capital cost. Direct allocation method was used for the data analysis, using the allocation criteria. The study was able to provide insight of the total programme cost and the programme cost for Medical Microbiology programme as one of the medical specialty training programme conducted by the institute for the year 2007. The total programme cost was SLR 53,873,222.57. The annual expenditure of the institute has exceeded the government allocated budget. Whilst annual expenditure may be further increased with other expenditure of the institute.

Analysis of the programme cost can be categorized as recurrent cost and capital cost as shown in table 6.1. The total recurrent cost was SLR 48,409,568 and it was 89.9 percent from the total cost. Only 10 percent was utilized as capital cost.

Table 6.1 Recurrent cost and Capital Cost of PGIM

SLR		Percentage
Recurrent cost	48,409,568.49	89.8
Capital cost	5,453,654.08	10.2
Total cost	53,873,222.57	100

Institutional labour cost was 56.3 percent from the total programme cost. It consists 81.2 percent for salaries and wages. The other 20 percent include all other allowances and benefits of the staff in the institute. The large portion of labour cost was given to the academic division and examination division. It was 41.3 percent from the total labour cost. Another 18.7 percent was given to the education supporting centre and it was the least amount among other cost centres. Institutional labour cost would have been increased if it included per-diem for members for meetings, workshops, symposium, examinations etc. in relation to each training programme.

The total material cost of the institute was SLR 18,071,521 for the year 2007. Academic division and examination division utilized the largest portion of material cost and it was 50 percent from the total material cost. It may be high since high cost for stationery & office requisites used by the academic division and examination division. General administration unit has used amount of SLR 4,310,415 for the material cost and it was less than the cost for education supporting units. In addition high utility cost may be for electricity due to utilizing number of equipment in respective units. In addition, maintenance cost for equipment and building also high.

Total capital cost was SLR 5,453,653 and 36.2 percent utilized as building cost. Education supporting unit has utilized high portion of capital cost and it was 37.9 percent from the total capital cost. The reason behind this could be the cost centres included for the education supporting unit taking more space than other cost centres; for board rooms, tutorials, lecture halls, library, laboratory etc.

Labour cost and material cost are the major factors determining the programme cost in the Postgraduate Institute of Medicine. However, academic personnel were not identified as having significant impact on programme cost. It may be due to the large variance of wage levels among the non-academic personnel which do not impact with the level of programme cost. It should also be noted that the majority of the academic staff work part time in the PGIM as they are full time employees of the respective universities involved in the training programmes, where they claim the salaries.

The programme cost for Medical Microbiology training programme was SLR 5,412,914. Significant amount was spent for the Board Certification, which include overseas training component and it was more than 50 percent (SLR 2,791,750) from the total cost of Medical Microbiology training. Board Certification as a specialist, trainee has to complete the 12 months training at a recognized center overseas approved by the Postgraduate Institute of Medicine. The largest portion of cost was given for overseas training when compare with the first 2 stages in this training programme, Cost for the Diploma in Medical Microbiology and MD in Medical Microbiology was SLR 472,870 and SLR 421,337 respectively. This can be applied to all other training programmes more or less equally.

Government will be able to retain the cost for overseas training if that training can be conducted in the country without sending trainees to overseas. Since introduction of the local postgraduate medical education in the country this has continued and whether it will be able to provide that specialty training in the country is questionable in the present context. In comparison, Thailand for the postgraduate training, there is no overseas training component and they can complete the postgraduate training in the country within three years. Also in other Asian countries like

India there is no compulsory overseas period attached to the postgraduate medical education, as observed in Sri Lanka.

In terms of outputs, the number of trainees' enrollment was identified as the highest determinant of the programme cost. The trainees sit for each examination (more than first attempt), also has a significant influence on the level and mix of resources used and it affects the programme costs in an indirect manner. The cost for 1st attempt (base case) was SLR 5,436,914.90 and it was increased to SLR 5,933,064.94 by final attempt (4th attempt). Total cost increased due to the extra cost for the selection examination, Diploma and MD examinations which cost has been borne by the trainee as examination fee, course fee and registration fee.

According to the sensitivity analysis with four scenarios of attempts with exclusion of non-returnees after overseas training with a rate of 10% & 15%, it effected a significant change of adjusted total programme cost. The cost for 1st attempt (base case) was SLR 5,436,914.90 and the adjusted cost with exclusion of 10% and 15% of trainee was SLR 6,041,016.60 and SLR 6,396,370.52 respectively. By 4th attempt the programme cost was SLR 5,933,064.94 and the adjusted cost increased to SLR 6,592,294.37 and SLR 6,980,076.40 with exclusion of 10% and 15% respectively.

It is important to identify the cost-minimising level of the programme cost, especially the cost of overseas training programme. It is essential to evaluate and scrutinize the process and the PGIM will be able to retain the cost for overseas training if that training can be conducted in the country without sending trainees to overseas. This is further aggravated by the substantial number (15-20 percent) of postgraduate trainees who may not either return to the country or may leave the government services after a short period of training. These costs need to be analyzed quantitatively and qualitatively to understand where the cost can be reduced in the postgraduate medical education.

Manpower requirement of specialists in Sri Lanka should be explored through the survey or some other technique to meet the demand and expectations of the public. Specially with increasing the non-communicable diseases, the specialty and

the sub-specialty training needed to be tailor made to the specific requirements of the changing epidemiological pattern in the country.

There is no universal best strategy for improving the health workforce. This will mainly lie in the better information or better understanding of the situation that emerges from the research, and those outcomes should serve to inform policy making for human resource development for health.

