DISTRIBUTION OF HEALTHCARE RESOURCES IN PENINSULAR MALAYSIA: AN EXAMINATION OF EQUITY WITH RESPECT TO GEOGRAPHY AND ALLOCATIVE PROCESSES

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2020

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THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PUBLIC HEALTH

FACULTY OF MEDICINE UNIVERSITY OF MALAYA KUALA LUMPUR

2020

UNIVERSITY OF MALAYA

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ABSTRACT

DISTRIBUTION OF HEALTHCARE RESOURCES IN PENINSULAR MALAYSIA: AN EXAMINATION OF EQUITY WITH RESPECT TO GEOGRAPHY AND ALLOCATIVE PROCESSES

On a country's pathway to Universal Health Coverage, it is important to ensure equitable healthcare provision and financing. There was a lack of evidence in equity of healthcare provision and financing across geographic areas in Peninsular Malaysia. This was despite the evidence that geographic factors directly and indirectly affect population health and healthcare services are mostly delivered at immobile healthcare facilities. In Malaysia's mixed public-private healthcare system, Ministry of Health Malaysia (MOH) has a geographically comprehensive provision network and the MOH resources are distributed through geographic-bound MOH administrative structures. The private sector, which concentrated on more affluent geographic areas, also plays a significant role in providing healthcare services in Peninsular Malaysia. Hence, this study was set out to assess the geographic healthcare equity across states in Peninsular Malaysia. It was, more specifically, to directly assess if the healthcare provision was provided according to healthcare needs across states in Peninsular Malaysia (i.e. horizontal equity in provision), and indirectly assess if the healthcare financing was pro-poorer states in Peninsular Malaysia (i.e. vertical equity in financing). This study also aimed to identify ways to improve the fairness of the healthcare allocative process and equity of healthcare resources distribution. Using regularly collected death registry and survey data from Department of Statistics and MOH, a novel approach, based on the concepts of Lorenz curve, Gini index, concentration curve and concentration index, were adopted to assess the horizontal and vertical geographic equity across states in Peninsular Malaysia in 1997 and 2012. Qualitative inquiry was also carried out to understand the factors influencing the allocation and to determine the fairness of the allocative processes. MOH decision

makers from various levels were interviewed. Using the Accountability for Reasonableness framework, a framework of four conditions (i.e. relevance, publicity, revision and regulation) for ensuring fairness of the allocative process, as a benchmark, MOH's success in the allocative process was evaluated. In general, quantitative analysis found that the distributions of overall financial expenditure for hospital care, number of acute beds for hospital care and financial expenditure of primary care in 1997 and 2012 were in line with the principle of horizontal equity in provision. Also, the distributions of MOH primary care financial resources and hospital acute beds were in line with the principle of vertical geographic equity in financing. Nevertheless, no concentrations of MOH hospital financial expenditure in wealthier sates were found. The qualitative inquiry confirmed that the MOH allocative process was geography-based. The operating budget allocation was historical, incremental and often dictated by previous development budget allocation across geographic areas. Evaluation of MOH's allocative process yielded recommendations such as improving dissemination of decisions and justifications and setting explicit regulations on the allocative process. The findings demonstrated that the geographic equity in Peninsular Malaysia can be further enhanced by ensuring more MOH hospital expenditure are spent in poorer states. The recommendations on the allocative process could help MOH to mitigate unjustified external influence asserted upon the decision makers. (487 words)

Key Words: Healthcare Resources, Geographic Equity, Fair Allocative Process

ABSTRAK

TABURAN SUMBER PERKHIDAMATAN KESIHATAN DI SEMENANJUNG MALAYSIA: PEMERIKSAAN KESAKSAMAAN BERKENAAN DENGAN GEOGRAFI DAN PROSES PENGAGIHAN

Dalam perjalanan sebuah negara mencapai Liputan Kesihatan Sejagat (Universal Health Coverage), amat penting untuk memastikan pembekalan dan pembiayaan perkhidmatan kesihatan yang saksama. Beberapa faktor kawasan geografi secara langsung dan tidak langsung membawa kesan kepada kesihatan populasi setempat dan perkhidmatan kesihatan yang biasanya hanya dapat diterima di kemudahan kesihatan tidak bergerak. Walaupun begitu, bukti bagi kesaksamaan pembekalan dan pembiayaan perkhidmatan kesihatan di antara kawasan-kawasan geografi di Semenanjung Malaysia adalah berkurangan. Dalam sistem kesihatan awam-swasta di Malaysia, Kementerian Kesihatan Malaysia (KKM) mempunyai rangkaian perkhidmatan komprehensif dari segi geografi dan sumber KKM diedarkan melalui struktur pentadbiran KKM yang juga mengikut sempadan geografi. Walau bagaimanapun, sektor kesihatan swasta yang tertumpu di kawasan geografi yang lebih kaya juga memainkan peranan penting dalam perkhidmatan penjagaan kesihatan di Semenanjung Malaysia. Oleh itu, kajian ini bertujuan untuk menilai kesaksamaan perkhidmatan kesihatan geografi di antara negeri di Semenanjung Malaysia. Lebih khusus, kajian ini menilai secara langsung sama ada perkhidmatan kesihatan disediakan mengikut keperluan kesihatan di peringkat negeri di Semenanjung Malaysia (iaitu kesaksamaan "melintang" bagi penyediaan perkhidmatan) dan secara tidak langsung sama ada pembiayaan perkhidmatan kesihatan adalah lebih kepada negeri yang lebih miskin di Semenanjung Malaysia (iaitu kesaksamaan "menegak" menegak bagi pembiayaan perkhidmatan). Kajian ini juga bertujuan untuk mengenalpastikan cara untuk meningkatkan keadilan proses peruntukan perkhidmatan kesihatan dan kesaksamaan pengagihan sumber perkhidmatan kesihatan. Menggunakan data pendaftaran kematian dan data tinjauan dari Jabatan Perangkaan Malaysia dan KKM,

satu pendekatan bahru yang berdasarkan konsep Lorenz curve, Gini index, concentration index dan concentration index, telah digunakan untuk menilai kesaksamaan geografi melintang dan menegak di antara negeri di Semenanjung Malaysia pada tahun 1997 dan 2012. Siasatan kualitatif juga dijalankan untuk memahami faktor-faktor yang mempengaruhi peruntukan dan menentukan keadilan proses-proses peruntukan. Pembuat keputusan KKM dari pelbagai peringkat ditemubual. Dengan menggunakan kerangka Accountability for Reasonableness, iaitu kerangka empat syarat (iaitu perkaitan, publisiti, semakan dan peraturan) bagi keadilan proses peruntukan sebagai penanda aras, kejayaan KKM dalam proses peruntukan dapat dinilai. Secara amnya, analisis kuantitatif mendapati bahawa pengagihan perbelanjaan kewangan secara keseluruhan bagi perkhidmatan hospital, bilangan katil akut bagi perkhidmatan hospital dan perbelanjaan kewangan perkhidmatan primer pada tahun 1997 dan 2012 adalah selaras dengan prinsip kesaksamaan melintang dalam peruntukan. Selain itu, pengagihan sumber kewangan perkhidmatan kesihatan primer KKM dan katil akut hospital KKM adalah sejajar dengan prinsip kesaksamaan geografi menegak dalam pembiayaan. Walau bagaimanapun, didapaiti bahawa tiada kelebihan perbelanjaan kewangan KKM hospital di negeri-negeri yang lebih kaya. Siasatan kualitatif mengesahkan bahawa proses peruntukan KKM berasaskan geografi. Peruntukan belanjawan operasi adalah mengikut perbelanjaan lepas (historical), semakin menambah (incremental) dan sering ditentukan oleh peruntukan belanjawan pembangunan sebelumnya di antara kawasan geografi. Penilaian proses peruntukan KKM menghasilkan saranan seperti memperbaiki cara penyebaran keputusan serta justifikasi keputusan peruntukan dan menetapkan peraturan yang jelas mengenai proses peruntukan. Penemuan menunjukkan bahawa kesaksamaan geografi di Semenanjung Malaysia dapat dipertingkatkan lagi dengan memastikan lebih banyak perbelanjaan hospital KKM dibelanjakan di negeri-negeri yang lebih miskin. Cadangan

mengenai proses peruntukan boleh membantu KKM untuk mengurangkan pengaruh luaran yang tidak adil yang dikenakan terhadap pembuat keputusan. (487 perkataan)

Kata Kunci: Sumber Kesihatan, Kesaksamaan Geografi, Keadilan Proses Pengagihan

University

ACKNOWLEDGEMENTS

Firstly, I would like to express my sincere gratitude to my supervisor Prof. Dr. Ng Chiu Wan for the continuous support over the long seven years of my DrPH study. Her teachings and works led me into the field of health system research and health economics. I have learned to approach research meticulously under her guidance. Most importantly, without her patient and encouragement, I would have given up completing the thesis.

I would like to thank my second supervisor Prof. Dr. Victor Hoe Chee Wai for spending his valuable time helping me to improve my research and thesis. My sincere thanks also go to my former supervisor Prof. Dr. Chan Chee Khoon. He was instrumental in emboldened me to choose the path of researching the topic in this thesis. I could not imagine myself managing such a research project. It has been a great learning experience. I crossed into unfamiliar fields and it certainly widened my horizon.

I thank the Government of Malaysia and the Ministry of Health (MOH) for funding my scholarship and allow me to research on the MOH. My appreciation also goes to the dozens of MOH officers that helped me to gain official access to the crucial unpublished data from Malaysia National Health Account and Malaysia National Health and Morbidity Survey and shared their experience and wisdom during the study interviews.

Last but not the least, I would like to thank my family. The nurturing and education provided by my mother and late father, who passed away during my DrPH study, laid the foundation for me to reach my full potential. I hope I make you proud parents. My wife, my life partner for the past 9 years, deserves special gratitude. She is the cornerstone of my life and our young family. Without her perseverance and sacrifices, I would not be able to complete the thesis while bringing up our three lovely young children.

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LIST OF SYMBOLS AND ABBREVIATIONS

- 95% CI : 95% Confidence Interval
- A4R : Accountability For Reasonableness
- AMO : assistant medical officers
- CC : Concentration Index
- CI : Concentration Curve
- CSDH : Commission on Social Determinants of Health
- DG : Director-General
- DHSS : Department of Health and Social Security
- DOSM : Department of Statistics Malaysia
- DI : Difference Index
- EPU : Economic Planning Unit
- ET : expenditure target
- GI : Gini Index
- ICPHC : International Conference on Primary Health Care
- IDI : In-depth Interview
- IHSR : Institute of Health Systems Research
- IPH : Institute of Public Health
- ISO : International Organization of Standardization
- KI : Kakwani Index
- LC : Lorenz Curve
- MCDA : multi-criteria decision analysis
- MDG : Millennium Development Goal
- MNHA : Malaysia National Health Accounts
- MOD : Ministry of Defence

- MOE : Ministry of Education
- MOF : Ministry of Finance
- MOH : Ministry of Health
- MP : Malaysia Plans
- NCD : non-communicable disease
- NGO : non-government organisation
- NHMS : National Health and Morbidity Survey
- NHS : National Health Service
- NICE : National Institute for Health and Care Excellence
- OECD : Organisation of Economic Cooperation and Development
- OOP : out-of-pocket
- PHFS : Private Healthcare Facilities and Services (Act)
- RAWP : Resource Allocation Working Party
- SDG : Sustainable Development Goal
- SHA : System of Health Accounts
- SHD : State Health Department
- SMR : Standardised Mortality Ratio
- THE : total health expenditure
- T&CM : traditional and complementary medicine
- U65 : under 65 (years old)
- UHC : Universal Health Coverage
- UN : United Nations
- WHO : World Health Organisation

CHAPTER 1: INTRODUCTION

"In these goals and targets, we are setting a supreme ambitious and transformational vision. We envisage a world... with equitable and universal access to quality education at all levels, to health care and social protection, where physical, mental and social well-being are assured" – The 2030 Agenda for Sustainable Development, United Nations (2015)

1.1 Introduction

This Chapter provides an overall introduction to this thesis. Section 1.2 introduces the concept of Universal Health Coverage (UHC) and the concern of an initial worsening of health equity as countries progress on the pathway to UHC. Section 1.3 and Section 1.4 further explore two integral facets of healthcare equity, i.e. equitable healthcare access and financial risk protection, and then focus on the geographic dimension of healthcare equity. Section 1.5 discusses the cardinal role of an equitable allocative process of healthcare resources in achieving healthcare equity. Section 1.6 presents a brief review of the evidence on healthcare equity in Malaysia. These sections identify the research gap for geographic healthcare equity in Peninsular Malaysia and provide the basis for research objectives of this study. Overall and specific research objectives are presented in the following Section 1.7 and the conceptual framework of the study is outlined in Section 1.8. The public health significances of the study are highlighted in Section 1.9. The final Section 1.10 provides the overall outline of the thesis.

1.2 Universal Health Coverage and Healthcare Equity

In September 2015, during the United Nations General Assembly, Malaysia together with other leading nations of the world, adopted a new development agenda for the post Millennium Development Goals (MDGs) era (UN, 2015). The new 17 Sustainable Development Goals (SDGs) comprise a broad range of economic, social and environmental objectives. It was envisaged that if the world could work together towards the achievement of these objectives, the global community would become more sustainable, peaceful and inclusive. Three of these 17 SDGs are devoted specifically for

health and are associated with 13 targets (Table 1-1).

Sustainable Development Goal 3: Ensure healthy lives and promote well-being for all at all ages		
Health Targets in Sustainable Development Goal 3		
3.1	By 2030, reduce the global maternal mortality ratio to less than 70 per 100,000 live births	
3.2	By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1,000 live births and under-5 mortality to at least as low as 25 per 1,000 live births	
3.3	By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases	
3.4	By 2030, reduce by one third premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being	
3.5	Strengthen the prevention and treatment of substance abuse, including narcotic drug abuse and harmful use of alcohol	
3.6	By 2020, halve the number of global deaths and injuries from road traffic accidents	
3.7	By 2030, ensure universal access to sexual and reproductive health-care services, including for family planning, information and education, and the integration of reproductive health into national strategies and programmes	
3.8	Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all	
3.9	By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	
3.A	Strengthen the implementation of the World Health Organization Framework Convention on Tobacco Control in all countries, as appropriate	
3.B	Support the research and development of vaccines and medicines for the communicable and non- communicable diseases that primarily affect developing countries, provide access to affordable essential medicines and vaccines, in accordance with the Doha Declaration on the TRIPS Agreement and Public Health, which affirms the right of developing countries to use to the full the provisions in the Agreement on Trade-Related Aspects of Intellectual Property Rights regarding flexibilities to protect public health, and, in particular, provide access to medicines for all	
3.C	Substantially increase health financing and the recruitment, development, training and retention of the health workforce in developing countries, especially in least developed countries and small island developing States	
3.D	Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks	

Table 1-1: Sustainable Development Goal 3 & 13 Health Targets

Source: WHO (2015)

Five of the 13 targets (Health Targets 3.1, 3.2, 3.3, 3.7 and 3.b) build on the achievements of MDGs in reducing maternal mortality, child mortality, infectious diseases and improving access to vaccines, medicines, and sexual and reproductive health

services; and set sights on new targets on non-communicable diseases (NCDs), mental health, substance abuse, injuries, health impact from hazardous chemicals, water and soil pollution and contamination, and tobacco control (WHO, 2015). On top of these, achieving UHC itself has been set as a new goal as the third SDG. The target of achieving UHC provides an overall framework for the implementation of other health targets and addressing linkages with health-related targets in other SDGs (WHO, 2015). Thus, the adoption of SDGs reinforces the commitment of all nation-states to ensure their health systems attain UHC, and the milestone is to achieve UHC in all nations by 2030.

Despite being a new target in SDG, UHC is not a new concept. It is a long sought-after global public health policy. It represents international commitment to the right to health as one of the fundamental human rights (UN, 1948). The origin of this policy can be traced to the movement of "Health for All', which started in the 1970s (WHO, 2010). The spirit of this movement was embodied in the Declaration of Alma-Ata during the International Conference on Primary Health Care (ICPHC, 1978). The Malaysian Government's commitment to "Health for All" and UHC can be dated back to this conference as Malaysia was one of the signatories of Declaration of Alma-Ata in 1978.

UHC is defined as all people receiving quality health services that meet their needs without being exposed to financial hardship in paying for the services (WHO, 2013b). The World Health Organization (WHO) used the now famous cube (Figure 1-1) to illustrate the three-dimensional approach towards UHC (WHO, 2010). The three dimensions that policymakers need to make trade-offs in the progress towards UHC, are the proportion of the population to be covered ("breadth"), the range of services to be made available ("depth"), and the proportion of the total cost to be met ("height").



Source: Reproduced from WHO (2010)

Figure 1-1: Three Dimensions to consider when moving towards universal coverage

From the research point of view, UHC can be examined from two perspectives: "the provision of, and access to, high-quality health services; and financial risk protection for people who need to use these services" (WHO, 2013a, p. 11). In other words, the first two dimensions of population and services coverage can be combined as the problem of healthcare services coverage in research. Hence, the research issue here is about what needed services are to be provided and whom those services should cover. At the same time, the third dimension of cost coverage can be translated into financial risk protection when the problem is tackled from the demand-side (i.e. perspective of people needing and receiving healthcare services). The research issue here is about whether people with less ability-to-pay are protected from catastrophic healthcare expenditure. Taken together, for healthcare services coverage, UHC provides a picture of a system in which services are made available and accessible to people according to their health needs. For financial risk

protection, UHC envisages that no other fundamental human rights such as food, housing and education should be sacrificed in exchange for needed healthcare.

What is the linkage between UHC and healthcare equity? Although debate on concepts of equity and its applications in healthcare continues, principles defined by Whitehead were among the most often quoted (P. Braveman, 2006; J. A. Macinko & Starfield, 2002). According to Whitehead (1992), the basic premise of equity in healthcare is that all people shall have equal access to needed healthcare regardless of their "lack of income, race, sex, age, religion or other factors not directly related to the need of care". It is obvious that this premise befits the healthcare services coverage facet in UHC. To ensure "equal access to needed healthcare" the population coverage should be as many or as "broad" as possible, and the range of services should be as comprehensive or as "deep" as possible for all. Also, by stating that access to care is not to be affected by "lack of income", equitable healthcare principles also encompass the financial risk protection facet of UHC. These suggest that principles of equity are deeply embedded in the basic tenets of UHC.

In practice, to achieve UHC, most health systems tend to fall short of full universality and many aim for the full breadth of population coverage by settling for either "limited" or "strategic" depth and height instead (Frenz & Vega, 2010). The example of the former is the implementation of a minimum package of cost-effective treatment for all (Bobadilla, 1998) and the latter is the scaling up of specific programmes, which is especially important for disadvantaged groups (e.g. maternal and child health program) (C. G. Victora et al., 2003). These strategies emphasise "equal access" to an essential package of healthcare for the population while the system works towards obtaining more resources to provide a greater range of services.

Although the principles of equity were often considered implicitly embed in UHC, it was found that achieving UHC does not guarantee more equitable healthcare distribution

(Hanratty, Zhang, & Whitehead, 2007; Rodney & Hill, 2014). E. van Doorslaer, Masseria, and Koolman (2006) found inequitable pro-rich access to specialist hospital services in all the 21 OECD countries they studied1, whose healthcare systems are deemed to be universal (at or near coverage in breadth). The systematic review by Hanratty et al. (2007) also revealed consistent empirical evidence of pro-rich specialist hospital service utilisation in Canada, Finland, the Netherlands, and parts of the United Kingdom.

For developing countries making strides towards UHC, concurrent improvement of equity in healthcare coverage has become a cause of concern (Gwatkin & Ergo, 2011). Some postulated that a new public health intervention, which is not specifically targeting disadvantaged groups, would initially reach the better-off segments of society and only later "trickle down" to the less well-off population (C. G. Victora, Vaughan, Barros, Silva, & Tomasi, 2000). This gave rise to the proposition of "inverse equity hypothesis", as the corollary of the more than 40-year-old "inverse care law" (Hart, 1971), which states that health inequity would initially worsen with the introduction of health interventions and these inequities would only start to reverse when those of higher socioeconomic status has attained maximum health benefit gains, where substantial further improvement of health status is unlikely, allowing those of lower socioeconomic status to gain greater access to the interventions (C. G. Victora et al., 2000).

¹ The studied countries included Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Mexico, Netherlands, Norway, Portugal, Sweden, Spain, Switzerland, United Kingdom, United States.

Gwatkin and Ergo (2011) noticed an increasing volume of empirical evidence suggesting the validity of this hypothesis. For example, WHO reported initial increasing survival gaps between rich and poor in 13 out of 21 developing countries which recorded diminishing under-5-mortality rate in the period between 1986 and 2001 (WHO, 2005). These were described as countries experiencing the "trickle down" effect when moving from the extreme patterns of "exclusion of massive deprivation" (i.e. low coverage among all but the highest socioeconomic groups) to "exclusion of marginalisation" (i.e. high coverage among all groups but the lowest socioeconomic groups) (WHO, 2005).

Another analysis of 40 countries covering the period between 1990 and 2006 revealed unsatisfactory increasing, stagnant or small declining maternal and child healthcare coverage gap, between the richest and poorest wealth groups within the countries (Boerma, Bryce, Kinfu, Axelson, & Victora, 2008). These 40 developing countries in Africa, Asia, Europe and America recorded an average of 42.7% maternal and child healthcare coverage gap between the richest and poorest wealth groups. There were four countries with widening coverage gaps, 17 countries with less than a one percentage point annual reduction (stagnant) and 16 countries with reductions of between one to two percentage points (small decline). Only three countries recorded more than two percentage points reduction. Encouragingly, later analyses suggested that many countries were able to circumvent the initial worsening of health equity described by "inverse equity hypothesis" on their path to achieving UHC, perhaps due to recognition of weaknesses of indiscriminate universal public health programmes (i.e. not favouring most disadvantaged groups) and the need to implement strategies and interventions which are pro-poor or pro-rural populations (C. G. Victora et al., 2017; Cesar G. Victora et al., 2012).

This empirical evidence on maternal and child healthcare exemplify the importance of why components of equitable healthcare coverage need to be measured and monitored on a country's pathway to UHC. As Malaysia has committed to and is striving towards achieving UHC as stated in target 3.8 of SDG, continuous assessment of equitable healthcare coverage should be among the country's top health agendas.

1.3 Equitable Healthcare Coverage

Before addressing the status of healthcare equity in Malaysia, the term "healthcare equity" used in this thesis is briefly clarified here (A more in-depth discussion will be presented in Section 2.3). While "equality" means "the state of being equal, especially in status, rights, or opportunities", "equity" means "the quality of being fair and impartial" ("Oxford Living Dictionaries," 2017). In health, inequity is often defined as the unfair and avoidable inequalities or disparities among different categories of people (Whitehead, 1992). However, achieving "health equity", which means all people from different categories or social groups attaining equal level of health status except the health disparities which originated from biology variation (Whitehead, 1992), is often seen as a larger multi-sectorial aspiration rather than a target to be accomplished by the healthcare sector alone. Hence, an often-operationalised definition of equity in the health sector is "healthcare equity", which denotes a pragmatic goal that all people should have access to needed essential healthcare services regardless of their social background (Whitehead, 1992). As such, in this thesis, an equitable healthcare coverage indicates a status where all people shall have equal access to needed healthcare regardless of their "lack of income, race, sex, age, religion or other factors not directly related to the need of care" (Whitehead, 1992). This can be understood as the principle of "equal treatment of equal need" (Lu et al., 2007).

It is important to note that ill-health and healthcare needs were repeatedly found to be unequally distributed among different subgroups of population such as those defined by socioeconomic status, class and ethnicity (Bleich, Jarlenski, Bell, & LaVeist, 2012). It was often documented that, within countries, those less wealthy or from lower socioeconomic groups were generally less healthy (Bleich et al., 2012; Gwatkin, Bhuiya, & Victora, 2004), which presumably means that they would need more healthcare. Hence, in order to assess healthcare equity, which emphasises on "equal treatment for equal need", assessment of healthcare coverage ought to take into consideration the healthcare needs of people from different social backgrounds.

For example, earlier evidence from the assessment of hospital specialist service coverage in developed countries (Hanratty et al., 2007; E. van Doorslaer, Masseria, et al., 2006) (as was described in Section 1.2) had adjusted for differential health needs. In these studies, healthcare needs were predicted according to age, sex and health status (these variables were considered "actual need characteristics") while the effect of other socioeconomic status variables such as income, education, and place of residence are being standardised or "neutralised by their being set at their sample means in the prediction stage". (E. van Doorslaer, Masseria, et al., 2006) The resulting predictions were the "expected-healthcare needs" which is defined as "the amount of medical care a person would have received had that person been treated the same as others with the same need characteristics, on average". (E. van Doorslaer, Masseria, et al., 2006) The distribution of healthcare utilisation was compared to the expected-healthcare needs according to income-groups. The findings showed that the rich were using specialist hospital services more than their expected-healthcare needs. In other words, in the context of these studies, the rich were provided with healthcare relatively more than what they needed. In line with the concept of healthcare equity discussed earlier, where healthcare utilisation is deemed equitable when people have access to healthcare services according

to their needs regardless of "factors not directly related to need of care", this evidence explicitly confirms the presence of healthcare inequity.

In contrast, the other earlier examples of assessment of maternal and child healthcare coverage in developing countries (Boerma et al., 2008; Cesar G. Victora et al., 2012; WHO, 2005) (as described in Section 1.2) were not adjusted for differential health needs of different wealth groups. Using the narrow definition of healthcare equity in this thesis, these studies only indicated healthcare inequality, instead of inequity. However, as the poorer individuals presumably needed more healthcare, a pro-rich unequal healthcare coverage is argued to be sufficient to indirectly indicate healthcare inequity (O'Donnell et al., 2007).

Due to the interest in measuring healthcare equity, instead of equality, the above described inequity measurement has been developed into a principle method of testing the socioeconomic status-related inequity in healthcare utilisation. Many more studies have applied such analysis by using household interview surveys (Lu et al., 2007; J. Macinko & Lima-Costa, 2012; O'Donnell, van Doorslaer, Wagstaff, & Lindelow, 2008; Shin & Kim, 2010; Somkotra, 2011; Eddy Van Doorslaer, Clarke, Savage, & Hall, 2008; Vikum, Krokstad, & Westin, 2012). These studies assessed if there were "equal treatment for equal need" regardless of individuals' socioeconomic backgrounds. In addition to the assessment by socioeconomic status, another common perspective is the inequity among those in different geographic regions within a country. The difference in geography can be of administrative areas (such as provinces or regions) or rural-urban residences (Lu et al., 2007; J. Macinko & Lima-Costa, 2012; Somkotra, 2012; Somkotra, 2011).

One of the causes of healthcare inequity among different socioeconomic groups could be different healthcare package entitlement or affordability to different socioeconomic groups. If poorer people are limited to minimal essential health service package but richer
people can afford package with much greater "depth" and are able to receive those services upon payment, poorer people would likely have less access to healthcare than their richer counterparts with same healthcare needs, especially when the services needed are expensive and not in the minimal essential package list. Even within a country or health system, there can be multiple healthcare packages catering for different groups in the population. Studies on healthcare inequity among different socioeconomic groups would hence provide policy input to systems where different socioeconomic groups were covered by very different healthcare packages.

Health funds of many public health systems are allocated through geographic-bound organisations or administrative structures (Rice & Smith, 2001b). Hence, in addition to inequity among socioeconomic groups covered by different health packages, healthcare inequity could arise among people due to residence in different geographic areas. If people in an area are covered by a similar (if not identical) health package and health funds are allocated through geographic-bound organisations or administrative structures, the healthcare services that a person has access to depend more on health funds allocated to the area where the person resides. In countries where people are covered by the same package or different packages with similar "depth", research findings of healthcare inequity between geographic areas can provide direct policy impact arising from the distribution of resources allocated according to geographic areas within those health systems. This particular focus of inequity will be termed as "geographic healthcare equity" in this thesis from here on. As the resources of public health services in Malaysia are distributed through geographic administrative areas (a more detailed description is provided in Section 3.5), geographic healthcare equity is an important angle to be examined to ascertain the equity in healthcare coverage of the Malaysian Health System.

1.4 Financial Risk Protection

As discussed in Section 1.2, from a research point of view, UHC can be examined from two perspectives: - i.e. healthcare coverage and financial risk protection. The equity of healthcare coverage discussed in Section 1.3 refers to the provision of healthcare. At the same time, concepts of healthcare equity have been introduced and operationalised in the financing of healthcare services as well. The concept of equity in healthcare financing can be operationalised with the concept of financial risk protection.

Healthcare equity in financing is often based on the concept of vertical equity. The concepts of vertical (and horizontal) equity originated from the fundamental principle of justice (Gillon, 1994). Aristotle stated that "equals should be treated equally (horizontal equity) and unequals unequally (vertical equity)". The concept of horizontal equity in health is based on Aristotle's principle and requires that individuals be treated equally if their status is same, while vertical equity requires that individuals be treated appropriately unequally according to their differential status (Gillon, 1994). The healthcare coverage discussed earlier emphasised on "equal treatment on equal needs" and it is a form of horizontal equity in healthcare provision.

To provide financial risk protection to people, the principle of vertical equity in healthcare financing is often applied. This principle advocates that people should contribute to healthcare financing according to their ability-to-pay regardless of their healthcare needs or amount of healthcare used (Mossialos & Dixon, 2002). Richer people should not only pay more in actual quantum but also pay proportionately more in relation to their income compared to poorer people (Mossialos & Dixon, 2002). In doing so, poorer people would be less susceptible to financial catastrophic expenditure (i.e. spending a large portion of household's available income) and impoverishment (i.e. falling into poverty) when they utilise more expensive healthcare services. To assess vertical equity of healthcare financing, researchers may examine the proportion of financial contributions of different socioeconomic groups to the health system or measure the occurrence of financial catastrophic expenditure and impoverishment of healthcare utilisation. The latter is translated into the concept of financial risk protection. When people are not exposed to financial catastrophic expenditure or impoverishment caused by healthcare usage, the people are provided with healthcare financial risk protection.

In short, Sections 1.3 and 1.4 have demonstrated that to achieve UHC not only the provision of healthcare should be horizontally equitable but also the financing of healthcare should be vertically equitable. The next concern arises from here is what could health systems do if the provision and financing of healthcare were found to be inequitable.

1.5 Equitable Healthcare Resources Allocative Process

The distribution or allocation of healthcare resources is the outcome of a set of processes of resource allocation or priority setting. In the reality of limited available healthcare resources and ever-increasing healthcare demands due to the proliferation of medical science and technology, how do health systems distribute the scarce resources among their people? For this, attention is turned to the process of decision-making leading to the allocation or distribution of resources. This process can be termed as 'healthcare resources allocative process'. The fact that many public health systems are allocating healthcare resources according to geographic areas (Rice & Smith, 2001b) leads to an important policy question to ensure equitable health coverage - how is the amount of resources allocated to each geographic area being decided?

For many health systems, prospective health budgets are set to help contain everincreasing health expenditures (Rice & Smith, 2002). Numerous different mechanisms, such as budgeting according to historical precedent or local performance, are then used to determine the portion of funds allocated to providers within the set budget (Smith, 2008a). Following the publication of the Resource Allocation Working Party's (RAWP) formula in England in the 1970's (DHSS, 1976), researchers have been developing mechanisms based on mathematical formulae to promote allocation of countries' health funds across geographic areas according to population health needs and ability-to-pay in order to promote equitable healthcare coverage (Finn Diderichsen, 2004; F. Diderichsen, Varde, & Whitehead, 1997; Rice & Smith, 1999; Rice & Smith, 2001a; Zere et al., 2007). These efforts have been increasingly adopted by developing countries, such as Ghana, Zambia, Namibia, South Africa and Zimbabwe, and attempts have been made to assess the impact of such policies on equity in these countries (Asante, Zwi, & Ho, 2006; Chitah, 2010; Finn Diderichsen, 2004; Di McIntyre et al., 2007).

Other than prescribing direct mathematical formulae for healthcare resource allocation, other researchers have also been developing equitable or fair processes based on ethical principles (Calltorp, 1999; Fox & Leichter, 1991; Ham, 1997; Hasman, McIntosh, & Hope, 2008; G. Mooney, 2005; Sabik & Lie, 2008). There were many ethical principles to be considered in the resource allocative process. These ethical principles include but are not limited to the 'need' principles, utilitarianism (or health maximisation), egalitarian (including 'fair innings' model), the "lottery principle", the "rule of rescue", choicism (or the "just desert"), individualism and communitarianism (Cookson & Dolan, 2000; Kasemsup, Schommer, Cline, & Hadsall, 2008; Williams, Robinson, & Dickinson, 2012). Some of these principles, such as utilitarianism, egalitarian, individualism and communitarianism were drawn from broader ethical or philosophical considerations. Others such as the "rule of rescue" and the "just desert" principles were developed more specifically in the context of healthcare resource allocation. These ethical principles are not mutually exclusive. To understand this, each principle mentioned is briefly explained and compared here. First, those advocates of need principles propose that healthcare should be provided according to the 'needs' of the individual. The definition of 'need' varies and could be the level of sickness, the amount of health status or quality of care that can be improved ('the capacity of benefit'), the resources needed to exhaust the capacity of benefit (Cookson & Dolan, 2000). However, as the cost and benefit of each healthcare modality is different, the amount of benefit gained is not proportionate to the amount of healthcare spent on different healthcare services. Hence, the amount of healthcare resources spent will sometimes bring more benefits, and sometimes less.

On the other hand, proponents of utilitarianism or the maximising principle suggest that healthcare should be distributed to achieve maximum 'benefit' for the population, regardless whether it is distributed according to individual's needs or not. Again, 'benefit' may be defined or quantified differently. 'Benefit' could be the length of life prolonged, the level of quality of life improved, or the combination of level and length of life with quality improvement (Cookson & Dolan, 2000). Following this principle, there could be a very sick person not given any or less health services if the resources spent on another healthier person will bring a higher aggregated amount of 'benefit' gained.

In healthcare, egalitarianism is best characterised by the notion that society solidarity or the need of society should take precedence over individual demands (Williams et al., 2012, p. 16). Proponents of the egalitarian principle would advocate healthcare to be allocated in a way that 'health' inequality among people is kept to a minimum (Cookson & Dolan, 2000). The benchmark of equal 'health' varies again. 'Health' could be the lifespan, the quality of life, or even the 'opportunity of lifetime health'. One of the applications of the egalitarian principle is the 'fair innings' model proposed by Alan Williams who advocates the achievement of 'a societal expected lifetime for everyone' (Cookson & Dolan, 2000; Kasemsup et al., 2008; Williams et al., 2012). Under this controversial and contested model, older patients who have exceeded or are projected to exceed the 'expected lifetime' will be given less priority in resource allocation.

At the same time, one may argue that we should not 'play god' and hence select which patients are to benefit, but instead, should fall back on a first come, first-served basis. This can be considered as a form of application of the "lottery principle" (Kasemsup, Schommer, Cline, & Hadsall, 2008). One may also prioritise patients with life-threatening conditions or more severe disease conditions if the "rule of rescue" is applied (Kasemsup, Schommer, Cline, & Hadsall, 2008). One may also give less priority to patients who are suffering from diseases due to their own doing (e.g. by practising unhealthy lifestyles) when the principle of "choicism" or "just desert" are upheld (Kasemsup, Schommer, Cline, & Hadsall, 2008).

Other conflicting principles that may be pursued in healthcare prioritisation include individualism. From the individualist perspective, patient preference is the utmost priority. When the relative weight afforded to individual preference or demand trumps the interest of the collective community, the individual who can afford to pay will be allowed to utilise healthcare even at the expense of equity considerations. This will be at odds with egalitarianism, since egalitarianism is aligned to the collectivist ideology.

Among the many perspective of communitarianism, proponents of communitarianism in general approach the prioritisation issue by focusing on the procedure of allocation (Williams et al., 2012, p. 17). When a communitarianism perspective is adopted, the society aims to establish healthcare allocation through a process of dialogue. This will ensure the opinion and preferences of citizens are incorporated into the allocation of healthcare resources. Evidently, ethical principles mentioned above are not an exhaustive list and not all these principles can be pursued simultaneously (Williams et al., 2012, p. 21). As a result, different ethical principles may be adapted and applied in a health system. The National Health Service (NHS) England is documented as an example of such hybrid approaches (Williams et al., 2012, p. 21). The overall set up and objective of NHS England is to provide equitable access to healthcare for everyone in society and is funded mainly out of general taxation, and hence it is best described as subscribing to egalitarianism. However, the utilitarianism approach is evident when NHS adopted guidance from the National Institute for Health and Care Excellence (NICE) in prioritising healthcare that is cost-effective. Also, individualism has been afforded more attention at an individual level as patient choice is championed as a desired end and a way to improve quality of service. At the same time, communitarianism is reflected in the public engagement carried out in commissioning of services (Williams et al., 2012, p. 21).

The plurality of ethical principles in allocation face challenges in ensuring principles of equity are being adequately and consistently incorporated in the allocative process. One of the leading conceptual frameworks for equitable allocative process that emerged amidst these challenges is "accountability for reasonableness" (A4R) (N. Daniels, 1981; N. Daniels & Sabin, 1997). It was developed by Daniels and Sabin, based on the premise that healthcare resource allocation for new technologies raise moral issues about which there is no clear consensus and consensus should not be expected in pluralist society even if some would accept certain ethical or moral principles (N. Daniels & Sabin, 1997). They proposed a normative resource allocative framework that prescribed four conditions: relevance, publicity, revision and regulation. In short, 'relevance' suggests that allocative decisions should be based on acceptable reasons. 'Publicity' indicates the allocative process should be transparent and the allocative decisions with their rationale should be accessible. 'Revision' means there should be appeal mechanisms in place allowing revision of allocative decisions. 'Regulation' implies that there should be enforcement or leadership to ensure the other three conditions are met. It was argued that if these four conditions were met during the healthcare resource allocative process, over time, people would come to view the procedure as fair and legitimate. In other words, regardless of what specific ethical principles are being adopted in a system, the allocative process is considered equitable or fair if these four conditions were found to be met in the process.

1.6 Healthcare Equity in Malaysia

Malaysia has a mixed public-private healthcare provision system (Heng Leng Chee & Barraclough, 2009b). The backbone of the public health systems was the direct provision of healthcare services at the Ministry of Health (MOH) healthcare facilities. Malaysia's MOH has an extensive network of primary and hospital care facilities which cover all districts in the country (Ghani & Yadav, 2008). The Federal government budget was distributed to MOH's healthcare facilities network via a federal-state-district/hospital administrative structure (Chua, 1997; Ghani & Yadav, 2008). The MOH services were funded principally by general taxation (Halina Hussein Rozita, 2000) with minimal co-payment required at point-of-service (Yu, Whynes, & Sach, 2008).

The private health sector plays an equally important role in Malaysia. The private hospital sector has been expanding rapidly since the 1980s due to government policy encouraging the private sector to provide services to the higher income group who can afford it (Heng Leng Chee & Barraclough, 2009b). Around half of the Total Health Expenditure was spent on the private sector. From 1997 to 2014, the share of private sector financing was between 40% and 49% of total healthcare expenditure (MOH, 2018). It is important to note that MOH also regulates the establishment of some non-clinic healthcare facilities, such as hospitals and maternity homes, even though private clinics are exempted from this geographic regulation (Malaysia, 2006). This means that MOH

indirectly determines the geographic distribution of non-clinic healthcare facilities to a certain extent. Users mainly paid directly out-of-pocket (OOP) for private healthcare expenditure. From 1997 to 2014, private household OOP contributions to private health sector spending were between 75% and 82% (MOH, 2016c).

Multi-country analysis found that catastrophic healthcare costs and household impoverishment due to health expenditure occurred more frequently when the share of OOP payments in total health expenditures was higher (Xu et al., 2003). The same positive correlation was also observed when the proportion of population below poverty line was higher (Xu et al., 2003). Hence, OOP payments can create a significant barrier in accessing healthcare, especially for the low-income household, and the high proportion of financing from OOP payments was often seen as a detrimental factor for achieving equitable healthcare coverage (WHO, 2009). WHO recommended to keep the share of OOP payments lower than 30% of total health expenditures to achieve universal health coverage and high financial protection (WHO, 2009). As such, the significant presence of a private sector with high reliance on OOP payment in Malaysia is a cause of concern in Malaysia.

However, some empirical evidence showed that Malaysia's health system has defied this normative assumption. Evidence from a series of household surveys showed that the combined effect of pro-poor public sector utilisation and pro-rich private sector, in general, has contributed to a shift from modestly pro-rich healthcare utilisation in 1986 and 1996 to equal overall utilisation among socioeconomic quintile groups in 2006 and 2011 (IHSR, 2013). Mohd (2016)'s analysis on the same set of household surveys found horizontal equitable healthcare utilisation of inpatient and outpatient care among Malaysian of different income-gradient divide in 1996, 2006 and 2011. At the same time, the combined effect of the rich paying more via OOP and general taxation has contributed to a pro-poor vertical equitable healthcare financing among socioeconomic quintiles between 1993, 1998 and 2004 (Ng, 2012). Other studies further confirmed that the levels of impoverishment and catastrophic expenditure due to healthcare utilisation in Malaysia were one of the lowest among Asian countries (E. van Doorslaer et al., 2007; E. van Doorslaer, O'Donnell, et al., 2006).

All the above implies that Malaysia's health system has been performing fairly well. The provision of healthcare under this mixed public-private system was equitable across socioeconomic groups. This mixed system is financed by multiple sources and the combined effect is a vertically equitable financing system across socioeconomic groups. However, even with equitable utilisation and financing across socioeconomic groups, it is still possible that there is mismatch between the distribution of population health services and distribution of health needs across geographic groups. Analysis of Mohd (2016) provided a case in point. While the analysis found equitable healthcare utilisation across income gradients in the Peninsular Malaysia and within states in the Peninsular Malaysia, it also revealed inequality of healthcare utilisation among states in Peninsular Malaysia. In short, it should be noted that equity of healthcare provision and financing among socioeconomic groups does not guarantee equity across geographic areas in Malaysia.

As mentioned earlier, the allocation of public resources and distribution of part of private resources are according to geographic areas. Hence, the assessment of healthcare equity, for both healthcare provision and financing, across geographic areas in Malaysia is the next jigsaw in confirming achievement of equitable healthcare and UHC. It is against this backdrop that this study is set out to assess if the Malaysian health system has been set up to provide and finance healthcare equitably. This angle is focused on whether healthcare resources have been distributed or made available across different geographic areas (states) according to differential needs of each locality. In addition, to provide direct policy recommendation to improve or ensure equitable healthcare coverage, the study seeks to understand how and to what extent principles of equity are being considered and enshrined in the healthcare resources allocative processes in the Malaysian health system.

The Federation of Malaysia was formed by the Federation of Malaya (which comprised the 11 states in the now Peninsular Malaysia), Singapore (which left the Federation of Malaysia later in 1965), Sabah and Sarawak in 1963. Today, Malaysia comprises 13 states and three federal territories (Kuala Lumpur, Putrajaya, and Labuan). Although Sabah and Sarawak are categorised as states, their healthcare system face unique geographic challenges as compared to the 11 states in Peninsular Malaysia. Not only because Sarawak and Sabah had the least and 3rd least population density in Malaysia in 2010 (Figure 1-2), they are the only two states which have the additional layer of Division administration level in-between State and District. Due to this administration structure difference between Sabah and Sarawak and states in Peninsular Malaysia, this study was limited to 11 states in Peninsular Malaysia and the federal territory of Kuala Lumpur to ensure the validity of comparison2. The Federal territory of Labuan was excluded because of its geographic proximity to Sabah (it was part of Sabah before it

² The cost of providing healthcare services can affected by the heterogeneity of geographic situation. For example, additional healthcare resources were given urban facilities due to higher cost of living in England National Health Services; while additional resources were given for rural services in Australia due to higher logistic cost (Penno, Gauld, & Audas, 2013).

became a federal territory in 1984) and the federal territory of Putrajaya was included as part of Selangor as it was part of Selangor until 2001 and the study period of this thesis was from 1996 to 2011.



Source: Reproduced from DOSM (2011, p. 3)

Figure 1-2: Population Density by State, Malaysia, 2010

1.7 Study Objectives

The overarching research objective is to assess if overall healthcare resources have been distributed equitably across states in Peninsular Malaysia and to produce recommendations on ensuring equitable geographic distributions. A conceptual framework was developed to provide the basis and to determine the scope of the study (Specific Objective 1). As Malaysia has a public-private mixed dual healthcare system, the study examined if overall (public and private) healthcare resources had been distributed equitably across states in Peninsular Malaysia in terms of horizontal equity for healthcare provision and vertical equity for healthcare financing since the proliferation of the private sector in the 1980s (Specific Objective 3 and 4). To assess the horizontal healthcare equity, state population healthcare needs were estimated first. Hence, the study developed a population health needs index and identified appropriate healthcare resources indicators to be compared (Specific Objective 2).

To contribute to the improvement of healthcare allocative (and regulating) processes, the study sought to understand how the MOH healthcare resources are being distributed or allocated and how the distribution of private healthcare resources are (or are not) being regulated (Specific Objective 5). The study then sought to identify the gaps in improving current allocative and/or regulating processes (Specific Objective 6), specifically by benchmarking allocative processes to an established equitable allocative process framework, i.e. the "Accountability for Reasonableness" framework.

Hence, the objectives of the study are:

1. To develop a conceptual framework to evaluate fairness in the geographic distribution of healthcare resources and healthcare allocative processes among states in Peninsular Malaysia.

2. To develop a state-level population health needs index and to identify appropriate healthcare resources indicators.

3. To assess if overall (public and private) healthcare resources have been distributed proportionately to population healthcare needs across the states in Peninsular Malaysia (horizontal equity in provision) since the 1980s.

4. To assess if public healthcare resources have been distributed proportionately more to population healthcare needs among poorer states in Peninsular Malaysia (vertical equity in financing) since the 1980s.

5. To understand the allocative processes and to explore factors influencing the allocative process of healthcare resources in Peninsular Malaysia.

6. To develop recommendations to improve the healthcare resource allocative process in Peninsular Malaysia and ensure geographic healthcare equity.

1.8 Conceptual Framework of the Study

Figure 1-3 is the conceptual framework developed for the study. The heart of the study is the horizontal and vertical geographic equity of healthcare provision (centre box on the left of Figure 1-3) and the resources allocative (or regulating) process (bottom box on the right of Figure 1-3) in Peninsular Malaysia.



Figure 1-3: Study Conceptual Framework

Other than measuring the healthcare utilisation of different geographic groups, the study also examined the healthcare resources being made available at each geographic area (top circle on the left of Figure 1-3). This is to acknowledge that healthcare funding does not only contribute to recurrent financial resources used to keep healthcare services operating but also the capital financial input allocated and translated into trained healthcare personnel and built healthcare facilities. The detailed argument on using available healthcare resources as the proxy of healthcare coverage is presented in Section 2.2.1. The study's approach of measuring healthcare resources in their three essential forms (i.e. healthcare resources, facilities, and recurrent financial inputs) rather than just aggregated financial expenditures are also expected to yield more direct policy impact as the healthcare resources distributed and allocated are in those three forms. The detailed explanation on the choice of these three proxy indicators, are presented in Chapter 4.

There is also a need to develop the methodology to estimate population health needs for each state before geographic equity can be measured (bottom box on the left of Figure 1-3). In this study, after identifying the most appropriate indicators consistently available across time, a method was proposed to compose state population health needs index based on state population size and demography, the average healthcare utilisation rate of different demographic groups, and further adjusted by Standardised Mortality Ratio (SMR). Construction of this health needs index is presented in Chapter 4.

If the healthcare coverage is horizontally equitable, overall (public and private) healthcare resources made available at each state should be proportionate to their respective population healthcare needs (big ovals in the geographic equity box of Figure 1-3). To assess if the distribution of public healthcare financing is vertically equitable, MOH healthcare resources (the main public health components which required minimal co-payment at point-of-service) should be concentrated on less wealthy states after adjusting for the differential healthcare needs (smaller ovals in the geographic equity box of Figure 1-3). The rationale of this indirect approach of assessing vertical equity is discussed in Section 3.4. The assessments of geographic equity were done separately for hospital and primary healthcare services as the settings were different and the resources were largely distributed through two parallel administrative structures within MOH.