6.2 Recommendations

Even though there are some limitations in analysis of the true behavior of programme cost in the institute, valuable implications were derived from this study for policy and decision makings. The following summarizes the major findings, policy implications and recommendations for further studies with reference to the research questions and objective of this study.

1. Recommendation for policy development.

In this study it was found that major proportion (more than 50%) of the cost of medical postgraduate study goes for the overseas training component. This should be an area for further policy development to be strongly be considered by the management of the PGIM, as well as by the Ministry of Health care. Cost of the overseas training (part 3) of the postgraduate training may be reduced by many means and this has to be carefully considered not to compromise the quality of training. Replacement of overseas training by internal training at a center of excellence in the country would be one of the options. At the same time it could be possible to consider having a shorter length of training overseas and combined that with longer internal training as a requirement of the part 3. Further it can be introduced with no-pay leave if trainee goes for a job while in the training.

2. Recommendation for Board of Management.

According to past reports in 1973, the Advisory Committee on Postgraduate Medical Education recommended to replace the existing scheme of training abroad (p. 5). However, this has not worked out for the last 30 years. According to the study results the overseas training component has the highest cost in the postgraduate medical education. Therefore, it is appropriate to re-consider the recommendation of Advisory Committee in 1973. How this could be done may have to be decided with consensus and collaboration of all the stakeholders involved in the postgraduate training programme.

3. Recommendation for re-structuring the existing scheme of training in postgraduate medical education.

This study found that 153 trainees have not come back after overseas training programme (from 1980-2006). Overall 15-20% has not been returned according to the PGIM but this may vary annually. There is a great need to re-structuring the existing scheme of training in postgraduate medical education, so that it will help to minimize the loss of trained expertise to the country. Methods to keep the trained workforce in the country need to be carefully worked out by the PGIM and MOH, taking all aspects of workforce development into the account.

4. Recommendation for research based evidence on cost of training programmes.

According to the results, it was found that the programme cost is higher than the fees charge from the foreign students. Programme cost for Non-SAARC, SAARC and Bhutan, and Maldives was US\$ 29,140, US\$ 24,800 and US\$ 20,270 respectively. However, according to the study results programme cost was US\$ 5,291.65. Therefore, it is essential to use research based evidence on cost of training programmes. This is going to be as important key component in charging fees from foreign students, especially cost of bench fee mentioned as hospital cost.

5. Recommendation for improvement of existing web site of the institute

The existing web site of the institute can be improved further with more information about the drop out students, failure rate of students as well as the structure of the institute, especially about the guidelines. The prospectors pertaining to training programmes, which is very important to trainees as well as to the scholars who are interested to study in postgraduate medical education, should be improved to provide all the possible information to the reader.

6. Recommendation for further study about the postgraduate medical education training (Surgical)

A costing study without the hospital cost and all the capital cost might not give a complete picture of the cost profile of the programme cost of postgraduate medical education. However, this study focuses on major aspects of the expenditure in the postgraduate medical education through the PGIM, which is the single training institute in Sri Lanka. Further, this study focused the programme cost of one medical specialty training (Microbiology) and it will show only the immediate outcome of this specialty. Regular studies must be conducted applying some other medical specialty training programme (e.g. Surgery) to identify the changes in the programme cost between each and every programme. It may be valuable to have inbuilt cost analysis component in the PGIM database for this purpose. Further the study results will be more accurate if the cost items are collected in a prospective approach rather than retrospective approach, where ongoing changes in the expenditure can be accounted and analyzed.

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APPENDICES

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Appendix I

Board Certified Specialists in Different Medical
Specialties between 1980-2006

Specialties	Period 1980-2005	Year 2006	Total
Anaesthesiology	99	14	113
Community Medicine	94	07	101
Community Dentistry	04	-	04
Dental Surgery	27	-	27
Oral Surgery	03	04	07
Orthodontics	12	02	14
Restorative Dentistry	04	02	06
Dermatology	09	03	22
Family Medicine	11	01	12
Forensic Medicine	40	06	46
General Medicine	150	18	168
Cardiology	32	02	34
Cardiac Electro Physiology	02	01	03
Neurology	19	01	20
Nephrology	04	01	05
Neurophysiology	02	-	02
Respiratory Medicine	13	01	14
Rheumatology & Rehabilitation	13	02	15
Gastroenterology	01	01	02
Endocrinology	02	-	02
Medical Microbiology	48	01	49
Medical Parasitological	01	01	02
Obstetrics & Gynecology	150	09	159
Ophthalmology	51	07	58
Otolaryngology	28	03	31
Paediatrics	143	19	162
Pathology			
Histopathology	55	03	58
Haematology	21	02	23
Chemical Pathology	04	-	04

Appendix I (Cont'd)

Board Certified Specialists in Different medical Specialties
between 1980-2006 (Cont'd)

Specialties	Period 1980-2005	Year 2006	Total
Psychiatry	38	-	38
Radiology	57	05	62
Radiotherapy & Oncology	22	01	23
General Surgery	99	12	111
Cardiothoracic Surgery	12	01	13
Cancer Surgery	07	-	07
Genito Urinary Surgery	14	01	15
Gastroenterological Surgery	07	-	07
Neuro Surgery	11	01	12
Orthopaedic Surgery	30	01	31
Paediatric Surgery	10	02	12
Plastic Surgery	05	02	07
Vascular & transplantation	02	-	02
Thoracic Surgery	01	-	01
Total	1367	137	1504