To understand the upstream cause of eventual distribution, the allocation process is explored through interviews with MOH decision makers at national, state and district levels. Using thematic analysis, a description of the allocative process is drawn, and criteria used in the decision-making process and other factors affecting the allocative process or decisions are being identified (three centre circles at the right of Figure 1-3). Furthermore, adopting Accountability for Reasonableness framework as the benchmark, MOH direct allocative and private sector regulating processes are evaluated to yield policy recommendations (upper box at the right of Figure 1-3). Wherever plausible, understandings on the allocative process are used to explain (in)equity of distribution of healthcare resources across geographic areas (Arrow from Resources Allocative Processes to Geographic Equity in Figure 1-3).

1.9 Significance of Study

This study developed a method to monitor healthcare resource distribution across geographic areas in Peninsular Malaysia over the specified time period. The methods developed could be used to assess past performance on MOH resource allocation and also be used as a monitoring tool in the future. As overall public and private sector resources are evaluated, the findings not only provide important baseline reference if the current public-private mixed system has been equitable but also provide guidance to overall system equity in the future.

The in-depth qualitative study on MOH allocative and regulating process would provide insight on how the process can be improved fundamentally. Direct recommendations would be developed to promote a more equitable allocative and regulating process. With a more equitable allocative process that would be able to make allocative decisions based on geographic healthcare resources and needs distributions data estimated by methods developed in this study, a geographic equitable health system could be achieved and maintained in line with UHC aspiration.

1.10 Outline of the Thesis

This thesis is structured into 8 chapters. Chapter 2 reviews past literature on healthcare needs, resources and the allocative process or mechanism that make up the conceptual framework for the assessment of equitable healthcare resource distribution in this study. Chapter 2 also reviews relevant concepts and definition in health equity, healthcare equity, and geographic healthcare equity with specific reference on why geography

matters for healthcare equity in Malaysia. Chapter 3 introduces Malaysia's mixed public/private healthcare system, with the specific aim of providing the contextual background for this study. Chapter 3 also reviews the current literature on healthcare equity in Malaysia, with the aim of identifying gaps in knowledge for geographic healthcare equity in Malaysia.

Chapters 4 to 5 develop a measurement of geographic healthcare (in)equity to assess the distribution of healthcare resources in Peninsular Malaysia. Chapter 4 transfers methods from international literature to create an appropriate method of constructing a population healthcare needs index for Peninsular Malaysia. Chapter 4 also details the choice of healthcare resource proxies to be examined in this study. Chapter 5 draws on existing methods in the literature, adopting the Kakwani Index (KI) as the measurement of horizontal geographic healthcare equity for healthcare provision and proposes a novel Difference Index (DI) as the measurement of vertical geographic healthcare equity for healthcare finance. Chapter 5 also reports the findings of horizontal and vertical geographic (in)equity of selected healthcare resources among states in Peninsular Malaysia.

Chapter 6 first reports the allocative process in Malaysia from the perspective of decision makers and identify areas for improvement based on established an equitable healthcare resource allocation framework. Chapter 6 then provides suggestions on how to achieve a more equitable healthcare resource distribution by improving the allocative process benchmarked against the established framework.

Chapter 7 synthesises findings from the previous two chapters (Chapters 5 and 6) to provide an overall picture of how the process of priority setting might have influenced the distribution of healthcare resources. Chapter 7 also concludes the study by highlighting the key policy implications of the study and reflecting on the contributions of the study in filling the current gaps in knowledge on geographic equity.

University

CHAPTER 2:

DISTRIBUTION OF HEALTHCARE RESOURCES: GEOGRAPHIC EQUITY

AND FAIR ALLOCATIVE PROCESSES

"In areas with most sickness and death, general practitioners have more work, larger lists, less hospital support, and inherit more clinically ineffective traditions of consultation, than in the healthiest areas; and hospital doctors shoulder heavier case-loads with less staff and equipment, more obsolete buildings, and suffer recurrent crises in the availability of beds and replacement staff. These trends can be summed up as the Inverse Care Law: that the availability of good medical care tends to vary inversely with the need of the population served." - Hart (1971)

2.1 Chapter Overview

Chapter 1 has briefly discussed the concepts of geographic healthcare equity and the need to examine the healthcare resource allocative process and distributive pattern in Malaysia. This chapter clarifies key concepts such as 'healthcare resources', 'healthcare needs', 'healthcare equity', and 'allocative process', and reviews frameworks of healthcare equity and allocative process.

Section 2.2 first reviews the literature of healthcare resource allocative processes and some relevant concepts. Then, Section 2.3 reviews the much-debated concepts of 'health and healthcare equity', and 'healthcare needs'. Section 2.4 discusses the meaning of 'availability of healthcare' and contrasts it with the more often used concepts of 'access to healthcare' or utilisation of healthcare. Section 2.5 explains the significance of geography in healthcare equity in the Malaysian health system and defines the principles of geographic healthcare equity for this thesis. The meanings of horizontal and vertical equity in different aspects of the health system are discussed in Section 2.6.

2.2 Allocative Process for Healthcare Resources

2.2.1 Healthcare Resources

Provision of healthcare can be understood as putting together a number of resource inputs to deliver an array of health services output (WHO, 2000). Primary care services may be delivered with elementary physical facilities or on mobile basis, but skilled practitioners and essential medical supplies are necessities. Hospital care services are often delivered by teams consisting of professionals with different expertise in established hospital facilities with adequate equipment. While sustained funding is needed to provide remuneration for healthcare workers, purchase of medical supplies and maintenance of facilities and equipment, nurturing of trained healthcare professionals and establishment of advanced healthcare facilities may need years of planning and investment in advance.

All these different types of resources are essential for the provision of healthcare. Ultimately healthcare workers would only be able to efficiently deliver quality services with sufficient supplies and equipment in adequately built healthcare facilities. Hence, it is important to identify valid healthcare resource indicators that can provide a comprehensive picture of the distribution of availability of resources. The framework of health system resources input described in World Health Report (WHO, 2000) provided an option to identify a few key indicators that would thoroughly capture the resources mix needed for healthcare provision. As shown in Figure 2-1, this framework identifies human resources, physical capital and consumables as three principal health system inputs. The source of these principal inputs can eventually be traced back to financial resources (i.e. "total financial resources" on the left). These financial sources can be broken down into categories of capital and recurrent expenditures. Following the arrows from expenditure categories to health system inputs via budget elements, it is important to note that while capital expenditure is required for generating human resources and physical capital inputs except consumables, recurrent expenditure is a necessity for the production of all these three categories of healthcare resources.



Figure 2-1: Health system inputs Source: Reproduced from WHO (2000)

From this framework, recurrent financial expenditure is identified as an important proxy of available healthcare services because it captures the immediate input needed to maintain healthcare facilities functions (e.g. water, electricity and rents of clinics and operation theatres), pay healthcare personnel and buy the consumables (e.g. medicine), and hence ensure the delivery of healthcare services. On the contrary, capital financial expenditure may not be a valuable indicator due to the variation of time lags for the investment to come to mature and lifespan of these capital expenditures once it has matured. For example, training a community nurse may take a couple of years while nurturing a sub-specialist may take decades. A simple health clinic may be built in a few months, but a state-of-the-art hospital may take years to plan and build. While a hospital building on paper may last for decades, its lifespan could be cut short if struck by disaster. A healthcare worker's career may be shortened by his or her exit from the workforce for any reason. For this reason, existing established human resources and physical facilities are considered better proxies to reflect current availability of capital resources in this study.

In other words, if indicators of (a) current financial expenditure and existing (b) human resources and (c) physical capital are collected, it could provide a comprehensive account on the available healthcare resources needed to provide healthcare services. All these three components are necessary and equally important for the provision of healthcare coverage, as acknowledged by World Health Report (WHO, 2000) that "not only is a workable balance between overall health capital formation and recurrent activities needed, but the three input categories (human resources, physical capital and consumables) should also be in equilibrium".

Valid proxies of these three components in the Malaysian context were sought after and will be presented in Chapter 4 (Section 4.4). The financial resource allocative process of the Malaysian health system will be described in Chapter 3 (Section 3.2.2).

2.2.2 Resource Allocation in Healthcare Triage

Resource allocation can be defined as the distribution of goods and services among programmes, populations or regions that are competing for the same funds (Ham, 1997; McKneally, Dickens, Meslin, & Singer, 1997). The special redistribution role of resource allocation in healthcare can be illustrated in the concept of "healthcare triage" (Figure 2-2) (Mossialos & Dixon, 2002).



Figure 2-2: The Healthcare Triage

In a free market, the provider delivers goods and services to the consumer when funds are paid in an opposite direction. Due to the uncertainty of ill health and potentially high cost for healthcare, many health systems have developed a third party that offers financial risk sharing. With the "third party insurer or purchaser", "consumers" (e.g. population or group of potential patients) pool their funds with the third party ("funding"), the third party uses the pooled fund to purchase healthcare services from the providers ("allocation"), and the services are given to the patients ("delivery"). As the amount of money collected from each of the consumers for the health fund is not directly determined by the services needed by or provided to the consumer, redistribution of resources occurs during this allocative process. This can be applied to government-funded health systems as well. Taking Malaysia's MOH public system as an example, the federal government forms a health fund and collects money from citizens via income tax and purchases health services for the people by allocating a health budget for MOH healthcare facilities. Again, in a system such as Malaysia's MOH, the healthcare service received by a citizen is not related to the amount of income tax paid by that particular individual. Part of the financial resources collected from citizens are redistributed via the allocation of Malaysia's MOH funds.

2.2.3 Levels of Resource Allocation

In the context of health systems, resource allocations are made at different levels. The allocation of healthcare resources are made at the macro- (international and national health system), meso- (district health system and institution), and micro-levels (individuals) (Gilson, 2012, p. 24; Ham, 1997; McKneally et al., 1997). Traditionally, macro-level allocation of resources are those made at the highest level of a health system. Depending on the setting of the health system, it could be at the national level and/or at the provincial level (in a decentralised or devolved health system). On the contrary, micro level allocations are made at the individual level which generally involves providers and patients. Meso-level allocations are activities that occur at the organisational level, in between macro- and micro-level. This typically occurs within institutions such as hospitals. The levels of resource allocation are not clear-cut in the case of distribution of resources at regional/district/municipal level. It has been classified as at macro (McKneally et al., 1997) or meso level (Gilson, 2012; Lydia Kapiriri, Norheim, & Martin, 2007) by different researchers.

As elaborated by Gilson (2012), health systems not only need to balance policies, strategies and resource allocation in line with overall system goals, but also need to recognise the influences from a wider national context such as politics, public pressure, and advocacy at the macro-level. At the meso-level, the concern is more on the adaptation of national policy and guidelines to local circumstances and responding to local needs and local actors. Micro-level resource allocation comprises the provision of healthcare and health-promoting activities by providers and the search for care and compliance with health advice of patients.

It is important to note that even when the resources are distributed across regions according to the equity principle at the macro-/national level, the meso-/subnational

allocation of resources "may still be unduly influenced by historic patterns of supply and inhibitions to access which perpetuate inequities" (T. A. Sheldon & Smith, 2000). In other words, the mechanism or process of resource allocation or distribution can be different at different levels and hence may need to be examined separately.

2.2.4 **Priority Setting in Healthcare**

Healthcare resources are scarce and the demand for healthcare by each and every individual cannot be possibly met fully. Hence, the third party purchaser of a health system has to decide how to spend these limited resources. From the literature, there are at least two dimensions of healthcare resource expenditure priority setting that have been discussed frequently. First, in a centrally supported system, third party purchaser needs to decide who gets the limited resources and how much each individual group should get. Each individual may have different healthcare needs hence there should be a mechanism deciding relative amount of healthcare resources to be distributed to each group of individuals, be it according to administrative levels, geographic regions, client groups or types of facilities or institutions. This resource allocative process is often called "resource allocation" (Knox, 1978). Second, in the era of ever-increasing medical possibilities, it is impossible to provide people with the choice of each and every possible medical modality with various efficacy and efficiency. This, on the other hand, brings the challenge of determining what services should (or should not) be provided to the population or included in the service coverage to keep overall health expenditure within available limited healthcare resources. This form of priority setting is often termed "healthcare rationing" (Williams et al., 2012). Narrowly speaking, "healthcare rationing" is determining the limit of resources to be spent in the health system, while "resource allocation" focuses on distributing the predetermined limited resources to individuals or population groups in the health system.

In the following two subsections (Section 2.2.5 and 2.2.6), brief accounts of both types of resource allocation mechanism or priority setting will be reviewed before comparison and contrast are drawn.

2.2.5 Resource Allocation

In most of the countries, either the health insurance scheme or public provision sector forms the backbone of the often plural and complex health system. According to Rice and Smith (2001a), health systems can be classified into four general types, according to the main scheme, as the following: (a) centralised public sector, (b) devolved public sector (c) competitive insurance markets (d) captive employment-based insurance (or social health insurance). The first and second types of system usually involve (direct or indirect) provision of healthcare by governments (at different levels), while the latter two types rely on health insurers to purchase healthcare for the covered population (Finn Diderichsen, 2004). One of the important features of all these arrangements is the increasing use of a prospective budget, even in insurance-based systems, as one of the cardinal instruments for containing escalating health expenditure (Rice & Smith, 2002). With the prospective budget set, some sort of prospective mechanisms are needed to allocate available health funds from the purchasers (insurers or public institutes) to the healthcare providers.

This prospective resource allocation mechanism could be in numerous forms including a mechanism based on political patronage, according to historical precedent, according to local bids or performance, and allocation by mathematical formula (Smith, 2008a). Allocation of healthcare resources according to political patronage is unlikely to be aligned with other objectives of resource allocation such as efficiency and equity. Budgeting according to historical precedent, according to local bids or performances is efficient in using resources in the short-term (Finn Diderichsen, 2004). This is because it essentially allocates health funds according to existing supply and utilisation of healthcare, which allows maximal usage of the current service structures such as facilities and human resources. However, healthcare service supply is a known predictor of healthcare utilisation. People with similar health needs but stay in areas with less access to healthcare services are less likely to utilise needed care which leads to "unmet" health needs. At the other extreme, overzealous supply will create excessive demand for unnecessary healthcare via "supplier-induced demand" (Rice & Smith, 2001a). Hence, these methods of resource allocation will create a cycle of overflowing healthcare resources in areas where resources are already abundant and eventually perpetuate and reinforce healthcare inequities in the long-term (Finn Diderichsen, 2004).

2.2.5.1 Systematic Formula Funding Method

On the contrary, a systematic (or mathematical) formula allocation or capitation method is argued to be the best prospect of satisfying equity criteria (Finn Diderichsen, 2004; Rice & Smith, 2001a; Smith, 2008b). Systematic formula allocation is the use of mechanical rules to determine the level of resources a devolved local agency should receive for delivering a specified health service. It started in 1976 in England based on the recommendation of the Resource Allocation Working Party (RAWP) (Smith, 2008a, 2008b). Many countries, including developed and developing countries such as New Zealand, England, Scotland, the Netherlands (Penno et al., 2013; Smith, 2008a), Namibia, Tanzania, Zambia, Zimbabwe and Uganda (Finn Diderichsen, 2004; Di McIntyre et al., 2007), have followed suit. It is often called the capitation payment method because formulas used throughout the world are predominantly based on the allocation of resources in accordance to per capita health needs (hence "capitation") with or without further risk-adjustment for expected difference in health needs between different individuals (Rice & Smith, 2001a).

The capitation method not only can be used in a centralised public sector or social health insurance system, it can also be utilised in a devolved public sector or competitive insurance market systems (Rice & Smith, 2001a). The allocation of a health fund for purchasers or insurers proportional to the (predicted) aggregated health needs of the population served intrinsically embodied the principle of horizontal equity in access to healthcare (Finn Diderichsen, 2004). Furthermore, when the capitation method is applied in competitive insurance market systems, the efficiency considerations are conspicuous as consumers can observe the residual variation in premiums or healthcare equality and hence the market pressure will lead to improved efficiency (given the fundamental condition that all insurers are able to deliver a standard package of service for a standard premium) (Rice & Smith, 2001a). The proponents of formula funding methods believe that its application at macro-level could be well accompanied by meso-level payment methods which enable achievement of the equitable allocation objective (T. A. Sheldon & Smith, 2000).

The risk-adjustment component in capitation methods is usually based on either individual-level or aggregated data (Rice & Smith, 1999). The archetype of the individual-level capitation method is one that was adopted by Stockholm County in Sweden. Under the individual approach, generally, risk factors such as sex, age, employment status, housing tenure, marital status and previous healthcare utilisation are used to create a matrix of capitations. Then, the payments for each individual is assigned according to the above individual characteristics and the fund is allocated according to the sum of payments for the individuals covered (Rice & Smith, 1999; Smith, 2008a). This approach is only possible because of the availability of comprehensive individual social characteristic and healthcare utilisation record. The model has since been promoted to the national level in Sweden and other health systems such as Alberta, Netherlands and New Zealand (Rice & Smith, 1999).

However, comprehensive personal records for social and health conditions are not available in most health systems. This prompted the development of an approach using aggregate-level data. Under this approach, the social and health characteristics of populations (or part of the population) of the health schemes (or health systems) are combined to create indices which are used to estimate the differential healthcare needs of the populations. Numerous geographically organised health systems in Finland, Northern Ireland, Quebec, Scotland and Spain have since applied this approach (Rice & Smith, 1999).

This latter approach is prone to "ecology fallacy" where a needs factor at the aggregate level does not necessarily hold true for the needs factor at the individual level (Morgenstern, 1982). To reduce this potential pitfall, smaller population groups (e.g. smaller geographic areas in the English approach) are preferred whenever possible (Rice & Smith, 1999). The scheme administrators or local health area authorities would need to avoid adopting the same aggregated-level needs indicators (used for allocating resources to scheme/geographic authorities) as the needs factors in distributing resources within the schemes or areas without empirical evidence of its validity at the individual level. Instead, they could adapt a normative approach in identifying needs factors to determine funding formula at their level. Under a normative approach, selection of needs factors can be based on epidemiological or other scientific evidence which is not or yet to be empirically proven to reflect healthcare needs.

In short, systematic funding methods apply empirical evidence in guiding healthcare resource allocation at appropriate levels depending on the availability of individual or aggregated data.

2.2.6 Healthcare Rationing

The healthcare resource allocative process described earlier is essentially the distribution of prospective healthcare budgets—whether it is a government health budget or an estimated/predicted/planned expenditure of health insurance schemes as a whole. The second type of priority setting discussed here has less direct association with budget distribution or allocation. However, most health systems, be it public sector provision-based or insurance-based, apply varying degrees and mechanisms of healthcare rationing at different levels. The purpose, as indicated by the terms of 'rationing', is to keep overall health expenditure within the limit of available but constrained healthcare resources in health systems in the face of increasing demand from the public (Ham, 1997, p. 6; Williams et al., 2012).

Healthcare rationing can be understood as processes which determine the priorities of different healthcare services and patients and inform or dictate choices on allocating healthcare resources between competing demands in health systems (Ham, 1997). The approaches taken in general is taking either the forms of inclusion of healthcare services into or exclusion of healthcare services from the provision or funding coverage. There are a few more notes worth mentioning in detail here. First, the inclusion or exclusion of services are often specific to patients/diseases, i.e. a treatment option may be paid for disease A and not disease B based on the effectiveness of treatment for disease A but not B. Second, the inclusion or exclusion of services are also done in more subtle ways such as providing clinical guidelines to first-line health professionals (and rely on them to perform "bedside rationing") or indirectly discourage utilisation of non-critical service by having a long waiting list (which favours emergency cases over elective treatments). This is due to various experiences of public or patient backlash in adopting a "rigid priority list" (e.g. the original Oregon list which placed capping teeth as higher priority than life-saving appendectomy (Hadorn, 1991)) or outright exclusion of relative less cost-effective

options (e.g. attempt to exclude oral contraceptive pills from coverage in the Netherlands) (Ham & Robert, 2003, p. 5). Third, compared to the exclusion of new services which have never been introduced into the system, disinvestment of existing treatment options is usually harder to be implemented and the more popular approach taken up by policymakers are allowing a "natural death" of such existing services.

2.2.7 Allocation vs Rationing

In short, the above-mentioned two aspects of handling limited resources both involve setting priorities: either setting preferences as to whom and how much resources are given (i.e. 'allocation'), or determining choices on what services to be made available or provided (i.e. 'rationing') (Ham, 1997). Examples of the former include allocation of a healthcare budget to different geographic healthcare administrations in a centralised public health system where the designated population coverage is by geographic boundary (e.g. England NHS) or distribution of healthcare subsidies to devolved lower tier of local governments in a devolved public sector where the local governments manage the public healthcare provision system (e.g. Sweden) (Rice & Smith, 2001a); the decision to include or exclude a certain treatment for a particular condition or disease under a health insurance or service purchasing scheme will be the classic case for the latter (e.g. NHS NICE process of inclusion, or exclusion from the list by Taiwan NHS) (Ham & Robert, 2003).

However, these two components of priority settings cannot always be separated distinctively in the process of distributing healthcare resources in a health system setting. For example, the decision of introducing a new programme (such as peritoneal dialysis) into a hospital may take into account of not only the burden of the disease (e.g. number of ESRF patients) and cost-effectiveness of current or other alternative treatment options (e.g. vs haemodialysis) but also the human and financial resources that is (or going to be)

made available for the nephrology department in that hospital. The burden of diseases and cost-effectiveness of treatments are often considered in the 'rationing' process, while the 'allocation' process may have determined the availability of resources in a particular public hospital.

Depending on the financing and purchasing structure of the system, one of these priority settings can precede the other. For example, a hospital under a global budget based on the capitation method may use cheaper or more cost-effective but less effective treatment options due to budget constraints. In this case, (macro-level) resource 'allocation' precedes (meso/micro-level) 'rationing'. On the other hand, a hospital may not offer certain treatment options to the patient at all if the option was not included in the patient's insurance scheme. This is in the health system where (macro-level) 'rationing' dictates eventual (meso/micro-level) priority setting. Again, in most settings, a hospital paid by a global budget ('allocation') usually has restricted choices of covered treatments for the insured population ('rationing') and, at the same time, the treatment options are further limited by a pre-established level of service both in terms of investment of expensive advanced equipment and availability of highly specialised personnel providing the services ('resource allocation').

In other words, these two considerations (i.e. "healthcare rationing" and "resource allocation" in the narrow sense) are often intertwined in many priority setting processes. This is reflected in the interchangeable usage of terms such as 'resource allocation', 'rationing' and 'priority setting' in the literature. Although Malaysia's MOH is allocating healthcare resources across various levels of geographically-bounded administrative areas, a certain degree of healthcare rationing is likely to be embedded with the MOH resource allocative process which determines the allocation of resources to different groups of people residing in different geographic areas. Hence, the resource allocative process researched in this thesis is not limited to the allocation of resources to geographic groups. Specifically, both the components of 'allocation' and 'rationing' are included in the qualitative inquiry of this study to provide a fuller picture of MOH healthcare resource allocative process (in the broader sense). The quantitative examination of horizontal and vertical geographic equity of healthcare resources is only concerned about the 'allocation' (in the narrow sense) only.

2.2.8 Determinants of Resource Allocative Process

Previous studies have examined resource allocative processes from different angles. Some sought to explore the contextual factors influencing applications of economic frameworks in healthcare resource allocation (Asante & Zwi, 2009; Bate, Donaldson, & Murtagh, 2007; Lasry, Carter, & Zaric, 2011). Bate et al. (2007) studied the integration of economic principles into the allocative processes in the English National Health Service (NHS) and found that contextual factors and complex realities such as political influence, "backroom commissioning" and "historical commissioning" need to be considered. From the study, decision makers from six NHS Primary Care Trusts3 of politics portrayed that national and local politics dominated the resource allocative process. Structure and policies of the government in general and national policy and planning guidance issued by the Department of Health influenced the PCTs resource allocation both positively and negatively. Similarly, local politics were described to be

³ Primary Care Trusts/Organisations (PCTs/Os) are the organisations where responsibility for making prioritisation of 80% of NHS health budget has been devolved to in English NHS system. Decision-makers at PCTs are entrusted to commission healthcare and services to population at their geographic communities by assessing local health needs, planning and securing health services within the NHS framework while adhering to financing duty stipulated in NHS. Hence, commissioning here can be understand as a resource allocation or priority setting process.

both guiding and interfering the allocative process. "Backroom commission" was termed to describe the extension of local political commissioning which was implicit. This implicit commissioning refers to some decision-making which was not transparent or made known to many respondents (decision makers) of the study. Historical commissioning was used to describe the allocation of PCT resources which were often "in line with allocations made in previous years with slight adjustments for inflation and new service development funding". In other words, spending in previous cycles could influence allocation in later cycles.