Source: Postgraduate Institute of Medicine of Sri Lanka

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Appendix II

Trainees not returning from Overseas from 1980-2006

Sub Specialty	Count
Anesthesiology	31
Chemical Pathology	1
Community Medicine	3
Dental Surgery	1
Endocrinology	1
Forensic Medicine	3
General Medicine	16
General Pediatrics	15
General Surgery	12
Genito Urinary Surgery	2
Hematology	3
Histopathology	7
Medical Microbiology	6
Nephrology	1
Neurology	2
Obstetrics & Gynecology	10
Ophthalmology	4
Oral Surgery	3
Orthodontics	1
Orthopedic Surgery	4
Otolaryngology	2
Pediatric Surgery	1
Pathology	1
Psychiatry	18
Radiology	4
Rheumatology & Rehabilitation	1
153	

Source: Postgraduate Institute of Medicine

Appendix III

Type of Public Institutions in the Country

Type of Institutions	Number of Institutions
National Hospital, SL	01
Teaching Hospital	10
Provincial Hospital	08
Base Hospital	40
District Hospital	160
Peripheral Unit	101
Rural Hospital	196
Maternity Hospital	03
Maternity Homes & CD	62
Mental Hospital	03
Chest Hospital	02
Leprosy Hospital	02
Cancer Hospital	01
Children's hospital	01
Eye Hospital	01
Dental Institute	01
Rehabilitation Hospital	01
Fever Hospital	01
Mental Rehabilitation Centers	02
Other Hospitals	12
Central Dispensaries	413
Total	1021

Source: Medical Statistics Unit, Ministry of Healthcare

Appendix IV

National Expenditure on Health in Sri Lanka (SLR)

A. SELECTED RATIO INDICATORS* FOR EXPENDITURES ON HEALTH	2000	2001	2002	2003	2004	2005
I. Expenditure ratios						
Total expenditure on health (THE) as % of GDP	3.8	3.9	3.9	4.1	4.3	4.2
Financing Agents measurement						
General government expenditure on health (GGHE) as % of THE	47.6	45.0	43.3	41.1	45.6	46.3
Private sector expenditure on health (PvtHE) as % of THE	52.4	55.0	56.7	58.9	54.4	53.7
General government expenditure on health as % of GGE	6.9	6.6	6.8	7.2	8.4	8.0
Social security funds as % of GGHE	0.3	0.4	0.3	0.3	0.2	0.2
Private households' out-of-pocket payment as % of PvtHE	81.5	81.2	81.6	80.9	84.0	84.4
Prepaid and risk-pooling plans as % of PvtHE	10.7	8.6	8.5	7.7	8.8	9.1
Financing Sources measurement						
External resources on health as % of THE	0.2	1.2	0.8	1.7	1.2	1.2
Resource Costs measurement						
Compensation of government health employees as % of GGHE	n/a	n/a	n/a	n/a	n/a	n/a
Total expenditure on pharmaceuticals as % of THE	23.7	23.2	23.5	22.7	21.2	21.0
Private expenditure on pharmaceuticals as % of PvtHE	31.2	31.7	32.4	29.7	29.8	29.0
Provider measurement						
Total expenditure on hospitals as % of THE	38.4	37.1	38.9	39.0	42.2	43.6
Functions measurement						
Total expenditure on inpatient care as % of THE	24.6	24.4	25.4	25.7	27.9	31.2
Prevention and public health services as % of THE	5.5	5.1	5.0	4.8	5.3	5.6
II. Selected per capita indicators for expenditures on health						
Total expenditure on health / capita at exchange rate	32	31	33	37	42	49
Total expenditure on health / capita at international dollar rate	119	123	130	143	163	174
General government expenditure on health / cap x-rate	15	14	14	15	19	23
General government expenditure on health / cap int. \$ rate	57	56	56	59	74	81

Source: World Health Organization

Appendix V

Distribution of Medical Specialties & Subspecialties in the Country

Specialties	Line Ministry Institutions in Positions	Provincial Institutions in positions	Total
1 Cardiologist	20	0	20
2 Resident Cardiologist	8	0	8
3 Resident Cardiac Electro physiologist	2	0	2
4 Neurologist	13	0	13
5 Resident Neurologist	2	0	2
6 Clinical Neuro Physiologist	1	0	1
7 Dermatologist	17	2	19
8 Rheumatologist	13	0	13
9 General Surgeon	44	31	75
10 V O G	48	38	86
11 Resident Obstetrician	4	0	4
12 Pediatrician	57	31	88
13 Anesthesiologist	62	16	78
14 ENT Surgeon	20	7	27
15 Eye Surgeon	26	14	40
16 Pediatric Surgeon	8	0	8
17 Orthopedic Surgeon	18	1	18
18 Plastic Surgeon	4	0	4
19 Neuro Surgeon	6	0	6
20 Cardio Thoracic Surgeon	10	0	10
21 Genito Urinary Surgeon	6	0	6
22 Gastro-Intestinal Surgeon	3	0	3
23 Gastroenterologist	2	0	2
24 Psychiatrist	23	1	24
25 T B & Chest Physician	9	7	16
26 Venereologist	6	5	11
27 Neonatologist	5	1	6
28 Pathologist	25	9	34
29 Radiologist	34	6	40
30 Micro-biologist	18	0	18
31 Bacteriologist	1	0	1
32 Pharmacologist	1	0	1
33 Haematologist	12	0	12
34 Histologist	1	0	1
35 Radiotherapist/Oncologist	16	0	16
36 Oncology Surgeon	6	0	6
37 Vascular Transplant Surgeon	2	0	2
38 Virologist	0	0	0
39 Mycologist	0	0	0
40 Nephrologist	4	0	4
41 Nephro Surgeon	1	0	1
42 Endocrinologist	1	0	1
43 Parasitologist	1	0	1
44 Entomologist	2	1	3
45 Epidemiologist	2	0	2
46 Immunologist	0	0	0
47 Urologist	2	0	2
48 Other Consultant	35	24	59