Asante and Zwi (2009) researched the health system in Ghana and reported that many factors such as human resource availability, local capacity to utilise funds and donor involvement influenced the allocation decisions and were not accounted for in Ghana's need-based allocative process. Lasry et al. (2011) assessed the allocative process in South Africa and argued that external factors such as political power, leadership and relationships of the organisation, religious and cultural issues, and capacity of facilities and workers were often more important than the formal planning processes, which were often characterised by economic and epidemiologic approach.

These studies show that to address potential issues in the healthcare resource allocative process, each health system has to be examined to identify its unique contextual factors and determinants.

2.2.9 Values and Principles Used in Priority Setting Process

Others reviewed values, principles or criteria adopted for equitable healthcare resource distribution (Guindo et al., 2012; Youngkong, Kapiriri, & Baltussen, 2009). From the vast majority of international experiences in the past few decades, it was obvious that the decisions of priority setting were complex and there was no single set of principles or criteria found to be consistently applied in different health systems.

Nevertheless, some values and principles were still commonly seen in many different contexts of resource allocation. For instance, the majority of policy or decision makers adopt the horizontal equity approach in providing 'equal access to equal needs', but some instead advocate providing proportionately more healthcare to social groups that have substantially worse health status (D. McIntyre, Muirhead, & Gilson, 2002; Gavin Mooney, Jan, & Wiseman, 2002). Also, although most systems take into consideration the effectiveness, cost-effectiveness and cost-benefit of healthcare treatments, costbenefit may not be applied in the funding of treatments for people at the end of life, or for treatments which were a last attempt rescue for a lethal condition (the "rule of rescue") (Hadorn, 1991). In these situations, less cost-benefit treatments for serious illness are usually given priority compared to more cost-benefit treatments for minor illness. Even when the macro-level formula funding mechanisms across the world were examined, there were hardly identical formulas as shown in the comparative study of seven models by Penno et al. (2013). This was not only because the availability of the data was different, it was also because people or policymakers in different countries give different weights and priorities to the factors considered.

2.2.10 Equitable Allocative Process

Baltussen and Niessen (2006) proposed to do away with applying single criteria methods and allow policymakers to weight the criteria according to their local context by using the multi-criteria decision analysis (MCDA). The MDCA approach advocates integrating multiple criteria in a systematic way, which enables policymakers to make use of all the relevant criteria and available evidence to come to a decision. This approach has been widely adopted in different sectors. It had since been implemented in a few countries in the health sector with varying degrees of success (Defechereux et al., 2012; Jehu-Appiah et al., 2008). The MDCA itself is a specific set of processes which involve quantifying the performance score of each treatment options according to a chosen group
of criteria (which can include binary, nominal, ordinal or ratio scales) and then combine the scores and rank the treatment options into priorities. Hence, healthcare decisionmakers and policymakers need to obtain a certain degree of training or guidance in order to adopt MDCA in their healthcare resource allocative process.

Others turn their attention from just finding the equitable distribution pattern of healthcare resources to also identifying equitable distribution processes of healthcare resources (N. Daniels & Sabin, 1997; G. Mooney & Jan, 1997; Sen, 2002). Essentially, this takes on the lens of procedural justice rather than distributive justice (N. Daniels & Sabin, 1997; Di McIntyre & Gilson, 2002; G. Mooney, 2000). This is because, based on the observation that there were no gold criteria for an equitable distributive justice. On the contrary, in the absence of a definite equitable or fair distributive pattern or criteria, the resulting distribution can be considered just or equitable if the allocative process was carried out fairly (Norman Daniels, 2008, p. 109). In this case, equitable healthcare distribution is understood as a condition of "pure procedural justice" 4 (as defined by John Rawls) that can be achieved (Norman Daniels, 2008, p. 109).

⁴ According to the philosopher John Rawls, procedural justice can be distinguished into three ideas. There is 'perfect procedural justice' if two conditions can be met: "(1) an independent criterion for what constitutes a fair or just outcome of the procedure, and (2) a procedure that guarantees that the fair outcome will be achieved". If there are independent criteria for fair outcome (first condition of perfect procedural justice) but there is no method that guarantees the fair outcome will be achieved (second condition) then only an "imperfect procedural justice can be achieved". It will be 'pure procedural justice' for the situations in which "there is no criterion for what constitutes a just outcome other than the procedure itself". (John Rawls, A Theory of Justice (1971).

One of the leading fair process models is "accountability for reasonableness" (A4R), which identifies four conditions of a fair allocative process (relevance, publicity, revision and regulation) and was developed by Daniels and Sabin (N. Daniels, 1981; N. Daniels & Sabin, 1997). It was argued that if a process can fulfil all these four criteria, it would be considered a fair process. A fair and transparent process, according to the A4R framework, would provide legitimacy to the process, and its decisions should be (because the process is fair) and would be (because the process is legitimate) accepted as fair (Norman Daniels, 2008, p. 109). Hence, the resulting pattern of distribution from the process is equitable.

This framework is compatible with the account of deliberative democracy which "the preference of majority rests on the kind of reason that even the minority must acknowledge appropriately plays a role in the deliberation" (Norman Daniels, 2008, p. 113). The people with poorer health and economic power are usually those with more healthcare needs and have less or are a minority political power in the process of setting public policy and agenda. This framework ensures the poor's preferences and needs are not neglected in the healthcare resource allocative process.

This conceptual framework has been used by many scholars to evaluate equity or "fairness" of allocative processes at different levels of healthcare systems. (Fraser, Estabrooks, Allen, & Strang, 2009; L. Kapiriri & Martin, 2006; Lydia Kapiriri et al., 2007; Maluka et al., 2010; Mori & Kaale, 2012; Singer, Martin, Giacomini, & Purdy, 2000). This framework is also endorsed by the WHO Consultative Group on Equity and Universal Health Coverage as a useful guide in institutionalising a robust public accountability and participation mechanism in undertaking tough resource allocation decisions in achieving UHC (WHO, 2014).

In this thesis, the A4R framework is adopted to evaluate the allocative process for MOH's allocative and regulating processes. This is because A4R does not prescribe a specific set of processes, such as MDCA or any other single criteria methods, and its four normatively set conditions can be examined for any type of processes currently applied in MOH Malaysia.

2.3 Health & Healthcare Equity

2.3.1 Equity of health and healthcare

To understand (in)equity, one must first understand (in)equality. Inequity in health is the unfair and avoidable disparities or inequalities in health among different categories of people (P. Braveman & Gruskin, 2003; Whitehead, 1992). These categories may be classified by socioeconomic resources or position (e.g. income, occupation, education), gender/gender identity/sexual orientation, race/ethnicity/skin colour, religion, nationality, geographic areas, disability, illness, political or other affiliations; or other characteristics associated with discrimination or marginalisation (P. A. Braveman, 2003; Paula A. Braveman et al., 2011). Disparities in health among different subgroups of population exist for different reasons and can be of social or physical origins. The disparities in health due to natural biology variation (physical (dis)advantages) are unavoidable and hence such inequalities are not considered inequitable. However, disparities due to social conditions are considered unfair if they are plausible, but not necessarily proven, to be reduced by policies given political will (Paula A. Braveman et al., 2011).

In principle, the differential health consequences resulting from freely chosen healthpromoting or health-damaging behaviours are not considered unfair either. However, the caveat is that resulting health differences are generally considered unfair if the choices of health behaviours are limited by severely restricted lifestyles choices, exposure of unhealthy living and working conditions, and inadequate access to essential health and public services (at a level permitting full social participation in workforce and political activities), and lack of respect and social acceptance (Paula A. Braveman et al., 2011; Whitehead, 1992). This is because differences in these conditions are avoidable or reducible and society should work together to ensure no one is to be left behind in those conditions as society progresses and develops. This consensus is reaffirmed in the final report delivered by the Commission on Social Determinants of Health in 2008 (CSDH, 2008).

For instance, inequality of health between men and women is likely not considered inequitable if both genders enjoy similar living and working lifestyles and conditions and have full access to healthcare and education. On the same note, inequality of health among different racial or religious groups is inequitable if these inequalities are resultant of some being constantly denied equal opportunities for employment, education and social mobility as others. A further note for people who are ill or disabled need to be highlighted here. It is not disputed that physical disadvantage due to irreversible disability or illness is unavoidable. However, when a disabled person is not supported by society (e.g. by accessible public transport and transportation, or by elimination of discrimination in hiring for work that they could perform) to reach their social participation potential, when it is plausible, these persons are in socially disadvantaged conditions which are reducible and avoidable; and this inaction of society would constitute health inequity, whether intentional or unintentional (Paula A. Braveman et al., 2011).

Drawing a target for a health system from the above definition of equity in health, the most extreme may argue that equity is achieved when an equal level of health status has been attained in all social groups with the exception of health disparities originated from biology variation (Whitehead, 1992). However, this health equity target will be an over-ambitious goal for a health system because healthcare is only one of the many factors that

contribute to health differences in a country (Whitehead, 1992). The governance of nonhealth sectors such as finance, education, transport, housing, employment and almost every other aspect of life have an impact on health, direct or indirectly. Healthcare is (not only about and) not able to restore each and every individual to the same level of health when one is suffering from illness. The majority of the prevention of ill-health should, and can only, be achieved by these non-health sectors which determine people's daily living and working conditions and lifestyle choices. Hence, notwithstanding the role of engaging and leading inter-sectorial efforts in promoting healthy living conditions for all (Marmot, Friel, Bell, Houweling, & Taylor, 2008), a more pragmatic and realistic goal for the health sector is to ensure that each and every individual has access to essential healthcare, regardless of his or her social background (Whitehead, 1992). Since this view is limited to ensure access to healthcare rather than promise restoration of equal health status, the terms of "**equity in healthcare**" or "**healthcare equity**", rather than "equity in health" or "health equity", are arguably more suitable and precise.

This study embraces this more restricted working definition of "equity in healthcare", which was proposed by Whitehead as (Leenan, 1985; Whitehead, 1992):

- 1. Equal access to available care for equal need,
- 2. Equal utilisation for equal need, and
- 3. Equal quality of care for all.

This definition focuses on the accessibility, acceptability and quality of healthcare services offered to all sections of population. These three themes are discussed in turn.

First and foremost, the basic premise of healthcare equity is that all people shall have equal access to needed healthcare regardless of their socioeconomic status, ability-to-pay, gender, age, race, religious or other social groupings (Whitehead, 1992). This study examines healthcare equity from the aspect of geography and hence, extending from this definition, focuses on equal access to needed healthcare for all people regardless of their place of residence. Within a health system, no matter whether one is living in rural or urban areas, states or districts with dominant agricultural, industrial or service industries, or states or districts with political allegiance with governing or opposition political parties, he or she should be granted equal access to needed healthcare similar to counterparts living in other areas. More discussion on geographic healthcare equity will be done in Section 2.5.

Secondly, this accessibility should be translated to actual utilisation. The key issue from having access to being really utilised is whether the healthcare is being organised in a way which is acceptable by all segments in the society, regardless of their gender, race or religious beliefs. Nevertheless, it is not considered inequitable if one chose not to utilise certain services if every effort has been taken to ensure the service is accessible and acceptable. It is important to note that Whitehead discussed the access and utilisation of healthcare services based on the premise of "available care". Furthermore, some researchers termed the provision coverage to be "actual coverage" if the services made available are accessible and acceptable (Tanahashi, 1978). More in-depth discussion of available care and "actual coverage" will be carried out in the next section (Section 2.4).

Lastly, it is important for the health system to ensure that the standards of professional services provided to people from all social groups are the same. The standards could be compromised when there is lack of effort from the healthcare workers or when there is lack of resources made available. Again, the availability of an adequate amount of resources such as trained healthcare workers, healthcare facilities and consumables are important in ensuring the availability of equal quality healthcare services.

2.3.2 Healthcare Needs

In the last section (Section 2.3) the working definition of healthcare equity is defined as the condition where all people in the health system have "equal access to available care for equal need, equal utilisation for equal need, and equal quality of care for all". In other words, to achieve healthcare equity, the access and utilisation has to be according to health needs. Hence, in this section, the study further reviews and operationalises 'health needs' or 'healthcare needs' in order to provide the foundation for further analysis and discussion.

The concept of "health needs" has been much debated but no consensus has been reached in the healthcare setting. A wide variety of definition of healthcare "needs" has been developed based on societal, philosophical, pragmatic, and economic views (Asadi-Lari, Packham, & Gray, 2003; A. J. Culyer & Wagstaff, 1992; Hasman, Hope, & Osterdal, 2006).

From the sociology point of view, Bradshaw (1972) classified needs into normative ("needs"), felt ("wants"), expressed ("demands") and comparative needs (Asadi-Lari et al., 2003; Wright, Williams, & Wilkinson, 1998). Normative needs ("needs") are determined by experts or professionals (of a particular field) by comparing the actual standard against a desirable standard derived from their knowledge. However, the level of services wished by the people can be higher or lower than the normative one depending on their perception, knowledge or ignorance of services. This is called felt needs ("wants"). When the people go to the professionals and request for services according to their felt need, it turns into expressed need ("demands"). Comparative need arises when an individual has similar characteristics to that of someone who is receiving service. This classification underlies the notion that expert desired health services may or may not be perceived as needed services by people and vice versa. Also, it highlighted that if the need

is not felt, it would not be demanded, and there lies the role of education in ensuring people take up health services.

The notion of normative and felt needs were also highlighted in the healthcare services framework of Stevens and Gabbay (1991) as "needs" and "demands" respectively. Also introducing the dimension of "supply", Stevens and Gabbay (1991) highlighted that the relationships between "needs", "demands" and "supply" are overlapping and differing in Venn-like fashion. By recognising their relationships, effort could be made to ensure healthcare is supplied and demanded where it should be needed. Also, supply and demand which are not appropriate or needed should be curtailed. For example, when essential health services ("needs") are provided ("supply") but not taken up ("demands") health education and promotion should be carried out; when there is long surgical waiting list ("needs" and "demands"), perhaps more resources should be allocated ("supply"); and when antibiotics are regularly provided ("supply") for viral infections ("demands") despite disproval in clinical guidelines ("needs"), strategies could be taken to curb the supply-side practice and reassurance could be given to decrease the demand.

In most cases, researchers and policy makers use normative needs, instead of felt or demand needs, as the definition in the resource allocative process and discussion. However, different experts may define normative needs differently. Some identify health need with health status or ill-health (A. J. Culyer & Wagstaff, 1992; Hasman et al., 2006). It might be defined as "if the value of a patient's initial health state is below a predefined threshold then healthcare is needed" (Hasman et al., 2006). However, such definition is inadequate to justify an ill person needing healthcare if there is no effective treatment to improve the person's health (A. J. Culyer & Wagstaff, 1992). Also, this account is incomplete in the setting of resources prioritisation because it fails to specify the relative priorities of different health services. On the contrary, the concept of "capacity to benefit" addresses these problems.

Researchers contended that need of healthcare could only exist when there was a "capacity to benefit" (A. J. Culyer, 2001; Hasman et al., 2006). This concept is also in line with the instrumentalist approach which was proposed by economists to operationalise the concept of health need (A. J. Culyer & Wagstaff, 1992). With the instrumentalist approach, an entity is needed only when it is a necessary condition for an "ultimate goal" to be attained (A. J. Culyer & Wagstaff, 1992); in other words, healthcare is needed only when it necessitates the achievement of a target or status.

Different "ultimate goals" were proposed and discussed. One of the proposed goals is a philosophical goal of attaining a "normal functioning range" (A. J. Culyer, 1998; Norman Daniels, 2008, p. 43; Hasman et al., 2006). On this account, healthcare is needed if it enables the person to reach a particular range of normal functions. This view is favoured because the "normal functioning range" is considered the (health) state that enables a person to have the opportunity to "flourish in life" (A. J. Culyer, 2001), "participate fully in society" (Hasman et al., 2006), or "pursue the array of life plans reasonable persons are likely to develop for themselves" (Norman Daniels, 2008, p. 43). On this account, however, healthcare is not needed if the services either fails to increase the health status above the lowest limit of a normal functioning range, or if the person's status is already within the normal functioning range (Hope, Osterdal, & Hasman, 2010).

Others applied a more pragmatic goal which avoids this problem. A J Culyer and Wagstaff (1991) argued that there is a "capacity to benefit" when an intervention can either enhance one's health, prevent deterioration of health, or postpone one's death (A. J. Culyer, 2001; A J Culyer & Wagstaff, 1991). In other words, it is not related to a particular threshold which allows people to function normally. It is worthy to note that,

with this view, a person with "ill-health" would have no "capacity to benefit" if no current technology is available to improve the ill-condition or to prolong the life; at the same time a "healthy" person could have "capacity to benefit" if vaccination is available for the person to prevent future illness. Hence, being sick is neither a necessary condition nor a sufficient condition for needing healthcare.

According to Culyer, healthcare need is the amount of resources required to "exhaust a person's capacity to benefit", rather than the amount or magnitude of "capacity to benefit" of the person itself (A. J. Culyer, 1998, 2001). These two notions can perhaps be differentiated and understood as 'healthcare needs' (resources needed to exhaust the capacity) and 'health needs' (the magnitude of capacity to benefit itself) respectively (A. J. Culyer, 2001; Norman Daniels, 2008)⁵. As opposed to Hasman et al. (2006), who argued that the concept of needs must be independent of costs, Culyer argued that the resources input should be the measurement of need (A. J. Culyer, 1998, 2001). Culyer's definition of healthcare needs (A. J. Culyer, 2001) embodies the concept of costeffectiveness into the measurement, i.e. only cost-effective care is relevant in the context of equitable healthcare resources distribution (A. J. Culyer, 1998).

The health needs definition that has been discussed is focusing on identification of the absolute (amount of) healthcare needs. However, it is immediately apparent that there are

s It is worth mentioning that despite the notion of difference between the terms of 'healthcare needs' and 'health needs' pointed out by A. J. Culyer and Norman Daniels, most of the body of literature use the term of health needs when referring to the needs of healthcare. Thus terms of health and healthcare needs is used interchangeably in this thesis as well.

not enough resources to go around to meet all needs (Acheson, 1978; A. J. Culyer, 1995). Since the purpose of defining healthcare need in this thesis is to allow people to choose how resources ought to be distributed on grounds of equity, a concept of relative health needs (A. J. Culyer, 1998) is emphasised here. The application of relative need is by comparing the (absolute) needs of different groups of individuals and allocates the resources according to the comparison.

This study looks into the fairness of the distribution of limited Malaysian health system resources, which is delivered by western medicine healthcare givers in the form of preventive, promotive, curative or rehabilitative healthcare services. Despite the different accounts of health needs in literature, an operational definition is adopted in this thesis to provide a more concise analysis. In this thesis, health needs is defined as the relative amount of healthcare resources determined by healthcare professionals to be required to exhaust the capacity to benefit, where the goal of benefit is a status where one's health is enhanced or prevented from deteriorating, or one's death is postponed by an intervention. Although there are not enough resources to exhaust all absolute healthcare needs identified, relative healthcare needs can be assigned to individuals/groups according to the total resources available and the relative amount of resources needed among these individuals/groups. This definition is one of normative (determined by expert), pragmatic (only when there is "capacity to benefit") and economic (input of resources is necessary to benefit and finite resources are not able to meet all health needs) views. This operational definition is the basis of estimation of population area healthcare needs in the geographic equity analysis.

2.4 Available Healthcare Services and Actual Healthcare Coverage

The healthcare services that are being allocated to a geographical area can be deemed as being made available to that locality. However, the availability of the health service does not guarantee its utilisation by potential patients. As proposed by Tanahashi, when available healthcare services are being translated into utilisation after overcoming all the potential barriers in between, it is considered "actual coverage" (Tanahashi, 1978).



Figure 2-3: Classification of Healthcare Coverage Source: Reproduced from Tanahashi (1978)

Figure 2-3 is the health service coverage framework proposed by Tanahashi. The framework points out that the availability of health resources targeted at a specific population does not immediately translate into actual coverage. The available resources need to be accessible to the target population. For Tanahashi, physical reachability (factors to consider include transport options, available infrastructure and distance to facilities) is the barrier to accessibility in this stage. In turn, the accessible resources need to be acceptable to the target population. A healthcare worker who is insensitive to the local culture or religious practice may reduce the acceptability. The user fee is also considered a potential barrier to acceptability in Tanahashi's framework. Finally, when

actual contact happens, regardless if it results in effective treatment, the acceptable service is translated into actual coverage.

Penchansky and Thomas (1981) also defined five specific dimensions of "fit between the patient and the healthcare system". The specific dimensions are availability, accessibility, accommodation, affordability, and acceptability. Specifically, Penchansky and Thomas defined the availability as the "relationship of the volume and type of existing services (and resources) to the clients' volume and types of needs", which refers to the adequacy of the supply of healthcare workers, healthcare programmes and healthcare services (Penchansky & Thomas, 1981). Accessibility refers to the physical reachability of healthcare facilities for potential patients in both frameworks. The latter three dimensions (accommodation, affordability and acceptability) of "fit" could be considered as a more detailed breakdown of the gaps between "accessible coverage" and "acceptable coverage" in Tanahashi's framework.

As mentioned earlier, the majority of studies are using utilisation as the measurement of health services. In those studies, when utilisation is quantified, essentially, the "actual coverage" is measured. However, this does not mean that the availability and (physical) accessibility coverage is not important. In fact, the availability and (physical) accessibility of healthcare services were singled out as essential components in both frameworks reviewed in the preceding paragraph.

It is argued in this thesis that availability is equally imperative as utilisation because the availability coverage precludes actual coverage. From a health system perspective, the services need to be made available first. Making services available not only means deciding the total amount of resources used in healthcare but also allocating those resources to particular services and specific geographic locations. The amount of healthcare resources needs to be adequate so that the services are not merely available but also of equal quality. Issues of accommodation, affordability and acceptability can be conquered at the management level once the resources are made available. For example, there may be, minimal co-payment (affordability), friendly operating hours (accommodation) and female staff for maternal care (acceptability) when these are necessary to allow full utilisation. The (physical) accessibility problem lies partially in the process of making available (where are the healthcare facilities going to be built and where are the healthcare workers going to be deployed) and can partially be addressed by managerial efforts such as providing free ambulance services and telecommunication technologies (mainly limited to secondary or tertiary care).

Whitehead interprets "equal access to available care" as "healthcare should be made available at each geographic area according to needs and ease of (physical) access, and all other (affordability, accommodation and acceptability barriers) barriers should be removed" (Whitehead, 1992). Essentially, Whitehead acknowledged that healthcare services have to be made available at the right place and with the right amount to meet healthcare needs.

Dissecting Whitehead's definition of healthcare equity, Hanratty et al. (2007) opined that "equal utilisation for equal needs" is the more pragmatic interpretation of "equal access to available care for equal needs". In other words, 'utilisation' and 'access to available care' are two ways of operationalising one same principle. It is argued in this thesis that the measurements of availability and physical accessibility are more fundamental in providing direct macro-level policy recommendation in Malaysia's health system. Availability and physical accessibility analysis provide evidence on the amount and physical locations that the resources are being distributed. This integral role of location or geography in healthcare resource allocation in achieving healthcare equity will be elaborated in the next section.

2.5 Geographic Healthcare Equity

As discussed earlier, health equity is said to be achieved when there is no unfair and avoidable disparities or inequalities in health among different subgroups of population. Subgroups of population mentioned here could be those being grouped by income, occupation, education, gender, ethnicity, religion or place of residence (P. Braveman & Gruskin, 2003; Whitehead, 1992). Hence, other than assessing healthcare equity across socioeconomic groups, which are usually defined by a variety or combination of measurements of income, economic assets, occupational class, and/or educational level (P. Braveman & Gruskin, 2003), analysis of healthcare coverage across other groups such as place of residence (or geographic areas) is as important. Geography distinguishes itself from other groupings in the operationalisation of equitable healthcare for two reasons. First, many geographic factors directly or indirectly influence health. Second, geographic considerations also influence the provision and finance of healthcare.

There is considerable evidence that geographic inequalities, in the form of "area" (Rice & Smith, 2001b) or "contextual" effects (Curtis & Rees Jones, 1998) in health, exists (Jones & Duncan, 1995). These effects can be from direct physical and biological factors. For example, the risk of communicable diseases transmission is related to the prevalence of disease in a geographic area and or the mobility of population with high prevalence areas (Curtis & Rees Jones, 1998). Another apparent case is the direct health effects of environmental physical risk factors such as water and air pollutants that people exposed to. For example, the higher level of ambient urban air pollution was positively associated with higher morbidity and mortality directly or indirectly related to respiratory conditions (Sunyer, 2001).

More elusive or indirect geographic health factors include local economic conditions, social support systems (such as transport, education and social care) and local culture (Jones & Duncan, 1995; Rice & Smith, 2001b). For example, Morris et al. (2001) established the evidence that geographic variation in the incidence of coronary heart disease in Britain can be attributed to factors such as higher prevalence of smoking, heavy alcohol consumption, manual social class, lower prevalence of physical activity and higher body mass index in their multivariate analysis. Prevalence of social class, smoking and alcohol consumptions were perhaps associated with local economic conditions (Jones & Duncan, 1995). Local culture, transport and education might have influenced physical activity level and dietary pattern while contributing to smoking and alcohol consumption (Duncan, Jones, & Moon, 1993). Regardless of whether these geographic factors are apparent causal effects (e.g. environmental pollutants) or more of aggregated individual characteristics (e.g. smoking or activity level), unequal aggregated health status across geography prevails.

Healthcare facilities such as hospitals and clinics are immobile. The majority of healthcare services, especially secondary care, cannot be delivered without appropriate physical facilities and equipment. Services that are being offered via mobile services are often more limited and outreach programmes often use static facilities as the base for operation and backup for advanced care. Hence, the physical accessibility coverage of healthcare services is directly limited by the geographic location of the healthcare facilities. In the Malaysian health system, MOH provides the most comprehensive nationwide healthcare facilities network. This hospitals and clinics network was organised according to the geographic administrative structure of federation-state-district. The amount, size and location of these MOH facilities directly determine the physical accessibility of Malaysians to public healthcare. (See more on Malaysia's health system and MOH provision network in Chapter 3)

The financing of health systems is often organised on a geographic basis as well. This is particularly true when the health system financing is a centralised public system of insurance (as in the United Kingdom, New Zealand, and many states in Australia and Canada) or devolved public sector system of insurance (as in Scandinavia, Spain, and Italy) (Rice & Smith, 2001b). As the health funds in these systems are allocated through geographic-bound organisations, the amount of healthcare services that can be generated or purchased at each geographic area are indirectly capped by the total funds received by each health area. Using Kutzin (2001)₆ framework, the revenue of Malaysia's public healthcare sector is mainly collected from general taxation and pooled at the federal government level and the services are "purchased" predominantly in the form of MOH direct healthcare services provision. As a result, pooled health funds were channelled through MOH's geographic-bound administrative structure and facilities in Malaysia. This indirectly determines the eventual quantity as well as the quality of healthcare services that are able to be generated and offered to people residing in each state and district.

In addition, when the provision of healthcare is left to be determined by market forces, the conventional wisdom is that "the availability of good medical care tends to vary inversely with the need for it in the population served" (Hart, 1971). This is perhaps because providers thrive easily in areas where people are more affluent and able to pay,

⁶ Kutzin (2001) proposed that healthcare financing arrangement of health systems can be described and analysed based on four main functions which are "revenue collection, pooling of funds, purchasing of services and provision of services".

and people residing in these areas are generally healthier than their more deprived counterparts in other parts of the country. Therefore, it is not surprising that predominant for-profit private healthcare providers in Malaysia are found to be concentrated in larger affluent cities (see details in Chapter 3). It is worth pointing out that Hart's observation, which was termed "Inverse Care Law", was based on National Health Services in the United Kingdom, which was essentially a public healthcare system. Hence, the Inverse Care Law is not only applicable to the private sector but also to the public healthcare sector in Malaysia, if no deliberate efforts are made to distribute healthcare resources according to needs across geographic areas (Watt, 2002).

Taken together, this section has demonstrated that geographic determinants, through both direct and indirect pathways, affect the health status of residents and influence the distribution of healthcare provision. Malaysians living in the 11 peninsular states and Malaysia's mixed public/private health system are not excluded from all these geographic leverages. Thus, as noted by Smith (2008a), one of the central policy issues for such a health system is how healthcare resources are allocated to these localities.

Linking back to Whitehead's definition of healthcare equity, it is argued in this thesis that to achieve healthcare equity, the antecedent objective of Malaysia's health system is to ensure that healthcare services are made available in each geographic area according to the population health needs of each area. The subsequent aim is then to ensure healthcare services are utilised according to health needs in each area. The scope of the thesis is limited to examining the first objective. This objective is more fundamental, and evidence generated can be used directly to inform allocation policy in Malaysia's health system.

This objective is referred to as the principle of 'geographic healthcare equity' from hereon in this thesis. The availability of services refers to both amount and location of healthcare being allocated or made available. Hence, the notion of 'availability of healthcare services in geographic area' incorporates the concepts of 'availability' and '(physical) accessibility' as discussed in Section 2.4. This geographic healthcare (availability) equity principle embodied the first theme of Whitehead's healthcare equity definition (i.e. "assess to available health according to health needs").

Healthcare services are the products of combinations of healthcare resources such as healthcare facilities, healthcare workers and medicines and other healthcare appliances and equipment. Hence, the geographic healthcare equity principle will be operationalised by examining the relation between healthcare resources availability and healthcare needs in each geographic area. The assessment will apply two different principles of equity, namely vertical and horizontal equity, according to the resources mix it examines. In the next section, concepts of vertical and horizontal equity will be briefly reviewed. Then, horizontal and vertical geographic equity will be defined and applied in the context of Malaysia's mixed public/private health system.

2.6 Horizontal & Vertical Geographic Healthcare Equity

The concept of horizontal and vertical equity has its root in the most fundamental principle of justice which stated that "equals should be treated equally and unequals unequally". It has been widely accepted since Aristotle first defined it more than two thousand years ago. From this definition, the concept of horizontal and vertical equity is derived. Horizontal equity principle requires individuals to be treated equally if their status is same, while vertical equity requires individuals to be treated appropriately unequally according to their differential status (Gillon, 1994). M. Sutton (2002) acknowledged that while horizontal inequity can be view as direct injustice, vertical inequity can be considered a more indirect form. These two principles can be applied to different aspects of an issue. In healthcare, horizontal and vertical equity are often

promulgated in the discussion of healthcare provision coverage (e.g. access and utilisation) and healthcare financing (funding).

2.6.1 Horizontal and Vertical Equity in Provision of Healthcare

For healthcare provision, many health economists advocate and compare the utilisation of healthcare and health needs of individuals with different socioeconomic status. Applying the principle of horizontal equity, they define equitable healthcare delivery as "persons in equal need are treated the same irrespective of their income (or socioeconomic status, ability-to-pay for healthcare, place of residence etc)" (E. van Doorslaer et al., 1992).

Matthew Sutton and Lock (2000) pointed out that most measurements of horizontal equity usually accounted for the health needs variation in the population by adjusting for the age and gender of area population using national average levels of health resources used by different age and gender groups. This is based on the assumption that "on average, the system gets it right" and hence the current distribution of resources among different age and gender groups in a health system reflect their relative needs.

Some researchers argued that achieving horizontal equity in healthcare utilisation is not enough. Vertical inequity could occur when individuals with different healthcare needs do not receive appropriately dissimilar amounts of healthcare. Vertical equity is about positive discrimination (G. Mooney, 2000). In order for those with lower socioeconomic status to achieve the same level of opportunity to fulfil their life potential, these researchers advocate that the provision/utilisation of healthcare for those at lower socioeconomic status should be appropriately more (proportionately more to need) than those at better status to 'overcompensate'. Some researchers advocate embracement of the principle of vertical equity in healthcare provision/utilisation which "seek to allocate resources preferentially to those with the worst health status" (Di McIntyre et al., 2007).

However, the principle of vertical equity in healthcare provision is still contentious. The first problem lies in "how much more" healthcare should be given to those in poorer socioeconomic status? This problem can be observed in the definition of vertical equity applied in some studies. For example, Wang and Yaung (2013) claimed "people with greater health needs should receive more healthcare than those of lesser needs", but stop short from defining how much more is appropriate for each unit less of needs. In other words, vertical inequity is less discussed and examined because researchers have to compare the actual variation between need groups with the optimal allocation of care on the basis of appropriate effect of need on use. The problem arises from difficulties in defining such a target (appropriate effect of need on use) (Vallejo-Torres & Morris, 2013), and defining and measuring needs (M. Sutton, 2002). In response to this problem, Matthew Sutton and Lock (2000) argued that, in a similar vein of using national average in operationalising horizontal equity, the utilisation pattern (by age and gender) of population in the most progressive region (where proportionately most resources are allocated to population with more health needs) could be used as the benchmark of vertical inequity. Vallejo-Torres and Morris (2013) adopted the same approach to measure income-related vertical inequity in healthcare provision but they acknowledged that income-related vertical inequity "does not necessarily capture the full degree of vertical inequity that might be present in a system" because it is a partial measure caused by the inappropriate effect of need and the maldistribution of needs across income groups.

Second, some may reject vertical equity principle in provision on the basis that by providing more healthcare to those who are in a lower socioeconomic status means that those in a higher socioeconomic status in practice will end up at a lower level of health status. These are perhaps the reasons that horizontal equity is still a more widely accepted and applied principle as the measurement of performance of healthcare provision.

2.6.2 Horizontal and Vertical Equity in Healthcare Financing

Contrary to its use in measuring equity in health provision, the principle of vertical equity is more often accepted and applied in healthcare financing. This principle is usually applied in the way that "individuals should be contributing to healthcare financing according to their ability-to-pay, not only in proportionate but proportionately more (progressive), regardless of healthcare they need or utilise" (Mossialos & Dixon, 2002).

The horizontal equity principle is sometimes applied in the assessment of healthcare funding arrangement as well. It is used in the health system that relies on multiple insurance schemes or funding sources (for example, different tax rates for people residing in different areas, or different insurance schemes for those on formal or informal sectors) to provide overall healthcare coverage. In this context, horizontal equity is achieved when people with the same income in different healthcare schemes are contributing similarly to the funding of healthcare (Mossialos & Dixon, 2002).

2.7 Conclusion

In this chapter, the literature of healthcare resources and resources allocative process have been reviewed and the scope of healthcare resources and the allocative process in this thesis are drawn. Also, the concepts of healthcare needs and healthcare equity were discussed and working definitions of healthcare needs and the pragmatic healthcare equity principle was adopted for this thesis. Geographic healthcare equity was defined specifically to focus on providing appropriate treatment for needed healthcare to all people regardless of their place of residence within a health system, as it was demonstrated that geography plays a central role in the distribution of healthcare provision and healthcare needs today. In the next chapter, an overall introduction of Malaysia's mixed public/private healthcare system will be given. It will provide the contextual background for the assessment of geographic healthcare equity in Peninsular Malaysia.

CHAPTER 3:

THE MALAYSIAN HEALTH SYSTEM

"As for equity in financing, studies have shown that tax financing tends to be more equitable than Social Health Insurance in distributing the cost burden... ... In terms of equitable distribution of health care, some tax-financed systems in low- and middle-income countries do favour the poor. However, most countries' systems do not favour the poor because of affluent groups' powerful political influence on the allocation of government resources" - Hsiao (2007)

3.1 Chapter Overview

Chapter 2 defines the concepts of geographic healthcare equity in this thesis and briefly describes the public/private mixed health system in Malaysia. This chapter aims to provide a detailed background context of Malaysia's health system and to operationalise the concept of geographic healthcare equity in the Malaysian context for later analysis. Along the way, this chapter also discusses and identifies the gaps of knowledge in assessing healthcare equity or attainment of UHC in Peninsular Malaysia.

Section 3.2 first gives an overview of the healthcare system in Malaysia from its provision and financing. Section 3.3 then draws on existing literature to understand the extent the Malaysian healthcare system has achieved in terms of providing equitable healthcare and achieving universal health coverage (UHC) for its people. From there, Section 3.4 defines and operationalises the concept of horizontal and vertical geographic healthcare equity in the context of Malaysia's health system. The chapter ends with Section 3.5 explaining how evaluating the healthcare resource allocative and regulating process can contribute to the understanding of geographic healthcare (in)equity in Malaysia.

3.2 Mixed Public/Private Health System in Malaysia

A healthcare system is an organisation of people, institutions and resources. These resources, actors and institutions are related to financing, provision and regulation of "health actions" (Murray & Frenk, 2000). A "health action" is defined to be any set of

activities whose primary intent is to improve or maintain health. In the following three sections (Sections 3.2,1, 3.2.2 and 3.2.3), provision, financing and regulation of Malaysia's healthcare system will be described in turn.

3.2.1 Share of Healthcare Provision in Malaysia

Malaysia has a mixed public-private healthcare provision system (Heng Leng Chee & Barraclough, 2009b). At the same time, as a multi-ethnic and multi-cultural country where different people have their own medical beliefs and practices, traditional and complementary medicine (T&CM) co-exist with western medicine in Malaysia (Ghani & Yadav, 2008). The following sub-sections will first briefly review the development and share of T&CM in Malaysia. Then, the structure of the western public and private healthcare sector in Malaysia will be described. Section 3.2.1 will end with the comparison of the share of healthcare provision to the population between the public and private sectors.

3.2.1.1 Traditional and Complementary Medicine in Malaysia

Traditional and complementary medicine (T&CM) was only officially recognised by the government in March 2016 with the gazetting of the Traditional and Complementary Medicine Act 2016 (Act 775) (Malaysia, 2016). In MOH facilities, traditional and complementary medicine was accepted as an adjunct treatment to overcome chemotherapy side effects (not alternative treatment) and was used in only three public hospitals (Loh, 2011).

Based on findings of national household health surveys conducted in 1996, 2006, 2011 and 2015, the proportion of respondents, who had been obtaining healthcare due to illness in the two weeks prior to the survey, that seek healthcare from T&CM practitioners fell from 3.8 percent to 0.9 and then 0.2 percent in both 2011 & 2015 (IPH, 1997, 2008, 2011a; IPH & IHSR, 2015). The gradual drop either represents the true decline of T&CM utilisation or change of attitude, whereby people no longer consider T&CM part of primary health actions for the improvement or maintenance of health. Either way, nonwestern medical services have been gradually reduced to a relatively minor role in the whole health system. Due to this relatively insignificant and diminishing role of T&CM in the Malaysia healthcare system, the scope of the study is limited to the western medical system for a more concise analysis.

3.2.1.2 Public Healthcare Provision in Malaysia

The Malaysian government inherited the western healthcare system established by the British colonial government. The system established by the British colonial government mainly constituted hospitals in cities. It was to cater for colonial government officials and expatriates. The inherited public hospital system was expanded to serve the general public when the Malaysian government took over (Heng Leng Chee & Barraclough, 2009b). Today, it has developed into a four-tier hospital service (Ghani & Yadav, 2008). District non-specialist hospitals provide the basic inpatient care. When more advanced specialist care was needed, the patient will be transferred to district specialist hospitals, as secondary referral centres. Every state capital is equipped with a specialist hospital that serves as the tertiary referral in their state. Lastly, Hospital Kuala Lumpur and nine other special medical institutes 7 serve as the quaternary referral centres for the most complicated cases all over the country.

⁷ As of 2014, there were nine special medical institutes namely National Cancer Centre, Putrajaya; Respiratory Medicine Institution, Kuala Lumpur (mainly for chronic pulmonary tuberculosis patients); Cheras Rehabilitation Hospital, Kuala Lumpur;

Although the provision of the public health sector is mainly entrusted to the Ministry of Health (MOH), the Ministry of Education (MOE)⁸, Ministry of Defence (MOD), Ministry of Local Government and the Housing and Ministry of National Unity and Social Development also play some roles (Ghani & Yadav, 2008). The latter two agencies have gradually shifted some of their health services to MOH (Ghani & Yadav, 2008; Nicholas & Baer, 2009). Most of the clinics and hospitals of MOD are sited within army camps and largely provide healthcare for armed forces personnel and their families only. There are three hospitals run solely by three universities under MOE. These hospitals served as tertiary hospitals to the public while serving the purpose of teaching hospitals for the training of healthcare workers.

The British colonial government did little to establish a primary care system in the country. Some health facilities were set up in estates, which were in the key economic interest of the colonial government. Facilities were also set up for the *Orang Asli* (aboriginal people) and in the new villages during the Emergency-era. The Malaysian government took the initiative to develop a primary healthcare system for rural areas since Independence (Heng Leng Chee & Barraclough, 2009b). At that time, public hospitals had outpatient departments that provided primary care services in urban areas. This primary healthcare system has also developed into a two-tier (converted from the initial

Leprosy Control Centre, Sungai Buloh; Women and Children Hospital, Likas; and Hospital Bahagia, Ulu Kinta, Hospital Permai, Johor Bahru, Hospital Mesra, Kota Kinabalu, and Hospital Sentosa, Kuching (All four for psychiatric patients). (MOH, 2015c)

s Ministry of Higher Education was combined with Ministry of Education to become one single Ministry which retained the name of Ministry of Education in 2013

three-tier system in 1973) primary health system (Ghani & Yadav, 2008). Health Clinics (*Klinik Kesihatan*) serve as the outpatient units in the rural areas, which also provide preventive and promotive care including maternal and child healthcare. The size of the Health Clinics varies greatly. It can be large polyclinics served by a few dozen medical officers (doctors) and equipped with laboratories, X-ray machines, and other allied health practitioners such as physiotherapists and nutritionists; it can also be a small clinic run by a single medical officer (who may also service other clinics). Nevertheless, most of these health centres, large or small, were generally supported by several Rural Clinics (*Klinik Desa*). Rural Clinics mainly cater for basic maternal and child healthcare and are run by nurses and community nurses. Since 2010, health centres also are supported by 1Malaysia Clinics (*Klinik 1Malaysia*), which are small clinics run by Assistant Medical Officers (*Penolong Pegawai Perubatan*) and care for simple acute outpatient illness. Since the second half of 2018, 1Malaysia Clinics are in the midst of being re-staffed with medical officers and rebranded into Community Clinics.

Free ambulance services were established to transfer patients among clinics and hospitals according to the levels of expertise required for the treatment. Having the public primary care network and hospital care network well linked up, the Malaysian government has provided a comprehensive national network of healthcare coverage. However, as discussed in Section 2.4, quantity and quality of healthcare resources made available via this nationwide network are important. Only with the appropriate quantity of healthcare resources made available according to the population health needs of each geographic area, are the people there able to access to the appropriate amount of quality healthcare services. In other words, as MOH has done an excellent job in making sure healthcare services located in the proximity of all people regardless of their area of residence, the next question would be whether the amount of resources distributed to each facility is justified by the amount of healthcare needs. The presence of the private healthcare sector further complicates the geographic equity issue in the Malaysian Health System. The provision of healthcare by the private sector is reviewed next.

3.2.1.3 Private Healthcare Provision in Malaysia

On the private sector side, private for-profit primary care could already be found in urban areas at the time of Independence (Heng Leng Chee & Barraclough, 2009b). Until today, private primary care clinics are still mainly located in large cities and smaller townships (Halina Hussein Rozita, 2000). Even though some provide preventive care like antenatal examination and immunisation, the main focus of services is still curative care (Ghani & Yadav, 2008).

During the early days of Independence, private for-profit hospitals were non-existent in Malaysia until the 1970s. That was followed by a rapid expansion of the private hospital sector since the 1980s (Heng Leng Chee & Barraclough, 2009a). The growth of the private sector is argued to be the result of the policy of state withdrawal from direct healthcare provision and increment of investment in for-profit private sectors via various state economic development corporations and the national sovereign fund (Chan, 2010; Heng Leng Chee & Barraclough, 2009a; Rasiah, Noh, & Tumin, 2009). The number of private hospitals has grown from 50 in 1980 (Heng Leng Chee & Barraclough, 2009a) to 2799 in 2015 (MOH, 2016b).

⁹ This includes 183 private hospital and 96 private maternity homes, nursing homes, hospices, and ambulatory care centres.

3.2.1.4 Comparing Private and Public Healthcare Provision Coverage

Given the existence of this two-tier private and public provision of healthcare in Malaysia, it is important to understand the geographic coverage and share of healthcare provision of each sector to the population. Table 3-1 shows the geographic coverage of public and private healthcare facilities in Malaysia in 1996 based on NHMS II findings10. The average distance to public clinics and hospitals were shorter than the distance to private counterparts, with the only exception of private clinics located nearer to the richest quintile of the population. This showed that public facilities provided better physical accessibility for the majority of the population. This is especially evident for people in the poorest quintile in primary care, where the distance to the private clinic is more than two times the distance to a public clinic, and it is for all people in hospital care regardless of socioeconomic status.

Population arranged by Income quintiles	Average distance to government clinic (km)	Average distance to private clinic (km)	Average distance to government hospital (km)	Average distance to private hospital (km)
1 (poorest 20%)	5.7	14.2	23.6	172.3
2	4.7	7.9	17.7	108.2
3	4.5	5.8	14.9	79.7
4	4.0	4.6	12.8	56.2
5 (richest 20%)	3.7	2.8	10.9	41.3

 Table 3-1: Average Distances to a Clinic by Income Quintile 1996

Source: Halina Hussein Rozita (2000)

¹⁰ Subsequent NHMSs asked the distance to the 'healthcare facilities used by the respondent' rather than the distance to the 'nearest healthcare facilities to the respondents' and hence similar comparisons could not be reproduced. Total numbers of public and private facilities have since increased. Hence, it is assumed that the average distances to all kinds of facilities now are not further than in 1996.

Further comparisons can be made by comparing the utilisation of public and private sector services by the people. As shown in table 3-2, 71.1 percent of total hospital admission was the public sector whereas 28.9 percent was in the private sector in 2015. From the 71.1 percent, 67.0% were in MOH hospitals whereas the other 4.1% happened in non-MOH hospitals (hospitals under MOD and MOE). This means that the 94% of hospital services were covered by the MOH and private hospitals. At the primary care clinic level11, a recent estimation showed that 40.4% (95% Confidence Interval, 95%CI 34.9 - 45.9) of clinic attendance took place in public facilities whereas 59.6% (95%CI 54.1- 65.1) presented to private clinics in 2014 (Sivasampu et al., 2016)12.

Table 3-2: Number of Inpatient Admissions by Sectors in 2015

	Pu	blic	Duivata	Total
	MOH	Non-MOH	rnvate	Totai
Admission No.	2,465,727	150,832	1,064,718	3,681,277
D	67.0%	4.1%	28.00/	1000/
Percentage	71.1	%	28.9%	100%

Source: Health facts 2016 (MOH, 2016a)

One can also understand the situation from the utilisation of services from the national surveys done in 1996, 2006, 2011 and 2015 (Table 3-3). When the people needed primary care services, 56%, 62.1%, 54.2% and 60.1% chose to go to private practitioners in 1996,

¹¹ Primary care clinic attendance here excludes outpatient attendance in hospital clinic.

¹² Non-MOH public facilities share is omitted here because (a) there were no primary care clinics under MOE, and (b) statistics of clinics attendance under MOD clinics was not available and MOD clinics served only armed forces personnel and their families.

2006, 2011 and 2015 respectively. At the same time, more people went to public hospitals when in-patient care was required (78%, 82.6%, 72.2% and 75.3% in respective years).