Appendix VI

Boards of Study and the Study Programmes they Supervise

Board of Study	Specialties/Certificates/Diplomas/Master/Degrees
Anesthesiology	Certificate of Competence in Anaesthesiology MD in Anaesthesiology
Community Medicine and Community Dentistry	M. Sc. in Community Medicine M. Sc. In Community Dentistry MD in Community Medicine MD in Community Dentistry
Clinical Oncology	MD in Clinical Oncology
Dental Surgery	Diploma in Hospital Dental Practice MS in Oral Surgery MS in Orthodontics MS in Restorative Dentistry
Dermatology	MD in dermatology
Family Medicine	Diploma in Family Medicine MD in Family Medicine
Forensic Medicine	Diploma in Legal Medicine MD in Forensic Medicine
Medicine	Diploma in Tuberculosis and Chest Diseases Doctor of Medicine in Medicine Board certification in Cardiology Cardiac Electrophysiology Endocrinology Gastroenterology Nephrology Neurology Neuro Physiology Respiratory Medicine Rheumatology & Rehabilitation
Medical Administration	M. Sc. In Medical Administration MD in Medical Administration
Microbiology	Diploma in Medical Microbiology MD in Medical Microbiology MD in Parasitology

Source: Postgraduate Institute of Medicine

Boards of Study and the Study Programmes they Supervise – Cont'd

Obstetrics and Gynecology	Diploma in Reproductive Health MD in Obstetrics and Gynaecology
Ophthalmology	MD in Ophthalmology
Otorhinolaryngology	MS in Otorhinolaryngology
Paediatrics	Diploma in Child Health MD in Paediatrics Board Certification in General Paediatrics Paediatric Neurology Paediatric Cardiology Paediatric Nephrology Neonatology Paediatric Intensive Care
Pathology	Diploma in Pathology MD in Pathology Diploma in Transfusion Medicine MD Transfusion Medicine
Psychiatry	Diploma in Psychiatry MD in Psychiatry
Radiology	MD in Radiology
Surgery	Master of Surgery in Surgery Board Certification in Cancer Surgery Cardiothoracic Surgery Gastroenterological Surgery Neurosurgery Orthopaedic Surgery Paediatric Surgery Plastic Surgery Genito Urinary Surgery Thoracic Surgery Transplant Surgery Vascular Surgery
Venereology	Diploma in Venereology MD in Venereology

Appendix VII

Labour Cost for Each Cost Center at Postgraduate Institute of Medicine

Cost Center	Salaries & Wages	Academic Allow.	Cost of Living Allow.	Acting Pay	Overtime	Holiday Payment	Language Prof. Allow.	Other Allow.	Total %	
Administration Unit	9,690,324.3		721,577.58	18,580.64	181,990.6	40,362.62	93,064.5	376,520	12,122,420.24	39.9
Education Unit	10,581,465.35	14,327.50	711,625		617,080.80	88,982.71	142,155.37	4,360.12	12,529,996.37	41.3
Education Supporting Unit	4,371,816.2	300,202.52	9,625	57,000.00	6,685.93		16,289.33	14,011.2	5,695,630.31	18.7
Total	24,643,605.91	314,530.0	1,732,827.5	75,580.64	2,325,757.3	129,345.3	251,508.8	894,891.0	30,338,036.04	100

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Appendix VIII

POSTGRADUATE INSTITUTE OF MEDICINE
UNIVERSITY OF COLOMBO

DIPLOMA IN MEDICAL MICROBIOLOGY CURRICULUM

Introduction

The Diploma is the first stage of a 3-part training programme conducted by the Board of Study in Microbiology for those who wish to specialise in the field of Medical Microbiology. A Diploma holder is entitled to work in a Medical Microbiological laboratory only under the supervision of a Consultant Microbiologist. The acquisition of this Diploma does not entitle to holder to Specialist status.

The training programme leading up to the Diploma consists mainly of laboratory and practical work, but also includes lectures, seminars, tutorials and assignments. It is an intensive, full-time course of 12 months duration, conducted by designated trainers in several centres approved by the Board for this purpose. All trainees selected to follow the course in any given year are trained together in these centres.

Objectives of training programme

Trainees who are awarded the Diploma in Medical Microbiology should have demonstrated:

1. basic knowledge of the aetiology, pathogenesis, common clinical features, epidemiology and prevention of infectious diseases prevalent in Sri Lanka.
2. basic knowledge of immunology and molecular biology in relation to infections.

Diploma holders will have the ability to perform:

3. routine microbiological tests with attention to quality assurance and laboratory safety.
4. basic sterilisation procedures and laboratory investigations with regard to sterility.
5. laboratory tests used in the diagnosis of common bacterial infections.
6. basic laboratory tests used in the diagnosis of common fungal diseases.
7. basic laboratory tests used in the diagnosis of common parasitic diseases.
8. basic laboratory tests used in the diagnosis of common viral diseases.

Programme outline

The programme is organised into 9 modules, each module varying in length from 2 to 12 weeks. They are as follows:

Module	Duration (weeks)
1. Orientation	3
2. General Bacteriology	8
3. Systematic Bacteriology	12
4. Virology	8
5. Mycology	4
6. Parasitology	4
7. Sexually Transmitted Infections	2
8. Immunology	4
9. Molecular Biology	2
Total	47

During each module, designated trainers will conduct not more than 4 hours of lectures and 10 hours of supervised bench work per week. Trainees are expected to spend the remaining hours in practising bench skills and in other forms of study as directed by their trainers.

Trainees will be permitted not more than 21 days leave for the entire year (including sick leave and maternity leave).

Assessment

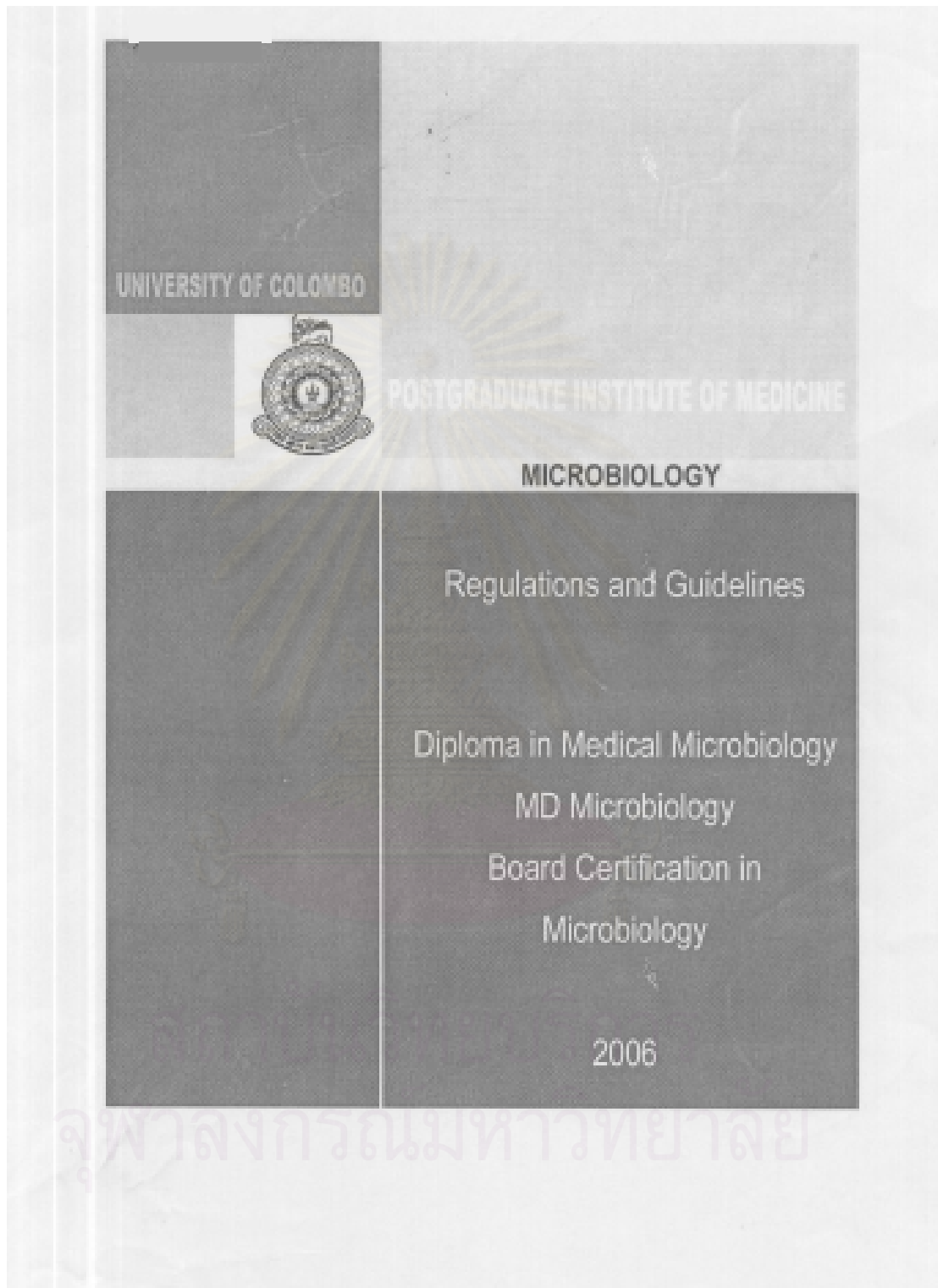
Trainers will be required to send progress reports on the trainees. These will include verification of satisfactory bench work, as well as attendance at lectures, demonstrations, tutorials and seminars. Unsatisfactory reports may result in candidates being discontinued from the training programme.

The Diploma in Medical Microbiology examination, conducted at the end of the training programme, consists of a written examination (both Multiple Choice Questions and Essay Questions), a practical examination (with several components) and an oral examination. Candidates who reach the stipulated standard for a pass will be awarded the Diploma in Medical Microbiology by the University of Colombo. The candidate who obtains the highest mark at the Diploma examination will be eligible for the Tissa Vitarana Gold Medal, provided that it is the candidate's first attempt, and an average minimum mark of 70% has been obtained.



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Appendix IX



Contents

1. PROGRAMME OF STUDY

2. REGULATIONS

3. DIPLOMA IN MEDICAL MICROBIOLOGY

- 3.1 Objectives
- 3.2 Programme components
- 3.3 Evaluation
- 3.4 Award of Diploma
- 3.5 Award of Tissa Vitarana Gold Medal

4. MD (MICROBIOLOGY)

- 4.1 Objectives
- 4.2 Programme components
- 4.3 Evaluation
- 4.4 Award of MD degree

5. BOARD CERTIFICATION AS A SPECIALIST

- 5.1 Post-MD training in Microbiology
- 5.2 Post-MD training in Parasitology
- 5.3 Post-MD training in Virology
- 5.4 Board Certification

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4.3.2 Dissertation

The report on the research project must be submitted in the form of a dissertation at least six months before the MD examination. The dissertation must conform to the format given in the guidelines to MD trainees.