	H	Hospital serv	ice	Primary care service								
	Public	Private	Others	Public	Private	Others						
1996	78%	18%	4%	39%	56%	5%						
2006	82.6%	16.9%	0.5%	37.9%	62.1%	0%						
2011	72.2%	27.8%	0%	45.8%	54.2%	0%						
2015	75.3%	25.8%	0%	39.9%	60.1%	0%						

Table 3-3: Utilisation of Healthcare Services by Sectors and Types of Service in 1996, 2006, 2011, and 2015

Source: National Health and Morbidity Survey 1996, 2006, 2011, 2015 (IPH, 1997, 2008, 2011a; IPH & IHSR, 2015)

The above data shows that the private health sector plays an important role in both primary and hospital service in Malaysia. Hence, in order to capture the complete picture of healthcare resource distribution in Malaysia, assessment for both public and private sector resources are necessary.

3.2.2 Financing of Healthcare in Malaysia

Public healthcare services are funded by general taxation (Halina Hussein Rozita, 2000) through MOH, MOE and other government agencies. MOH and MOE total health expenditure constitute around 90% of total health expenditure in the public sector from 1997 to 2016 (MOH, 2018) (Table 3-4).

Table 3-4 also shows that extra-budgetary sources of health financing are negligible in Malaysia. Social insurance and Employee Provident Funds only constitute of 1.16% and 0.21% of total health expenditure of the public sector respectively in 2016 (MOH, 2018). Public primary care services are provided to the public with a nominal user fee of RM1 (Ng, 2012; Yu et al., 2008). Public hospital services are also provided at a low price (Ng, 2012). As a result, user fee collected by MOH only constitute 2% of the MOH budget in 2004 (Yu et al., 2008).

In contrast to the public sector, private healthcare service does not receive direct funding from taxation. The private sector receives indirect subsidies through tax incentives such as industrial building allowance for hospital buildings, service tax exemption for expenses on medical advice and use of medical equipment (Heng Leng Chee & Barraclough, 2009a), and income tax rebates for taxpayer's expenditures on private healthcare. From 1997 to 2016, 71% to 78% of total health expenditure by the private sector was financed by OOP payments from the user (Table 3-5). This high proportion of OOP payment is perhaps the reason that in 2015 only 25.8% of Malaysian utilised private hospital care when in-patient care was needed (Table 3-3). Despite that, the Malaysian government allowed the private sector to expand. The high OOP payment had less impact on utilisation of private primary care (60.1% Malaysian utilise private primary care is much lower than the cost of private hospital care and hence OOP payment is a less significant barrier when accessing private primary care.

Table 3-4: Total Health Expenditure by Public Source of Financing, 1997-2016 (Percent %)

Sources of Financing	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Ministry of Health (MOH)	81.93	82.03	82.21	83.43	83.13	82.62	85.02	82.55	80.81	83.97	79.65	80.85	81.23	82.20	81.44	82.46	83.25	83.81	84.34	83.60
Ministry of Higher Education (MOHE)	8.64	8.15	8.28	7.60	7.74	7.95	6.37	6.70	7.48	6.23	6.66	6.80	6.32	6.83	6.25	6.14	5.99	5.32	5.06	5.17
Ministry of Defence (MOD)	0.96	0.95	0.91	0.86	0.83	0.86	0.75	0.70	0.83	0.76	0.79	0.86	0.75	0.65	0.69	0.78	0.77	0.71	0.63	0.61
Other federal agencies (including statutory bodies)	5.46	5.78	5.61	5.34	5.75	5.96	5.43	7.11	7.55	6.44	7.56	8.85	8.66	7.91	8.93	7.94	6.92	7.25	7.06	7.62
(General) State government	0.81	0.85	0.78	0.66	0.56	0.58	0.66	0.85	0.69	0.60	0.65	0.61	0.48	0.48	0.46	0.50	0.35	0. <mark>3</mark> 4	0.35	0.37
Other state agencies (including statutory bodies)	0.57	0.55	0.52	0.50	0.44	0.45	0.40	0.44	0.58	0.48	0.46	0.45	0.43	0.50	0.56	0.54	0.75	0.75	0.73	0.79
Local authorities (LA)	0.35	0.33	0.32	0.28	0.26	0.28	0.26	0.33	0.46	0.33	3.02	0.71	1.34	0.56	0.70	0.68	0.82	0.63	0.66	0.47
Employee Provident Funds (EPF)	0.16	0.32	0.37	0.37	0.43	0.46	0.41	0.53	0.62	0.36	0.37	0.31	0.21	0.17	0.19	0.17	0.18	0.17	0.19	0.21
Social Security Organization (SOCSO)	1.12	1.04	1.00	0.96	0.85	0.85	0.70	0.79	0.98	0.83	0.84	0.56	0.58	0.70	0.78	0.80	0.96	1.02	0.97	1.16
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: Malaysia National Health Accounts (MOH, 2018)

Table 3-5: Total Health Expenditure by Private Sector Sources of Financing, 1997-201 (Perce	nt %)
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Sources of Financing	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Private insurance enterprises (other than social insurance)	7.03	8.27	8.92	9.38	11.13	12.42	14.12	13.89	12.72	13. <mark>1</mark> 8	13.30	14.25	17.04	16.79	16.72	15.88	15.51	15.43	15.79	15.19
Private MCOs and other similar entities	1.19	1.55	1.54	1.42	1.57	1.59	1.56	1.48	1.44	1.46	1.42	1.39	1.53	1.48	1.55	1.73	1.53	1.60	1.68	1.74
Private household out-of-pocket expenditure (OOP)	75.55	74.04	74.10	75.94	72.16	71.33	72.41	74.04	74.87	75.58	74.56	75.76	72.56	73.11	74.24	74.54	77.09	77.73	77.20	78.03
Non-profit institutions serving households (NGO)	1.53	1.58	1.51	1.59	1.73	1.81	1.73	1.71	1.74	1.69	1.76	1.78	2.00	1.98	1.99	2.08	0.41	0.19	0.30	0.35
All corporations (other than health insurance)	14.70	14.56	13.93	11.58	13.41	12.85	10.18	8.89	9.23	8.09	8.95	6.80	6.85	6.63	5.49	5.76	5.44	5.03	5.01	4.67
Rest of the world (ROW)	0.00	0.00	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.01	0.02	0.01	0.02	0.02	0.02	0.02
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Source: Malaysia National Health Accounts (MOH, 2018)																				

In short, the comparison of the finance of public and private healthcare services above shows that public healthcare services are funded by general taxation and private healthcare services are largely financed by out-of-pocket (OOP) payment from the users. Previous studies in the 1970s (Heller, 1982) and 1990s (H. H. Rozita, Sararaks, Oostendorp, & Zulkarnain, 2000) confirmed that low or nominal user fee in the public health sector had ensured low financial barrier of accessibility of public healthcare services. However, high OOP payment for private healthcare raises the question of whether private healthcare is affordable by all segments of society. This issue will be revisited in section 3.3.

3.2.3 Administration and Regulation of Healthcare in Malaysia

This section will briefly describe the administrative structure of the main public healthcare sector provider and the regulation of the private sector. The review will focus particularly on the administrative and regulating aspects that are related to the distribution of healthcare resources across geographic areas in Malaysia.

As described earlier, the MOH is directly involved in the provision of public healthcare services, which is mainly funded by general taxation, through its nationwide primary and hospital care network. It is the main actor among the public healthcare providers. MOD's facilities serve only armed forces and MOE's facilities are few and serve as tertiary centres in major cities. MOH's network of facilities provide the primary access to public sector healthcare for the majority of people in Malaysia. This large network of healthcare facilities is organised into three administrative levels: national headquarters, state health office and district health office. Table 3-6 shows the respective healthcare facilities operated by each administrative level.
Level	Administration Level	Service Facilities
1	MOH headquarters	Special Medical Institutions;
		Hospital Kuala Lumpur
2	State Health Office	State Hospitals;
		District Specialist Hospitals;
		District Non-specialist Hospitals
3	District Health Office	Health Clinics;
		Rural Clinics

Table 3-6 MOH Administrative Structure and Service Facilities

Source: Ghani and Yadav (2008)

At the same time, MOH also regulates private healthcare practice via clinical practice guidelines, directives and laws, which oversees the medical profession, controls treatment fees schedule and establishment and operations of private healthcare services (Chua & Cheah, 2012).

The expansion of the private healthcare sector, to some extent, has been encouraged by the government since the 1980s (Heng Leng Chee & Barraclough, 2009a). The encouragement comes in the form of the tax incentives for the healthcare industry contained within economic policies and an official statement urging the private sector to cater for those who can afford it (Heng Leng Chee & Barraclough, 2009a). However, the regulation of the private sector at that time was rather laissez-faire. Hence, the consequences from the rapid unconstrained private sector included brain drain of doctors from the public sector, the concentration of private facilities in high-income urban areas and exorbitant charges for private hospitalisation (Heng Leng Chee & Barraclough, 2009a; Nik Rosnah & Lee, 2011). The Private Healthcare Facilities and Services (PHFS) Act 1998 (and Regulation 2006) was enacted and implemented in 2006 to replace a previously restrictive Private Hospital Act 1997 (Heng Leng Chee & Barraclough, 2009a). It provides a regulatory framework to address and achieve the national objectives of accessibility, equity and quality healthcare in the private sector and medical profession (Nik Rosnah, 2009).

Section 9 of the Private Healthcare Facilities and Services (PHFS) Act 1998 has stated that the approval for the establishment of private non-clinic healthcare facilities13 would consider matters such as the extent to which the healthcare facilities or services are already available in an area, and the need for the healthcare facility and services (Malaysia, 2006). In other words, the government can accept or reject the application of establishing facilities such as haemodialysis centres and hospitals in a particular area based on the equity principle. It is important to note that, private medical and dental clinics are excluded from Section 9 and are not subjected to this equity-based regulation.

3.2.4 Multiple Roles of MOH Malaysia in Malaysia's Health System

Section 2.2 demonstrates that MOH Malaysia has multiple roles as funder, provider, and administrator/regulator in Malaysia healthcare system. As the main direct provider of healthcare services in the public sector, MOH's healthcare facilities network is administered through a national-state-district structure and is funded by general taxation revenue. Economic and healthcare policies are in general designed to allow the private sector to thrive alongside the public sector. Nevertheless, MOH also closely regulates the

¹³ This section under PHFS Act applies to private non-clinic facilities which includes hospital, ambulatory care centre, nursing home, maternity home, blood bank, haemodialysis centre, hospice and community mental health centre. More discussion in Section 4.5

private industry from various aspects. Among those regulations, the geographic distributions of private (non-clinic) facilities are indirectly regulated by allowing or not allowing the establishment of new facilities proposed by private providers (see details in Section 3.4.2). Collectively, it is outlined that while MOH has limited authority over the distribution of private sector facilities and resources, it has full administrative control over its nationwide facilities and resources network. In addition, the MOH public sector network has lower physical and financial barriers compared to the private sector because of its 'comprehensive' geographic coverage and very low user fee. ('Comprehensive' here means MOH network has ensured that healthcare services are accessible in every district. However, it does not guarantee that the services available in each district is enough to cater to the needs of the people there.)

Hence, it is argued here that MOH Malaysia is the backbone of Malaysia's dual mixed public/private healthcare system. MOH has laid out a nationwide healthcare safety net which is geographically accessible and financially affordable to all people. This network permits the contribution of the private sector in places where people are able and willing to pay. MOH Malaysia's multiple roles have the dominant influence over the distribution of overall healthcare resources across the country.

3.3 Equitable Healthcare and UHC in the Malaysian Context

As one of the signatories of the Alma-Ata declaration in 1978, Malaysia is committed to the provision of universal access to primary healthcare. Today, the concept of universal access is perhaps best benchmarked by UHC. The core principle of UHC is that a health system should provide healthcare to all of the people it serves, according to the people's need, together with financial protection from the expenses incurred by the usage of healthcare (WHO, 2010). As discussed in Section 1.2 and 1.3, the principle of UHC shares similar concepts to equitable healthcare in covering two dimensions: provision coverage and financial risk protection.

In Section 3.3.1, current evidence on distribution of health status and healthcare resources will be reviewed briefly. Then, existing pieces of evidence on provision coverage and financial risk protection in Malaysia will be sought after in Section 3.3.2. Finally, Section 3.3.3 will end by identifying current gaps of knowledge in understanding healthcare equity and attainment of UHC in Malaysia.

3.3.1 Disparities in Health Status and Resource Distribution in Malaysia

Since independence, Malaysia has achieved great improvement in health status for the country as a whole. Neonatal mortality rate decreased from 29.6 per 1,000 live births in 1957 to 2.2 per 1,000 live births in 2005. Over the same period, maternal mortality rate decreased from 3.2 to 0.4 per 1,000 live births and life expectancy increased from 56.0 to 70.6 and from 58.0 to 76.0 years for males and females respectively (Ghani & Yadav, 2008). The health status was comparable to other countries in the world with similar economic development status. As an upper middle-income country, the life expectancy in Malaysia was at the same level as other countries in these categories in the early 2000s. The infant mortality rate was even more impressive. It was almost at the level of high-income countries (Ng, 2012; Ramesh, 2009). Even though there was no improvement in neonatal mortality since then, the maternal mortality rate has further decreased to 0.23 per 100,000 live births 2012 (MOH, 2015b). Male and female life expectancy further increased to 72.5 and 77.4 years in 2015 (MOH, 2016b).

However, despite good overall health status, different health status is observed across different geographical areas. Figure 3-1 showed the under-five and neonatal mortality rates by states in Peninsular Malaysia in 2011.



Figure 3-1: Neonatal and Under-five Mortality Rate by States in Peninsular Malaysia, 2011

Source: Health Indicators 2012, Ministry of Health, Malaysia

Excluding Sabah and Sarawak (as vital statistics for these two east Malaysia states are considered less accurate in comparison to those for the peninsula (H. L. Chee, 2005)), the neonatal and under-five mortality rates ranged from 3.9 to 6.4 per 1,000 live births and from 7.2 to 13.1 per 1,000 live births respectively. It seems that there was a great divergence of health status across states. Even though the discrepancies of health status might be the result of factors other than healthcare provision, such as demography difference, these figures certainly warrant further investigation.

3.3.2 Distribution of Healthcare Resources across Geographic Areas

The choice of location to establish a private healthcare facility is mainly based on the consideration of viability of the business in Malaysia (Nik Rosnah, 2009). Only more densely populated and affluent areas can support the existence of private healthcare facilities. Hence, the distribution of private facilities is largely in more urban and affluent areas.

For the public sector, the distribution of healthcare resources between rural and urban areas are more equal. As described earlier, MOH Malaysia has a geographic network of primary and hospital care service. In 1973, the establishment of public rural primary care services was according to population size (Ghani & Yadav, 2008). The aim was to have a health centre for every 15,000 to 20,000 rural populations, and a community clinic for every 2,000 to 4,000 people. In parallel, development of hospital services at district level was aimed to meet the norm of at least two acute beds per 1,000 population (Ghani & Yadav, 2008). These strategies provided a guide for the distribution of health facilities.

As shown in Table 3-1, data from the National Health and Morbidity Survey 1996 (NHMS II) showed that healthcare facilities in general are located nearer to those from higher income groups (Halina Hussein Rozita, 2000). As the higher income groups more often reside in urban areas, this result might imply that healthcare facilities are located nearer to urban folks. In the same vein, this also raised the question of whether healthcare facilities were more abundant in richer or more urbanised states.

Nevertheless, if one compares the distance travelled to seek healthcare by states in 2006 (Table 3-7), which was reported in Malaysia NHMS III14, there are large differences across states in Peninsular Malaysia. The average distance travelled can be more than three times higher when comparing Melaka to Pahang. In short, Table 3-1 and 3-7 shows

¹⁴ Even though NHMS IV and NHMS V was repeated in 2011 and 2015, similar findings on "distance travelled to seek health" were only reported at Peninsular, Sabah and Sarawak level.

that the physical distribution of healthcare facilities are not equal across geographic areas (i.e. across states).

		95% CI		
	Mean (km)	Lower	Upper	
Melaka	3.1	2.2	4.0	
Pulau Pinang	4.3	3.5	5.2	
Selangor	4.5	4.0	5.0	
Kedah	4.8	4.1	5.5	
Terengganu	4.9	4.0	4.9	
Negeri Sembilan	5.1	4.3	5.9	
Kelantan	5.6	4.3	7.0	
Perak	6.2	5.0	7.4	
*Perlis	6.3	1.3	11.4	
Johor	6.6	5.3	7.8	
Pahang	7.5	5.7	9.2	

Table 3-7: Average Distance Travelled to seek treatment for recent illness

Source: Adapted from NHMS III (IPH, 2008)

* The large confidence interval for Perlis might be due to low sample size. (n = 8)

However, from the above data, it is not possible to conclude if the distribution of healthcare facilities is associated with the differing health status. As discussed earlier in Section 2.3.1, Section 2.6.1 and Section 2.7.1, to truly assess if healthcare resources are distributed across geographic areas equitably (i.e. horizontal equity in healthcare provision), one must define and measure healthcare needs difference and assess if these differential needs are allocated with appropriate amounts of healthcare resources.

3.3.3 Utilisation of Healthcare Services across Socioeconomic and Geographic Groups

Having demonstrated the disparities in health status and resources distribution in Peninsular Malaysia, the focus is now turned to the first of the two dimensions of UHC attainment - healthcare provision. As briefly mentioned in Section 1.2, many researchers have adopted a similar strategy to assess healthcare equity for provision by measuring the utilisation of healthcare services across socioeconomic groups for health systems. For Malaysia, Halina Hussein Rozita (2000) had long established the evidence that there were little differences in overall healthcare utilisation rates (including both private and public sector) across different socioeconomic groups in Malaysia in 1996. Using national health survey data, it was also shown that the richer quintiles of society utilised private healthcare proportionately more for both inpatient and outpatient care. Recent updates showed that from 1986 to 2011, the overall utilisation rate of outpatient care shifted from slightly pro-rich to being essentially equal (IHSR, 2013). Over the same period, overall utilisation of inpatient care shifted from slightly pro-poor to being statistically equal. These might be the combined effect of pro-public sector utilisation and pro-rich private sector utilisation over the time.

Another study using the same national health survey data from 1996 to 2011 demonstrated inequality in utilisation of healthcare across geographic areas in Peninsular Malaysia (Mohd, 2016). It was shown that there were statistically significant differences in adult out-patient and in-patient average utilisation rates across states in Peninsular Malaysia in 1996 to 2011. For example, Kedah and Kelantan had the lowest and significantly lower out-patient care utilisation rate than other states in 1996 and 2011 respectively (Table 3-8). At the same time, Negeri Sembilan had the highest and significantly higher out-patient care utilisation rate in both 1996 and 2011.

	1996			2011		
	Average number of visits for out- patient care per capita per anum	Lower Limit of 95% confidence intervals	Upper Limit of 95% confidence intervals	Average number of visits for out- patient care per capita per anum	Lower Limit of 95% confidence intervals	Upper Limit of 95% confidence intervals
Johor	3.2	2.7	3.7	6.4	4.6	8.2
Kedah	2.5	1.9	3.1	2.8	2.0	3.6
Kelantan	3.3	2.5	4.2	2.2	1.6	2.8
Melaka	4.7	3.7	5.7	5.0	3.3	6.9
Negeri Sembilan	6.3	5.0	7.5	7.7	5.3	10.2
Pahang	3.6	2.8	4.5	3.2	2.3	4.1
Pulau Pianang	3.3	2.6	4.0	3.5	2.4	4,6
Perak	3.5	2.8	4.2	6.6	5.0	8.2
Perlis	3.2	2.3	4.0	3.2	2.3	4.1
Selangor	3.2	2.8	3.7	3.7	3.1	4.4
Terengganu	3.1	2.4	3.8	2.6	1.9	3.3
Kuala Lumpur	3.7	3.0	4.4	5.2	3.3	7.1
Peninsular Malaysia	3.5	3.3	3.7	4.5	4.1	5.0

Table 3-8: Average Utilisation Rate for Out-patient Care Visits, by states (Peninsular Malaysia) for adults aged 30 years old and above in 1996 and 2011

Source: (Mohd, 2016)

However, the evidence did not take into account the possible different health needs of people in different socioeconomic status or geographic locations. Since the landmark "Inequalities in Health: The Black Report and the Health Divide", ill-health and healthcare needs were repeatedly found to be unequally distributed among different subgroups of population such as socioeconomic status, class and ethnicity (Bleich et al., 2012). Hence, without adjusting the underlying healthcare needs of different socioeconomic and geographic groups, the above-mentioned Malaysian studies could not say if all health needs had been met (Hanratty et al., 2007). Equal utilisation across population groups might not be equitable if some groups had more healthcare needs then others.

The study of Mohd (2016) addressed this issue across socioeconomic groups. It further examined the equity of healthcare utilisation for adults aged more than 30 years old within three types of Malaysian population groups, namely (a) urban and rural strata, (b) Peninsular Malaysia and East Malaysia, and (c) 14 states and federal territories, by standardising for health needs of those from a different income gradient. It was found that, after standardising for health needs, the utilisation of outpatient care shifted from slightly pro-rich across urban and rural strata and within Peninsular Malaysia in 1996 to being statistically equitable in 2006 and 2011. At the same time, the utilisation of inpatient care shifted from slightly pro-poor in 1996 to being equitable in 2011. However, this study did not examine if there were inequitable utilisation of healthcare across geographic areas in Peninsular Malaysia.

3.3.4 Financial Risk Protection in Malaysia's Health System

Section 3.2.2 highlighted that Malaysia has a mixed public-private healthcare provision system where public healthcare services are funded by general taxation and private healthcare service are largely financed by out-of-pocket (OOP) payment by the user. While 72% to 83% of the population utilised public hospitals when they need hospital care in 1996, 2006, 2011 and 2015, 54% to 62% of people drew on services from the private sector when primary care services were required. Despite the high proportion of OOP expenditure (ranging between 32-40% from 1997 to 2011) out of total health expenditure (THE), it was found that the Malaysian population was well protected from impoverishment and catastrophic expenditure due to utilisation of healthcare. (E. van Doorslaer et al., 2007; E. van Doorslaer, O'Donnell, et al., 2006).

Using household expenditure survey data in 1998-1999, the effect of large and unpredictable health OOP payments were assessed. This effect was termed "impoverishment" and estimated by the additional number of individuals who would fall below international poverty line thresholds if OOP medical payments were subtracted from their total household resources (E. van Doorslaer, O'Donnell, et al., 2006). It was found that the impoverishment rate due to health OOP expenditure was only 0.3% when the 2.15 dollar per head per day middle-income country poverty line was applied. At a lower (low-income country) poverty line of 1.08 dollar per head per day, there would be no statistically significant rise in the poverty rate. The low rate was attributed to lower user charges for the public sector.

From the same database, analysis of catastrophic payments for healthcare in Malaysia was analysed (E. van Doorslaer et al., 2007). When OOP health expenditures exceed a substantially large fraction of the household budget, these "catastrophic" payments severely disrupt short and long-term household living standards. Applying the threshold of 10% of total household expenditures to compare with other low- and middle-income countries in Asia, the incidence of catastrophic health payment in Malaysia was the lowest (2.01%) in 1998/1999. When using the threshold of 25% of non-food expenditures, Malaysia still outperformed other high-income countries in Asia (namely Taiwan, Hong Kong, and Korea) with the incidence of only 0.78%. The low incidence was attributed to the reliance of public sector financing on general taxation and the exemption of the poor from public sector user charge. It was also found that the already low incidence was contributed disproportionately more by those who are better-off.

The notion of the poorer section of the society being less exposed to healthcare financial risk is important in Malaysia's public/private mix health system. The private sector is 'designed' to be utilised only by richer people who can afford, while the poorer ones can continue to receive needed subsidies via healthcare services. This system blueprint seems to be effectively put in place, given the evidence that the public healthcare spending in Malaysia was concentrated among poorer people (O'Donnell et al., 2007) in

1996. Using the household national health survey and national health account data, the study found that public healthcare spending was targeted at the poor as the poorest quintile received significantly more than 20 percent of the total subsidy.

However, the national health account data used in this study was not disaggregated to geographic regions. This means that differential public spending to different states in Malaysia was not accounted for, which means that the spending was assumed to be evenly spread across geographic regions. Secondly, there were also indications from the same study that subsidy per unit of care to each individual might have risen as household consumption rises, which implies that the richer individual may, in fact, be subsidised more when they utilise public service rather than private care. This implies that there is room for improvement in healthcare resource spending, to make it more equitable.