The trainee may be questioned on the dissertation at the viva voce examination.

4.3.3 Final assessment

The MD examination will include:

- Two written essay type papers
- A practical examination
- A viva voce examination
- A MCQ paper may be set if considered necessary

An overall average of 50% will be required for a pass.

4.4 Award of MD degree

On successful completion of Stage 2, the candidate will be awarded the degree of MD.

5. BOARD CERTIFICATION AS A SPECIALIST

(Stage 3 of training programme)

5.1 Post-MD training in Microbiology

This will consist of 12 months of training locally as a Senior Registrar, and 12 months of training at a recognised centre overseas approved by the PGIM.

The 12 months local training can be done before or after the period of overseas training.

5.2 Post-MD training in Parasitology

This will consist of 12 months of training locally as a Senior Registrar, and 12 months of training at a recognised centre overseas, approved by the PGIM.

The 12 months local training can be done before or after the period of overseas training.

If the overseas training institution requires payment of a bench fee, the trainee may seek approval of the Board of Study to reduce the overseas training period to 9 months, and request the PGIM to pay the bench fee. In such cases, the stipulated period of local training will be increased from 12 to 15 months.

5.3 Post-MD training in Virology

This will consist of 12 months of training locally as a Senior Registrar and 12 months of training at a recognised centre overseas, approved by the PGIM. The 12 months of local training can be done en bloc or in 2 parts before or after the period of overseas training.

Appendix X

POSTGRADUATE INSTITUTE OF MEDICINE
UNIVERSITY OF COLOMBO
BOARD OF STUDY IN MICROBIOLOGY

**Post-MD training in Microbiology / Parasitology
FORMAT FOR PROGRESS REPORT**

1. Name of trainee:
2. Training institution / unit:
3. Name of supervisor:
4. Period covered by report: to (mm/dd/yy) (mm/dd/yy)
5. Description of work carried out by trainee
5.1 Routine clinical services (applicable to hospital-based appointments only)
5.2 Other clinical services
5.3 Research projects
5.4 Any other work of significance

6. Any training away from main institution / unit (if relevant)	
7. Meetings / conferences / seminars attended by trainee	
8. Any publications / presentations by trainee	
9. Interaction with colleagues and other staff	
9. Overall progress <i>General comments:</i> <i>Summary (underline appropriate comment)</i> Highly satisfactory / Satisfactory / Unsatisfactory / Very unsatisfactory	
Signature of supervisor	Date

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จุฬาลงกรณ์มหาวิทยาลัย

Appendix XI

Bench Training and Rotation in Specialist Laboratories for Medical Microbiology in First Year

Training in	Bench Rotation			Virology	Clinical Mycology	Resp. inf. /TB	Epidemiology	STD/AIDS	Immunology	Food & water
Weeks	12	12	12	2	2	2	2	2	2	2
FOM	/C	THK	MR I	MRI MRI		Chest Hospital Welisara	EPID Unit, Colombo	NSACP M	RI	MRI
FO	M/C	THK	MRI			FOM/Colombo				
			MRI							
THG		NIHS	SJGH							
FOM/P		MRI	THK							
FOM/P		MRI	NIHS							
M	RI	THG	SJGH							
M	RI	THG	SJGH							
THK		SJGH	FOM/P							
THK		SJGH	FOM/C							
SJGH			MRI							
SJGH			FOM/P							
NI	HS		THK							
NI	HS		THK							

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Appendix XII

Dissertation and Clinical Training Programme in Medical Microbiology from Second Year to Third Year

	Duration	Station
Dissertation	January – April	
1 st Clinical appointment	May – October	Outside Hospitals in Western Province
2 nd & 3 rd Clinical appointments	November – April	(Colombo)
4 th Clinical appointment	May – December	Specialized Hospital Labs
MD Examination	January	Hospitals in Western Province (Colombo)

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Appendix XIII

POST-GRADUATE INSTITUTE OF MEDICINE (Payable within 30 days from the date of issue)		
TRAVELLING CLAIM		
Head of Estimate :	Voucher No.	
Name of Officer :	Total Annual Salary	
Appointment :	Rate of Subsistence Allowance	
Department:		
*On University Service:		
1. Transport allowance (Details overleaf)	Rs.	cts.
2. Combine Allowance		
Prepared by:	BURSAR	
Checked by: F. NO.	Certified correct:	
Cheque No:	Head/Dept. of	
Date of Payment:	Payment	
Votes Ledger Folio No :	Recommended	Approved

	Senior Asst. Registrar.	Director.
		Rs.
Total Amount		
*State nature of duty performed	Received in Advance:	
	Balance Payable:	
	TOTAL :	
I CERTIFY that the above claim amounting to (in words) Rupees.....		
..... and cents..... contains a correct state of the travelling performed by me on the University Service, that travelling expenses were necessary and actually incurred, that the rates charged are fair and reasonable and in accordance regulations, and that the Journey was performed by the quickest possible route and in a manner involving least expenses to University having regard to the nature of service.		
Certified For Payment Officer Preferring Claim	
..... Asst. Bursar/Deputy Bursar	Date.....	
Date :		

YEAR 200.....		TIME		TRANSPORT ALLOWANCE				(a)		(b)		EXPLANATORY REMARKS (State reasons for staying more than 2 days in one place, and name of hotel, rest-house or boarding-house at which you lodged if Combined Allowance is being claimed.)
Month	Date	Departure	Arrival	1. Place of Starting	2. Place visited	Mode of conveyance	Fare Paid Rs. Cts.	Number of miles/km. travelled	Amount of mileage claimed	Combined Allowance Rs. Cts.	Additional Allowance if any Rs. Cts.	
						TOTAL						

I certify that the registration number of the motor car/motor cycle in which the travelling was done is and that it is registered in my name (if any travelling was done by hiring car, the receipt issued by the driver should be attached).

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Date : _____
 Claimant's Signature _____

Approved Director of Accounts (Name and Signature)

Appendix XIV

පියවනු ලබන මුදල 30 දින තුළදී කෙරෙනු ඇත. Payable within 30 days of issue.
 Appendix XIV
 පෞරුහ විද්‍යා කේන්ද්‍රයේ ප්‍රාථමික කාණ්ඩය
POSTGRADUATE INSTITUTE OF MEDICINE
 කොළඹ විශ්වවිද්‍යාලය
UNIVERSITY OF COLOMBO

වර්ෂය Financial Year ව්‍යවස්ථාපිත අංකය Voucher No.
 ප්‍රගමන Programme කෙටුම්පතේ අංකය Cheque No.
 ප්‍රවේශනා Project දිනය Date
 වස්තු පිටපත් Object Code මුදල් පොතේ අංකය Voucher Ledger Folio
 පියවනු ලබන්නා Payable to ණයකරු / ප්‍රවේශනා පොතේ අංකය Deposit/Advances Ledger Folio
 D කේෂිතය

දිනය Date	සේවය සපයනු ලැබූ කාර්යයන් හා සපයනු ලැබූ සේවාවන් විස්තර කිරීම සහ අනුමැතිය ලබා දුන් නිලධාරියාගේ සහතිකයක් Description of Services rendered, work executed or goods supplied and authorizing officer's certificate where necessary	මුදල Rate	රුපියල් Rs.
	<div style="border: 1px solid black; padding: 5px; margin: 0 auto; width: fit-content;"> PAYMENT APPROVED Director/DR/DB/SAR/AR/AN මෙහිදී පිටපත් කළ බව පෙනේ. Authority for payment and reference to file </div>		
Prepared by	සකස් කළ කාර්යාලීය නිලධාරී	මුළු මුදල Total	
Checked by	සකස් කළ කාර්යාලීය නිලධාරී		

මෙහි මෙහෙයුම් / සේවාවන් / කාර්යයන් හි පිටපත් අනුමැතිය ලබා දුන් බවට, ඒ පදනම මත මෙහෙයුම් / සේවාවන් / කාර්යයන් සම්බන්ධ වූ සියලුම පිටපත් සඳහා සේවාවන් සපයනු ලැබූ බවට සහතික කරමි.
 I certify from personal knowledge / from the certificates in the relevant files / overall / the supplies / Services / works were duly authorized and performed and that the payment of Rupees is in accordance with regulations / contract / fair and n

දිනය / Date /
 විශ්වාසීය නිලධාරියාගේ අත්සන සහ නිල නාමය / Signature and Designation of officer Certifying the

ලබා ගැනීමේ සහතිකය සඳහා ඔබට
 200 මුදල විසින්
 Received this day of 200
 of the above account the sum of Rupees

POSTGRADUATE INSTITUTE OF MEDICINE - UNIVERSITY OF COLOMBO
Details of Visiting Lecturers

Name of Lecturer

Course

Month & Date	Duration of Lecture Practical	Subject	No. of Hours

I certify that in the month of I have been given
lectures as per details above.