3.3.5 Has Malaysia Achieved UHC?

Section 3.3.2 to Section 3.3.4 described the existence of health disparities and possible inequitable distribution of healthcare resources in Peninsular Malaysia. Existing evidence on health and healthcare equities or equalities in Malaysia were largely focused on analysis across socioeconomic groups. Reviewed studies indicated equal utilisation of healthcare across socioeconomic status and unequal utilisation of healthcare across states in Peninsular Malaysia, without adjusting to possible different health status, since 1986. Studies also confirmed that Malaysia's health system provided excellent financial risk protection since 1996 despite a mixed public/private system with a high proportion of financing of health from OOP payments. Based on this, researchers believed that Malaysia had achieved UHC (Ng, Hairi, Ng, & Kamarulzaman, 2015).

However, it is argued here that more can be done to ascertain UHC in Peninsular Malaysia. First, equitable healthcare can only be claimed when equal access to available care for equal need is confirmed. Second, existing evidence largely focused on assessing the healthcare services coverage across socioeconomic groups which are usually defined by measurement of income, economic assets, occupational class, and/or educational level (P. Braveman & Gruskin, 2003). Assessment of healthcare services coverage across other "more and less advantaged" relevant social groupings (P. Braveman & Gruskin, 2003) such as racial/ethnic or religious groups, or groups defined by geography are lacking. Existing studies lack direct policy impact for Malaysia's health system where healthcare resources are distributed mainly across geographically-bounded health administrative areas. For these two reasons, it is proposed in this thesis that assessments of healthcare provision across geographically-bounded health areas with adjustment of different health needs across areas are needed to provide a clearer path to achieving UHC in the Peninsular Malaysia context.

3.4 Operationalisation of Geographic Healthcare Equity in Malaysia

As discussed earlier in Section 2.5, the equity principles applied can be differentiated into vertical and horizontal dimensions in different aspects of the health system such as healthcare provision and healthcare financing. In this thesis, which is examining Malaysia's mixed public/private healthcare system, geographic horizontal and vertical equity principle is set to be the objectives of the health system for healthcare provision and healthcare funding respectively.

3.4.1 Horizontal Geographic Healthcare Equity in Provision

The Malaysian government's rationale behind the construction of this mixed healthcare system (where the private sector was allowed to grow substantially since the 1980s, see Section 3.2.1.3) is to allow those who can afford it, to utilise private healthcare. The government aims to provide healthcare coverage to those who cannot afford private services via the public provision system. While the private sector is allowed to choose where they want to establish their services (even though latecomers to a particular geographic area might be rejected if the area already has an existing private establishment), it was left to the public sector to fill up any deficiencies in geographic areas lacking adequate quantity of healthcare service. Since, the public and private provision in Malaysia complement each other to cater for different segments of population in each geographic area, the overall healthcare resources available in the area would presumably serve the overall healthcare needs of the area.

As discussed earlier in Section 2.6.1, proponents for horizontal equity in healthcare provision or utilisation opined that the healthcare resources should be provided or utilised proportionately to the healthcare needs, while proponents for vertical equity in healthcare provision argued that those with more healthcare needs should be allocated proportionately more resources. This study took the perspective of the former where horizontal equity is a more appropriate principle in healthcare provision or utilisation. Applying it in the Malaysian context means that the overall healthcare resources (public and private) should be distributed across geographic areas in Malaysia according to area health needs.

3.4.2 Vertical Geographic Healthcare Equity in Financing

For geographic equity of healthcare financing, the application of the vertical equity principle (See Section 2.6.2) is desired. In Malaysia, people in different geographic areas are subjected to the same 'schemes' of funding. It is mandatory for all Malaysian residents to contribute to the public health system indirectly via the contribution of personal income tax to the federal government. People in Malaysia also may contribute directly via outof-pocket payment or voluntarily via private insurance schemes to private practitioners. The structure of income tax is progressive (people with higher income contribute proportionately more of their income) and in line with the principle of vertical equity. However, the supplies of healthcare services can affect the proportion and amount of healthcare funding provided as well. The contribution of direct OOP payment to the health system may increase when less provision of public healthcare and more availability of private healthcare 'push' people to utilise more private services.

It is not the focus of this thesis to examine progressivity of healthcare financing at the individual level. The emphasis is on the presumptive effect of healthcare financing by the mix of healthcare provision at an aggregated level among geographic areas. It is argued here that, given the mixed public/private system in Malaysia, the availability of public healthcare resources should be proportionately more in geographic areas where people have lower income (after taking into consideration the differential healthcare needs of the population in different geographic areas). In such an arrangement, people in wealthier areas would likely be paying proportionately more OOP payments for private healthcare services as public resources are proportionately less. This is on top of their higher contribution towards public health provision via the progressive general taxation system, which is not related to the amount of public resources they utilise. In such an arrangement, people in less wealthier areas would likely be enjoying more public health resources which require less OOP payments as the proportion of public healthcare resources available is more than private resources, at the same time contributing less to the public health system.

Taken together, this is in line with the principle of vertical equity in financing that wealthier people (assumed to have better ability-to-pay) should be paying more regardless of their need or utilisation of healthcare. It is worth noting that this is based on the premise that public healthcare resources were not 'captured' by the rich or wealthy segment of the society in each geographic area.

Another thing to note is that this application of vertical geographic equity will be more meaningful if there is evidence of horizontal geographic equity for overall healthcare resource distribution. This is because the limited amount of healthcare resources is examined in relative terms (not in absolute terms). Regardless of the total amount of healthcare resources made available to a geographic area, the proportion of private healthcare resources affects its utilisation and hence the amount of non-income tax contribution to the health system. However, this differential amount of non-income tax contribution will only be comparable across geographic areas if there is an overall equitable distribution of healthcare resources across geographic areas.

In conclusion, this thesis advocates equal distribution of overall healthcare resources for equal needs (i.e. the availability of resources should be proportionate to the needs) across geographic areas in Malaysia in conforming to the horizontal geographic healthcare equity principle in healthcare provision. This thesis also argues that proportionately more public resources should be allocated to poorer states, in line with the principle of vertical geographic healthcare equity in healthcare financing. This study does not intend to set the benchmark of how much proportionately more (or progressive) resources should be allocated. This target should be set by policymakers, just as how the progressivity of income tax is set by the government with the mandate of the people. The approach of looking at horizontal equity but ignoring vertical equity on healthcare financing, is similar to an approach adopted by Adam Wagstaff, Van Doorslaer, and Paci (1989).

3.5 Healthcare Resource Allocation and Regulating Process in Malaysia

In Section 3.5.1, how public healthcare resources are directly allocated via MOH, which is the main player of Malaysia public health sector, will first be described. Then, how and to what extent the current legal framework allows MOH to exert influence on the distribution of private healthcare facilities will be examined in Section 3.5.2.

3.5.1 Public Healthcare Resource Allocation

Public healthcare services in Malaysia are delivered through a comprehensive network of MOH health facilities throughout the country and it is under the jurisdiction of the federal government (Ghani & Yadav, 2008). Even though MOH operation and organisation is centralised under federal governance, the provision of healthcare is devolved and organised into multiple administrative levels. There are administrative offices of MOH in each of the states and districts in Peninsular Malaysia, which run the healthcare facilities at their respective levels and geographic area.

The MOH healthcare resource allocation is in principle determined by the allocation of the operating budget (recurrent financial input needed to run day-to-day operations) and the developmental budget (One-off capital investment to establish new facilities). Both operating and development expenditure budgetary processes, in principle, involve bottom-up resource requests, and the budget is then allocated top-down from national headquarters to states and districts. Figure 3-2 is the schematic flow of this process.



Figure 3-2: Flow of MOH healthcare resource allocation

According to Chua (1997), requests for operating budgets were put forward mainly based on past years' expenditures by MOH officers at different administrative levels and healthcare facilities. In other words, it was based on historical budgeting. In historical budgeting, when more people came to clinics or hospitals for healthcare, the expenditure was higher. With higher expenditure, there would likely be a bigger budget allocated for in subsequent years. Hence, the allocation of the operating budget is linked to the utilisation of healthcare in particular facilities or geographic areas (See more discussion on historical budgeting in Section 2.2.5 and Section 2.2.8). However, as discussed in Section 2.2.1 and 2.2.2 people who need healthcare may not necessarily utilise it due to various reasons such as availability, accessibility and acceptability. On the other hand, those who do not need healthcare may 'over utilise' the healthcare services because of the availability, accessibility and acceptability of services. As discussed in Section 2.3.2, according to Wright et al. (1998) "needs" is what experts need to determine to achieve the desired health standard, while "demands" originates from what people feel they need (which experts do not necessarily agree). This means the MOH budgeting may better reflect the "demands" of healthcare at each facility and administrative office rather than the true healthcare "needs" of the population of the geographical areas covered.

According to Chua (1997), top-down allocation of a *development budget* was based on health needs of the population using norms such as one health centre for 15,000-20,000 rural population and two hospital beds per 1,000 population. The question here is how the high and middle-level managers at national and state levels plan their budgeting and use the resources allocated. Are the managers aware of the implication of geographic equity of resources distribution when they exercise the power to allocate budgets across different states and districts?

3.5.2 Regulating Private Healthcare Resource

Figure 3-3 is the illustration of the regulating framework of the establishment of private healthcare facilities, according to the purview given by the PHFS Act 1998 (Malaysia, 2006).



Figure 3-3: Regulating framework for establishment and operation of private healthcare facilities and services

MOH can only regulate the geographic distribution of private healthcare facilities other than private clinics. This process is termed "zoning". These non-clinic private facilities include hospitals, psychiatric hospitals, ambulatory care centres, nursing homes, psychiatric nursing homes, maternity homes, blood banks, haemodialysis centres, hospices, and community mental health centres. As prescribed by Section 9 of the PHFS Act, the Director General of Health shall approve or reject the establishment of such new facilities (licence is granted if approved) or maintenance of such existing facilities (licence is renewed if approved) by "consider the following matters: (a) the nature of healthcare facility or service to be provided (b) the extent to which healthcare facilities or services are already available in an area, (c) the need for the healthcare facility or service in the area; (d) the future need for the healthcare facility or service in an area; or (e) any other matter which in his opinion is relevant". Considerations (a), (b) and (c) in Section 9 clearly establish that availability and need of healthcare services in a geographic area as the basis of approval or rejection of establishment or maintenance of private healthcare facilities. It can hence be argued that the core value of "zoning" non-private healthcare facilities is the principle of geographic equity in provision.

Currently, the implementation of this regulatory framework is carried out by the Private Medical Practice Unit (*Cawangan Kawalan Amalan Perubatan Swasta*) in MOH. A previous study showed that this framework was successfully utilised to ensure equitable distribution of haemodialysis centres (Lim & Goh, 2009). This proposed study aims to assess to what extent the "zoning" process is currently being carried out for other facilities, and what are the challenges in the implementation. In short, the allocative process of MOH resources is highly related to the geographic compartmentalisation (states and districts) of the administrative structure. On the other hand, for private sectors, only the geographic establishment of non-clinic facilities are regulated.

3.5.3 Level of Allocation and Regulation in the Malaysian Context

Putting the three levels (macro, meso and micro) of resource allocation (See definitions in Section 2.2.3) into the Malaysian health system context, allocation of MOH resources at the national level (between provinces and regions) and at the provincial level (between districts) in this thesis are considered macro-level allocation. The distribution of resources at district and hospital levels is considered meso-level as the district health authorities and hospitals together constitute the "local health system". The regulation of the distribution of private non-clinic healthcare facilities is carried out directly by the MOH agency at national level for each facility. It could perhaps be considered both macro- and mesolevel allocation. Nevertheless, all three levels are interrelated and the focus of this study is on the macro-level and, to a lesser degree, meso-level allocation. The attention differs from the priority setting process at individual or micro level because the treatment options offered are often restricted by the resources made available to the individual provider's institution or facility and not vice versa, and the service coverage of healthcare facilities are usually geographically bounded as physical access is a necessity for most health service provision.

3.5.4 Importance of Understanding and Evaluating the Allocative Process

Section 3.5 illustrated the direct allocative and indirect regulating roles of MOH on MOH and private healthcare resources distribution. Geography is the basis of the allocation and regulation of these resources. This is the reason the central interest of the thesis is on the geographic aspect of equity across states in Peninsular Malaysia. As mentioned in Section 2.2.8 and 2.2.9, different values, principles and determinants affect the allocative process in different health systems uniquely. An explorative inquiry will help to identify these contextual factors in the Malaysian system which has not been much documented thus far. Also, once the allocative and regulating process is understood, it's fairness can be evaluated by benchmarking it against one of the leading fair process models called "accountability for reasonableness" framework (Section 2.2.10).

3.6 Conclusion

This chapter gave an in-depth overview of the Malaysia Health System and its current achievements in providing UHC for its people. From the review, gaps of knowledge were identified and the scope of research to be carried out in this thesis to fill up the gaps is pointed out.

Section 3.2 provided detailed descriptions of the provision and financing of Malaysia's mixed public and private system. Although the MOH public sector provides a 'comprehensive' geographic network of primary and hospital healthcare services, the private sector still plays a very significant role (as up to 26% and 60% of hospital and

primary care services were utilised in the private sector in 2015). The main source of financing for public and private sectors are quite different as the public sector is supported by government general taxation while the private sector is mainly funded by private OOP. Section 3.3 started by briefly providing some evidence on disparities of health status and healthcare resources physical accessibility across states in Peninsular Malaysia. In spite of the evidence showing that there was equity in utilisation of healthcare services across socioeconomic groups and low impoverishment or catastrophic expenditure due to healthcare utilisation, it is argued that achievement of UHC in Peninsular Malaysia is still not proven unless analysis on equity of healthcare provision and financing across states are performed. To provide more concerted policy impact, in Section 3.4, the geographic equity is operationalised as the availability of healthcare resources, which is the prerequisite of eventual utilisation. Tailored for Malaysia's health system, horizontal geographic healthcare equity in provision and vertical geographic healthcare equity in financing were defined in Section 3.4. This is the basis of geographic equity analysis in Chapters 4 and 5.

Section 3.5 reviewed the allocation process of MOH public resources and regulating process of establishment of private healthcare facilities by MOH. While federal government has full control on the distribution of public sector healthcare facilities and resources, it also has partial influence over the distribution of private healthcare resources via the approval or rejection of establishment of new non-clinic private healthcare facilities. Hence, the Section concluded that a qualitative inquiry into the MOH allocative and regulating process would provide insight into the principles used and determinants influencing the current process and the evaluation of fairness of the current process by benchmarking it against a widely accepted framework. The finding of this inquiry will be presented in Chapter 6.

CHAPTER 4:

CONSTRUCTION OF GEOGRAPHIC POPULATION HEALTHCARE NEEDS

4.1 Chapter Overview

To evaluate the geographic healthcare equity across states in Peninsular Malaysia, provision of healthcare and population healthcare needs has to be estimated first. The challenge was that there was no universally accepted definition and hence no gold standard indicator of geographic area healthcare needs (Stephen Birch & Eyles, 1991; Pearson, 2002) (See more discussion in Section 4.2). Furthermore, appropriate indicators were not always gathered in a consistent and comprehensive fashion that allows comparative analysis across years, if not decades (Pearson, 2002). If such an indicator is collected regularly and timely, it has the added benefit that estimated healthcare needs can be used in the assessment of previous allocations as well as be the guide for future allocations. This challenge is dealt with in this chapter. Section 4.2 details the construction of the formula to estimate state geographic healthcare needs in Peninsular Malaysia, including the rationale of chosen indicators used in the formula. Section 4.3 presents the estimated healthcare needs of states in Peninsular Malaysia. Section 4.4 explains the choice and availability of indicators for healthcare resources.

4.2 Construction of Geographic Population Health Needs Index

A formula has been developed to estimate primary and hospital healthcare needs across states in Peninsular Malaysia in this study. The formula is proposed based on the formula funding method (see Section 2.2.5.1). In Section 2.3.2, healthcare needs have been defined based on the concept of "capacity to benefit" so that it can be operationalised and measured. A similar approach was used in the formula funding method in many healthcare systems such as New Zealand, England, Scotland, the state of New South Wales in Australia and the city of Stockholm, Sweden where the objective was to allocate healthcare resources according to health needs of geographical areas (Penno et al., 2013).

The basis of the method is capitation, which can be defined as assignment of an amount of healthcare fund to a person for the service in question, for the time period in question, subject to overall budget constraints (Rice & Smith, 1999; Rice & Smith, 2001a). Under this principle of capitation, a geographic area health authority caring for 10,000 shall be allocated with twice the amount of the health fund of another health authority caring for 5,000 persons. In the formula funding method, healthcare needs are then measured and used to further adjust the basic capitation rates (Rice & Smith, 1999; Rice & Smith, 2001a). The challenge of proposing a formula for Malaysia's health system originated from the availability of data, which allows further adjustment of differential healthcare needs over and above a crude population number. As in other health systems, data availability is often the most important limiting factor of adopting a health needs estimation formula (Pearson, 2002). In the following sections (Section 4.3.1), the potential indicators that can be used in population health needs estimation are reviewed based on literature. Based on the availability (being collected since 1980s and accessible to researchers or policymakers), validity (adequately reflecting healthcare needs) and reliability (including being consistent over time) (Carr-Hill & Chalmers-Dixon, 2005), the data indicators that can be used in the Malaysian health system is identified.

4.2.1 Additional Differential Health Needs Across Geographic Areas

Further adjustment is needed to reflect the differential health needs over and above crude population numbers. The English NHS in 1976 took an essential epidemiological approach to assess differential health needs across geographic areas (Mays, 1987). It assumed that differential health needs could be equated with the differential morbidity across areas (Mays, 1987). At the same time, morbidity was assumed to reflect the social and environmental condition of areas on the basis that adverse (social and environmental) conditions were known to increase susceptibility to disease and death (Mays, 1987). Various direct and indirect morbidity indicators were proposed to be the adjustment factor (Stephen Birch & Eyles, 1991). Direct indicators included health utilisation data, diseases registry and health status data from population-based health surveys as they directly quantify the healthcare services required to improve population health status. Whereas indirect indicators such as age and gender, mortality, and socioeconomic status were said to be closely related to morbidity and hence could be used as an indirect proxy. However, none of the various indicators was deemed to be the gold standard (Stephen Birch & Eyles, 1991). While there is no one gold standard indicator for additional adjustment of differential health needs over and above demographic factors, some were deemed to be "appropriate" for this purpose (Stephen Birch & Eyles, 1991).

4.2.2 Appropriate Additional Need Indicators

To establish if an indicator was "appropriate", it was often examined for its validity, reliability and responsiveness (Stephen Birch & Eyles, 1991; Carr-Hill & Chalmers-Dixon, 2005). Validity may be defined as the ability to measure what it is intended to measure (Stephen Birch & Eyles, 1991). Reliability may be defined as the capacity to produce the same result in precisely the same circumstances (Carr-Hill & Chalmers-Dixon, 2005). Responsiveness denotes the capacity of the instrument to measure difference or change (Carr-Hill & Chalmers-Dixon, 2005). A search and review of available needs indicators in Malaysia has been carried out. In following sub-sections, the appropriateness of these potential indicators was examined.

4.2.2.1 Age and Gender

Demographic characteristics (age and gender) were a reliable and valid adjustment. Among adults, increasing age is related with poorer health and increasing risk of death. Among children, particularly in the first year of life, the reverse is true (Stephen Birch & Eyles, 1991). The increasing differential health needs of age groups at the two ends of the life spectrum (the younger and the older) can be approximated by the differential agespecific national average healthcare utilisation rate. In Malaysia, demographic data is regularly collected by the Department of Statistics Malaysia (DOSM).

4.2.2.2 Healthcare Utilisation and Case Register

Administrative healthcare utilisation data (such as outpatient attendants or bed occupancy rates) and case register (such as HIV/AIDS registry and diabetic registry) were considered potential direct measurement for adjustment (Stephen Birch & Eyles, 1991; Finn Diderichsen, 2004). Both were available in Malaysia, but they were not independent from supply factors (only those who had access to available healthcare facilities were captured in the utilisation data and national registry) and thus considered inappropriate.

4.2.2.3 Health Status from Population-based Health Survey

Health status data from population-based health surveys was another candidate. It was usually self-reported and sometimes a composite indicator (Stephen Birch & Eyles, 1991). It is the most valid and reliable snapshot measurement. However, it has the problem of infrequently repeated representative sampling, and inconsistency over time because of difference in question wording and ordering, which reduces its compatibility over time (Stephen Birch & Eyles, 1991). The National Health and Morbidity Survey (NHMS) was Malaysia's version of a population health survey. It was conducted in 1986, 1996, 2006, 2011 and 2015/16, and shared the problem of inconsistent questions over time. Hence, health status reported in NHMS is not a good indicator for comparison over time.

Specific morbidity or disease burden data can be used to estimate population health needs for specific disease and hence specific health services. A comprehensive set of morbidity or disease burden data, if available, can hence be used to construct overall healthcare needs for population. Malaysia NHMS collected some disease burden data. However, the data were not collected comprehensively and consistently over time and hence not appropriate indicator to be used in this study.

4.2.2.4 Mortality and Standardised Mortality Ratios

Mortality was an administratively feasible, reliable and valid indicator (Stephen Birch & Eyles, 1991). Firstly, mortality rate has been found to be correlated significantly with chronic and permanent illness which require continuing healthcare or with high case fatality illness which consumes considerable healthcare (S Birch, Chambers, Eyles, Hurley, & Hutchison, 1990). Secondly, people who are dying are argued to be among the heaviest users of health services when resources are available. It was found in the United States that as much as 28% of Medicare expenditure was spent on those in the last year of life, while in England and Wales as much as 23% of beds were occupied by people who died before being discharged (T A Sheldon, Smith, & Bevan, 1993). Thirdly, mortality is found to have a strong linear relationship with morbidity data (Brennan & Clare, 1980). Lastly, mortality indicators are less contaminated by the availability of healthcare resources (as opposed to healthcare utilisation) (Mays, Chinn, & Ho, 1992), especially for chronic or permanent illness requiring continuing healthcare. For fatal illness reversible with treatment, unmet needs would result in mortality and would be reflected in a higher mortality rate.

All cause, all age SMR were found to be highly correlated (coefficients 0.75~0.85) with permanent and temporary sickness rate at both the Regional Health Authorities and District Health Authorities in England in 1981 (Mays & Chinn, 1989). Furthermore, SMRs based on age groups 0-64 was found to be more closely related to population health needs (as opposed to all age SMR) in England, Scotland and Wales in 1980-1982 (Carstairs & Morris, 1989). It was argued that under-65 SMR represents premature mortality and therefore provide a better proxy for health risks in the population and under-

65 SMR was used or proposed in the formula funding mechanism in England, Scotland, Wales and Ontario, Canada. (Stephen Birch & Eyles, 1991). Mortality of older age groups, such as those more than 65 year-old, are more reflective of accumulated healthcare needs of a lifetime rather than current healthcare needs because many chronic conditions give rise to needs of healthcare services, but do not result in immediate death.

Although the above correlation between SMR and healthcare needs were found in England, Scotland and Wales, there was no evidence showing this correlation does not exist in an upper middle-income country such as Malaysia. Moreover, health indicators of Malaysia, such as neonatal, infant and under-5 mortality and life expectancy at birth, in 1996 and 2006 (study period of this study) were comparable with health indicators of the United Kingdom in 1980 and 1982 (study period of above-mentioned studies in England, Scotland and Wales (Table 4.1). This indicates that the performance of the Malaysian Health System and health status of Malaysia's population in 1996 and 2006 was not lower than the United Kingdom and, hence, the under-65 SMR is a good indicator of health needs in Malaysia.

Department of Statistics Malaysia (DOSM) has collected mortality data consistently for decades with granularity at state and district levels. Despite some doubts over the accuracy of these statistics for East Malaysia (Sabah and Sarawak) (H. L. Chee, 2005), these vital statistics are considered reliable and often used by other scholars in research for Peninsular Malaysia (H. L. Chee, 2005; Khoo, Tan, & Khoo, 1991; Mariapun, Hairi, & Ng, 2016; Tan Poo et al., 1987). Hence, SMR of geographic areas (districts and states) can be constructed in Malaysia using demographic and mortality data collected by DOSM.