Date Signature of Visiting Lecturer

Recommended and forwarded

Date Signature Head of Department

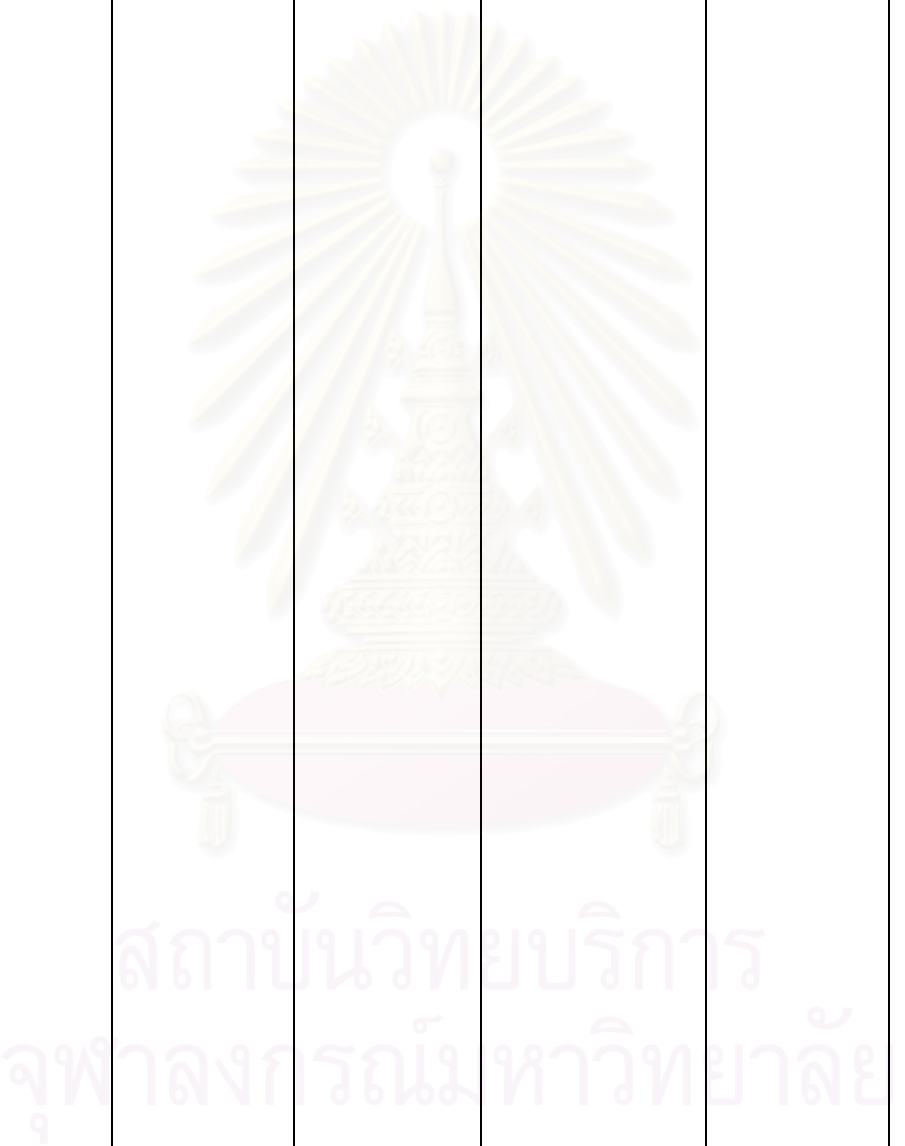
Dept. of

(Note: To be prepared in duplicate)

Appendix XV

Form for Labour cost

Month.....

No. Salary		Allowance	Hospitalization fee	Others	Total
					

Appendix XVI:

Form for Material Costs

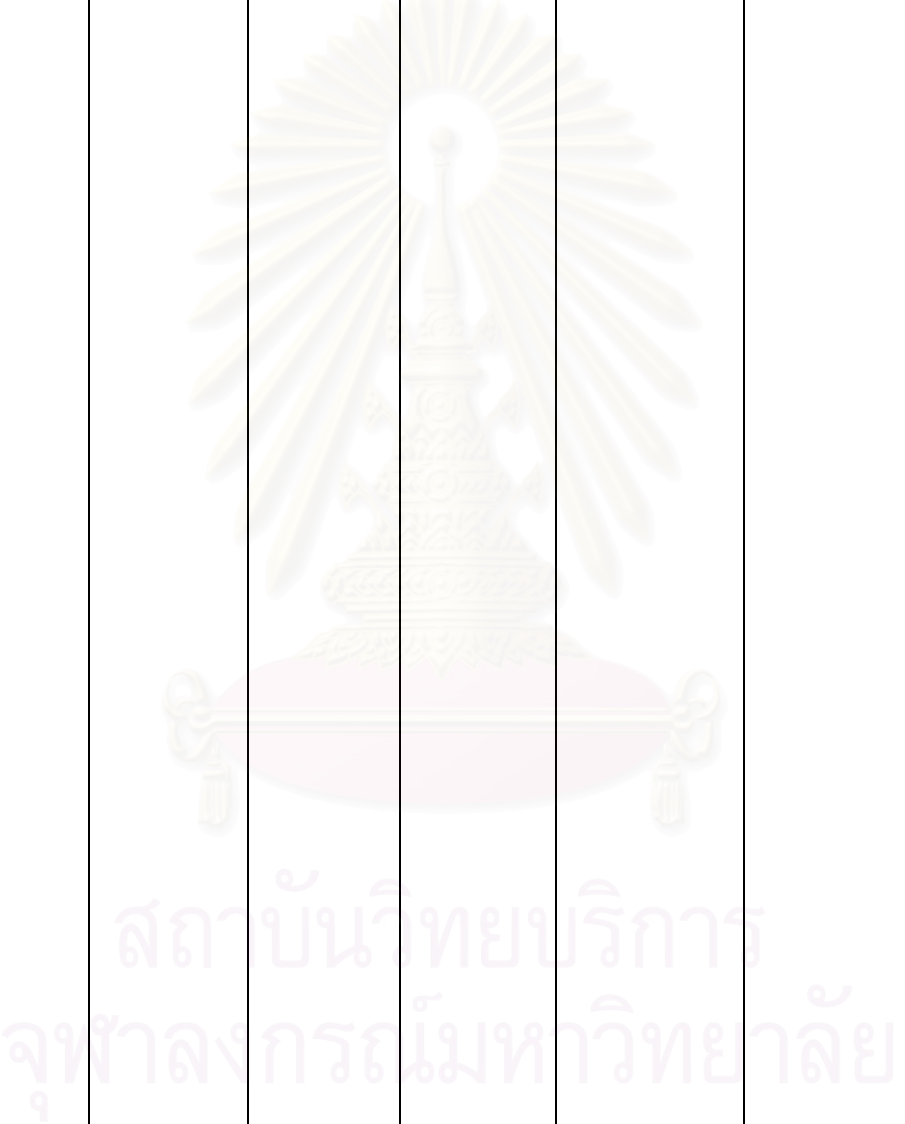
Month of

Cost Center	Office material	Household material	Teaching material	Water	Electricity	Telephone	Other

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Appendix XVII

Form for Capital assets

Name of Capital	Quantity	Price per unit (\$)	Total amount	Month, Year of acquirement	Time of utilization (Year)	Expiration of utilization (Month, Year)
						

BIOGRAPHY

Name	B H B Jeevani
Nationality	Sri Lankan
Permanent Address	32, Second Cross Street, Walpola, Matara, Sri Lanka.
Education	B. A. General Degree
Occupation	Planning & Programming Office
Working Place	Ministry of Healthcare & Nutrition Management Development & Planning Unit Colombo 10, Sri Lanka



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