	Malaysia		United Kingdom	
	2006	1996	1982	1980
Neonatal Mortality Rate (per 1,000 live births)	4.3	6.5	7.5	6.4
Infant Mortality Rate (per 1,000 live births)	6.9	11.1	10.8	12.0
Under-5 Mortality Rate (per 1,000 live births)	8	12.9	12.7	14.1
Live Expectancy at Birth, Male (in Years)	71.5	70.1	71.3	70.7
Live Expectancy at Birth, Female (in Years)	75.9	74.1	77.2	76.8

Table 4-1: Comparison of Health Indicators between Malaysia in 1996 & 2006 andUnited Kingdom in 1980 & 1982

Source: The World Bank

4.2.2.5 Socio-economic Characteristics

Socio-economic characteristics or deprivation status were considered because many found that lower income, lower education level and working class groups (as opposed to professional groups) experience significantly poorer health status and, hence, likely have higher healthcare needs (Stephen Birch & Eyles, 1991; S. Birch, Eyles, & Newbold, 1996; D. McIntyre et al., 2002). However, a few important notes also need to be considered for its inclusion in the construction of area healthcare needs.

First, various different composite deprivation index could be generated depending on the indicator used (e.g. occupation class, income, possession of assets etc) and, hence, the validity of the composite index needs to be tested locally (Carr-Hill & Chalmers-Dixon, 2005). Second, inclusion of measurement of socio-economic status in the healthcare needs estimation for healthcare resource allocation may imply that health systems should "compensate" poorer health status origin from other social sectors such as housing and working conditions (Mays, 1987). In other words, inclusion of deprivation level is more in agreement with the objective of "health equity" rather than "healthcare equity", as discussed earlier (chapter 3). Third, while socioeconomic status was strongly correlated with morbidity, there were also close correlations between deprivation and mortality (Stephen Birch & Eyles, 1991). Hence, if both mortality and deprivation were used in the construction of population health needs, we risk "double-counting" the healthcare needs. Lastly, there were contradicting empirical evidence on the validity of mortality and deprivation indicators. It was found that mortality indicators and self-reported health status are more closely related than socioeconomic indicators and self-reported health status in Ontario (Newbold, Eyles, Birch, & Spencer, 1998) but vice-versa in Quebec (S. Birch et al., 1996). Hence, empirical evidence suggested both mortality and socioeconomic indicators were valid but none was superior (Newbold et al., 1998).

As discussed in-depth earlier, this study has adopted a narrow objective of assessing geographic healthcare equity (instead of "health" equity). Hence, mortality indicator was preferred over socioeconomic indicators. The use of mortality only, instead of mortality and deprivation indicators, also avoids double counting. The lack of consistency in the collection of self-reported health status data in Malaysia via the NHMS, has precluded the possibility of constructing a deprivation index for the purpose of evaluating health needs over time. Department of Statistics Malaysia (DOSM) has collected mortality data via the National Registration Department for years and has maintained a consistent methodology.

4.2.2.6 Health Needs Indicators Identified

In short, health status from population-based health surveys, mortality and demography are reliable and valid indicators. However, health status from population-

based health surveys is not appropriate for serial comparison over time due to reduced compatibility over time. Hence, indirect measures of mortality and demography are the two appropriate indicators used for further adjustment of the baseline health needs indicator yield from national per capita health utilisation in this study.

The constructed formula of health needs measurement is presented in the next section.

4.2.3 Construction of State Population Health Needs Indicators

4.2.3.1 Baseline Area Population Utilisation Rate

National average per capita hospital bed utilisation (bed days) and primary care utilisation (patient visits) were assumed to be the baseline per capita healthcare needs (i.e. national average utilisation = baseline per capita healthcare needs). Hence, baseline state population healthcare needs can be obtained by multiplying the population number of the states and the national average utilisation rate.

The state population number was obtained from the Department of Statistics Malaysia (DOSM). National population censuses were carried out in Malaysia every ten years. Population estimation for each year in between the census were done and published by DOSM based on decennial census. The population number of year 1996 and 2011 were used in this study. The population number of 1996 was estimated from 1990 and 2000 censuses and the population number of 2011 was projected from 2010 census.

National average utilisation rate was calculated from the National Health and Morbidity Survey (NHMS) 1996 and 2011. NHMS is a national representative health survey. The respondents were asked about the times and lengths of hospitalisation for the last one year before the interview day. Hospitalisation bed-days for each demographic group are estimated from NHMS. This is used as proxy for hospital care. Similarly, the respondents were asked about the frequency of outpatient visits for the last two weeks before the interview day₁₅. Outpatient patient-visits are annualised and estimated for each demography group. This is used as proxy for primary care.

NHMS was also conducted in 1986, 2006 and 2015. The respondents were not asked about the times and lengths of hospitalisation and times of outpatient visits as in NHMS 1996 and 2011. When this analysis was carried out, NHMS 2015 had not yet concluded and the data were not available for this study.

4.2.3.2 Generation of National Average Utilisation Rate

Even though average national utilisation rate for outpatient and hospital care were reported in NHMS, the definition of healthcare utilisation in NHMS is not perfectly compatible with this thesis. The most important difference in scope being that healthcare related activities such as those involving traditional and alternative medicines were also included in NHMS. Whereas for this study, as it was explained and defined earlier, the healthcare activities concerned were limited to western healthcare activities. This is because (a) traditional and alternative medicines seem to play a minor, lesser and secondary role after western healthcare in the public's own perspective and perception, and (b) traditional and alternative medicine is not yet a fully regulated medical practice even though relevant laws were gazetted recently. Hence, the outpatient-visits and hospitalisation-days data were generated from NHMS raw data set by excluding activities

¹⁵ For NHMS 1996, the respondents were asked if asked about visits to obtain curative and preventive care separately. In this study, both were considered as primary care visits and the number of visits were totaled. For NHMS 2011, the respondents were asked if obtained any outpatient care which is not limited to treatment for recent illness (IPH, 2011b). In this study, this was taken as the number of primary care visits.

that are not considered western medicine. As the design of NHMS questionnaires were slightly different over the years, the data were cleaned separately using STATA 11 software but adhering to the same principle.

For NHMS 1996, for each out-patient department (OPD) visit reported, the respondents were also asked about the place visited. A total number of 12,778 OPD visits were reported by 10,241 respondents. Those reported to have gone to traditional medicine, alternative medicine, pharmacy, direct sales, "home-based", "community-based" and club/association practitioners were excluded from the study as they were not or might not be utilising western healthcare services. As a result, 441 of reported OPD visits were not included.

For NHMS 2011, the respondents were required to give a report on the place they utilised both hospital and outpatient care. Similarly, those reported to have gone to dental clinics, pharmacies, homeopathy, Chinese herbalists, Malay or indigenous herbal medicines, *ayurveda*, massage, chiropractors, spiritual healers, cupping centres, reflexology treatments, sinusitis treatment centres, hypnotherapy centres, acupuncture treatment centres and community health workers in NHMS 2011 were excluded from the study. As a result, 16 of the hospitalisations were not included because it was for dental treatment, and 263 of the OPD visits were not included because it was neither clinics nor hospitals.

Data cleaning were also done for other extreme and missing values. For NHMS 1996 188 (1.47%) of OPD visits were excluded from the analysis due to extreme value of visit times (more than 14 visits in two weeks). Also, 200 (1.57%) and 14 (0.11%) of reported OPD visits were excluded due to missing place visited and missing age respectively. At the same time, no extreme value of hospitalisation bed-days were reported and 43 (0.17%) of hospital bed-days were omitted due to missing age. Those with missing age were not

included as the average utilisation rates were obtained for according to 18 age- and sexspecific groups (see section 4.2.3.3). For NHMS 2011, 10 (0.26%) of OPD visits were excluded due to extreme value (more than 14 visits within two weeks), and 197 (4.03%) of OPD visits were excluded due to missing place visited. There was no extreme value for hospitalised bed-days reported in NHMS 2011. There was also no missing place visited for hospitalisation and no missing age for any OPD visits or hospitalisation in NHMS 2011.

Efforts of imputations were not attempted when generating utilisation rates because (a) there were no obvious pattern of missing data observed and (b) the missing information were less than 5%, which means imputation is unlikely to significantly change the generated results (Azur, Stuart, Frangakis, & Leaf, 2011). In other words, complete case analysis approach was adopted in the generation of national average utilisation data for OPD and hospitalisation from NHMS 1996 and 2011. Overall, there were less than 3.15% and 0.17% of OPD visits and hospitalisation data dropped respectively due to missing data (either missing age or missing place/facility visited) for NHMS 1996. For NHMS 2011, the overall missing information was less than 4.29% for OPD visit and there was no missing information for hospitalisation bed-days.

4.2.3.3 Adjustment for Demography (Age and Sex)

To estimate per capita need of each geographic area, the first step is to disaggregate the population by age and sex groups. From the NHMS 1996 and 2011 database, the average utilisation rates were generated according to two sex (male or female) and nine age categories (0-4, 5-14, 15-24, 15-34, 35-44, 45-54, 55-64, 65-74 and, 75 years old and above). In total, there were 18 age- and sex-specific demographic groups.

The differential healthcare needs of each demographic group was approximated using the national average per capita hospital bed utilisation (bed days) and primary care utilisation (patient visits) (i.e. population by demographic group x utilisation rate = expected utilisation by demographic groups = health needs by demographic groups).

The total hospital care and primary care needs of each geographic area are the sum of the healthcare needs of all demographic groups in that geographic area (i.e. sum of utilisation by demographic groups = total health needs by geographic areas).

Hence, the construction of area hospital care and primary care needs were:

$$HN_A = \sum_{i=1}^{18} \frac{H_i}{P_i} \times p_{iA}$$

Where,

 HN_A = Hospital care needs for Area A

 H_i = National hospitalisation bed-days for age group i

 P_i = National population for age group i

 p_{iA} = Area A population for age group i

And

$$PN_A = \sum_{i=1}^{18} \frac{C_i}{P_i} \times p_{iA}$$

Where,

PNA =Primary care needs for Area A

 C_i = National primary patient-visits for age group i

Ì

 P_i = National population for age group *i*

 p_{iA} = Area A population for age group i

4.2.3.4 Adjustment for morbidity (Under-65-year-old Standardised Mortality Rate)

The indicators are in turn adjusted by morbidity. Adjustment with relative morbidity index for each area is to reflect the differential health needs of each area over and above demographic consideration (i.e. further adjustment of total health needs by geographic areas by morbidity).

The indicator used as the proxy of relative morbidity is under-65-year-old standardised mortality ratios (SMR). It was found that under-65-year-old SMR were better correlated with morbidity than overall SMR (Carstairs & Morris, 1989) and was used or proposed in formula funding mechanisms in England, Scotland, Wales, and Ontario, Canada. (Stephen Birch & Eyles, 1991). The standardised mortality ratio was calculated as follows (S Birch et al., 1990):

$$SMR_A = \frac{\sum_i m_i p_i}{\sum_i M_i p_i} \times 100 = \frac{\sum_i d_i}{\sum_i D_i} \times 100$$

Where

 $SMR_A = SMR$ for geographic area A

 m_i = Area age-specific death rate for age group i

 M_i =Standard (National) age-specific death rate for age group i
p_i = Area population in age group i

 d_i = Actual numbers of death in age group i

 D_i = Expected numbers of deaths in area in age group *i* (if standard age specific death rates prevailed)

4.2.3.5 The Formula of State Relative Health Needs Indicator

The relative health needs indicator of hospital care for each geographic area is calculated as follows:

$$HI_A = HN_A \times SMR_A$$

Where

 HI_A = Hospital relative health needs indicator for Area A

 HN_A = Hospital care needs for Area A

 SMR_A = Area SMR

The relative health needs indicator of primary care for each geographic area is calculated as follows:

$$PI_A = PN_A \times SMR_A$$

Where

 PI_A = Primary care relative health needs indicator for Area A

 PN_A = Primary care needs for Area A

 $SMR_A = SMR$ for geographic area A

4.2.3.6 Summary of Construction of Area Population Needs Indicators

In short, state health needs for hospital and primary care for the years 1996 and 2011 were estimated based on national average utilisation rate (of 18 age- and sex- specific groups), state demography (number of populations according to age and sex), adjusted by premature mortality (under-65-year-old standardised mortality rate; as proxy of morbidity). The national average utilisation rates were generated from NHMS 1996 and NHMS 2011. Data was obtained from Institute of Public Health and data cleaning was carried out by excluding utilisation of non-western medical services and chronic nursing care. Other data were obtained from DOSM.

It is to note that this approach assumed that national level average utilisation rates reflect the differential healthcare needs for primary care and hospital care due to the biological factors of age and sex. In other words, this assumes that there is no unmet health need or inequitable health utilisation across age and sex specific groups in the current health system (T. A. Sheldon & Smith, 2000). If there were evidence of inequity in healthcare utilisation for a specific age or sex nationally, the utilisation rate of that specific deprived group should be adjusted accordingly. However, given the lack of evidence justifying this in the Malaysian context, national utilisation rate across age and sex groups is adopted as the base for healthcare needs.

Also, this formula assumes that the relationship of differential mortality (under 65 SMR) and healthcare needs is 1:1. This assumption was based on the finding that the relationship between all-cause mortality and both "short- and medium-term" morbidity and "long-term" morbidity were of strong linear relationship (Brennan & Clare, 1980). This implies that a 25 percent higher rate of mortality should be provided with 25 percent more healthcare resources in order to meet the differential healthcare needs. This assumption between SMR and healthcare needs was also adopted by England, Scotland, Wales and Ontario, Canada when using SMR as a needs indicator in their funding formula (Stephen Birch & Eyles, 1991).

4.3 Estimation of State Population Healthcare Needs

4.3.1 National Utilisation Rate by Age- and Sex- Group

State primary and hospital care needs in Peninsular Malaysia for the years 1996 and 2011 were constructed according to the formulas described in the previous Section (Section 4.2). The first step of constructing the state population health needs was to estimate national average utilisation rate of 18 age- and sex- specific groups for both primary and hospital care in 1996 and 2011 (method detailed in Section 4.2.3.2). Table 4.2 and 4.3 show the national average utilisation rate of 18 age- and sex- specific groups in 1996 and 2011.

Age- and Sex-	Average Primary Care			Avera	ge Hospital	Care
Specific Group	Utilisation Rate			Uti	lisation Rat	te
(age: years)	(Visits Pe	er Capita P	er Year)	(Bed-Days	Per Capita	Per Year)
	Point	[95% Co	nfidence	Point	[95% Co	nfidence
	Estimate	Inte	rval]	Estimate	Inte	rval]
male 0-4	7.75	7.19	8.32	0.54	0.31	0.76
male 5-14	2.68	2.37	2.99	0.16	0.11	0.20
male 15-24	3.17	2.76	3.57	0.22	0.14	0.30
male 25-34	5.17	4.61	5.73	0.28	0.20	0.37
male 35-44	5.69	4.96	6.41	0.28	0.20	0.35
male 45-54	5.87	4.80	6.94	0.76	0.35	1.17
male 55-64	7.51	6.33	8.68	0.86	0.64	1.07
male 65-74	7.88	5.77	9.99	1.36	0.88	1.84
male 75 &	7.11	4.89	9.33	2.12	1.13	3.11
Above						
female 0-4	7.02	6.43	7.61	0.44	0.33	0.55
female 5-14	2.53	2.21	2.86	0.11	0.04	0.19
female 15-24	4.05	3.63	4.47	0.38	0.29	0.47
female 25-34	7.18	6.55	7.80	0.71	0.60	0.83
female 35-44	6.03	5.33	6.72	0.53	0.44	0.61
female 45-54	6.06	5.25	6.88	0.44	0.33	0.54
female 55-64	6.41	5.54	7.28	0.69	0.50	0.88
female 65-74	7.03	5.75	8.32	0.81	0.51	1.11
female 75 &	5.91	4.39	7.42	0.96	0.60	1.32
Above						

Table 4-2: Malaysia National Average Healthcare Services Utilisation Rate byAge- and Sex-Specific Group in 1996

Age- and Sex-	Avera	ge Primar	y Care	Avera	ge Hospital	Care
Specific Group	Utilisation Rate			Uti	lisation Rat	e
(age: years)	(Visits Pe	er Capita I	Per Year)	(Bed-Days	Per Capita l	Per Year)
	Point	[95% C	onfidence	Point	[95% Cor	nfidence
	Estimate	Int	erval]	Estimate	Inter	val]
male 0-4	7.81	6.72	8.91	0.48	0.33	0.63
male 5-14	3.21	2.72	3.70	0.13	0.06	0.19
male 15-24	2.06	1.30	2.81	0.29	0.17	0.42
male 25-34	2.92	2.24	3.59	0.21	0.12	0.30
male 35-44	2.78	2.04	3.52	0.29	0.17	0.41
male 45-54	5.11	3.46	6.76	0.34	0.22	0.46
male 55-64	3.64	2.64	4.64	0.64	0.29	0.98
male 65-74	6.00	4.08	7.92	0.66	0.31	1.00
male 75 &	7.61	4.54	10.68	1.44	0.67	2.21
Above						
female 0-4	5.87	5.01	6.73	0.44	0.29	0.58
female 5-14	2.64	2.23	3.04	0.14	0.08	0.19
female 15-24	4.55	1.89	7.21	0.43	-0.03	0.89
female 25-34	3.81	3.13	4.50	0.62	0.48	0.77
female 35-44	3.40	2.76	4.05	0.32	0.24	0.39
female 45-54	3.49	2.69	4.28	0.39	0.25	0.53
female 55-64	4.24	3.45	5.02	0.57	0.37	0.76
female 65-74	4.37	3.08	5.65	0.63	0.39	0.87
female 75 &	8.47	4.37	12.57	1.15	0.75	1.55
Above						

Table 4-3: Malaysia National Average Healthcare Services Utilisation Rate byAge- and Sex-Specific Group in 2011

In general, the average healthcare utilisation rates (for both primary care and hospital care) were the lowest for the 5-to-14-year age group, for both sexes and in both 1996 and 2011. The utilisation rates were high for the under-5-year age group, this is likely due to high healthcare needs in early childhood, where children are relatively more susceptible to infectious diseases, especially new-borns. For males, healthcare utilisation rate gradually increased as the age group progressed from the 5-to-14-year age group to the 65-to-74-year age group in 1996 and to the 75-year-and-above age group in 2011. The only exception was that male primary care utilisation rate of the 45-to-54-year age group in 2011. For females, other than the increase of healthcare utilisation for higher age

groups, those in the 25-to-34-year age group reported higher healthcare utilisation for both primary and hospital care in both 1996 and 2011. High utilisation rates were also observed for the 15-to-24-year age group (compare to the 35-to-44-year age group) for both primary and hospital care in 2011. Females ages 35 to 44 years also reported relatively high utilisation of hospital care (compare to 45-to-54-year age group) in 1996. This relatively high utilisation of healthcare during early and middle reproductive age may be related to utilisation of healthcare services due to maternal care.

In short, healthcare utilisation was high during early childhood and later years in life for both male and female, and during women's reproductive years. This pattern is consistent with age- and sex-specific total inpatient and/or outpatient healthcare expenditure in six European countries, including Spain, Italy, Norway, Luxembourg, Finland and Switzerland, in 1999 (IGSS/CEPS, 2003).

4.3.2 State Under-65-Year-Old Standardised Mortality Rate (U65 SMR)

After calculating the national average utilisation rate of the 18 age- and sex-specific groups, baseline population healthcare needs were estimated based on the population size and demography (age and sex) of the states in 1996 and 2011 (method is detailed in Section 4.2.3.3). The unadjusted population healthcare needs is presented in the next Section (Section 4.3.3) together with the adjusted state population healthcare needs (Table 4-4 to Table 4-7). To further adjust the state population healthcare needs, the under-65-year-old standardised mortality rate (U65 SMR) were calculated (Table 4-4).

Ctoto		1996		2006
State	SMR	U65 SMR	SMR	U65 SMR
Johor	1.10	1.08	1.04	0.98
Kedah	0.97	0.95	0.91	0.89
Kelantan	0.98	0.93	0.84	0.77
Malacca	0.95	0.93	0.96	0.94
N. Sembilan	0.96	0.93	0.93	0.88
Pahang	1.02	1.00	0.93	0.87
Penang	0.95	0.97	1.02	1.09
Perak	0.98	0.96	0.95	0.94
Perlis	0.98	0.91	0.91	0.89
Selangor*	1.08	1.17	1.23	1.30
Terengganu	0.90	0.86	0.82	0.74
Kuala Lumpur	0.92	0.97	1.16	1.31
Peninsular Malaysia	1.00	1.00	1.00	1.00

Table 4-4: Standardised Mortality Rate by State in 1996 and 2006

SMR: Standardised Mortality Rate for All Ages U65 SMR: Under-65-year-old Standardised Mortality Rate *Including Putrajaya

Source: Author's Calculation from State Population and Death Data from Department of Statistics Malaysia

4.3.3 State Population Healthcare Needs in Peninsular Malaysia

Tables 4.5 to 4.8 show the proportions of state population size and estimated state healthcare needs. These tables are presented to demonstrate the differences between crude state population size and proportion of estimated state healthcare needs, after adjustment by differential healthcare needs over geographic areas.

Tables 4-5 and 4-6 show the number of population and estimated hospital care needs of the states in Peninsular Malaysia, ranked according to state aggregated hospital care needs (i.e. bed-days needed). Average hospital care needs for Peninsular Malaysia were 0.419 and 0.384 bed-days per capita in 1996 and 2011 respectively. State per capita hospital care needs varied between 0.342 (Terengganu) and 0.472 (Selangor) bed-days in 1996 and between 0.281 (Terengganu) and 0.481 (Kuala Lumpur) bed-days in 2011.

In general, the larger the state population size, the larger the state aggregated hospital care needs. This is expected as a higher population means more people are expected to be sick. There were a few exceptions, however. In 1996, Kelantan and Terengganu's hospital care needs were lower than Penang and Negeri Sembilan respectively despite larger population (Table 4-4).

These are the effects of adjustment based on demography (sex and age) and U65 SMR of the population. For example, the total population of Penang was lower than Kelantan (1.24 million population and 1.30 million population respectively) in 1996 (Table 4-1). However, the estimated aggregated hospital care needs based on the demography (i.e. the population number and national average utilisation rate of 18 age- and sex-specific groups), before further adjustment with SMR, of Penang was higher than Kelantan (540,588 bed-days and 532,511 bed-days respectively) in 1996. A closer look at the data showed that this was because 44% of the Kelantan population was at the two age groups with the lowest average national utilisation rate (i.e. age group 6-15 and 16-25 years) while only 29% of the Penang population were in these two age groups (data not shown here). The average national utilisation rate of these two age groups were 0.16 and 0.22 bed-days for male and 0.11 and 0.38 bed-days for female (Table 4-2). The final estimation of hospital care needs, after adjustment of under-65 SMR was even lower as SMR of Kelantan is lower than Penang (0.93 and 0.97 respectively) in 1996 (Table 4-4).

Similar effects can be observed for the comparison of Terengganu and Negeri Sembilan in 1996. The total population of Negeri Sembilan was lower than Terengganu (0.80 million population and 0.87 million population respectively) in 1996 (Table 4-5). Forty five percent (45%) of the Terengganu population was in the two age groups with the lowest average national utilisation rate while 42% of the Negeri Sembilan population were in these two age groups (data not shown here). In this case, the crude state

aggregated hospital care needs of Negeri Sembilan (333,474 bed-days) was still lower than Terengganu (345,971 bed-days). However, the under-65 SMR of Terengganu was lower than Negeri Sembilan (0.86 and 0.93 respectively) in 1996 (Table 4-4). Hence the final adjusted state aggregated hospital care needs of Negeri Sembilan (310,131 beddays) was higher than Terengganu (297,535)

	Рор	ulation		Hospital	Care Needs	
State	(Persons)	(Proportion)	*Crude Needs (Bed-days per year)	**Adjusted Needs (Bed-days per year)	**Adjusted Needs (Proportion)	Per Capita Needs (Bed-days per capita)
Selangor [#]	3,371,100	19.8%	1,360,319	1,591,573	22.3%	0.472
Johore	2,503,900	14.7%	1,031,298	1,113,802	15.6%	0.445
Perak	2,047,000	12.0%	884,308	848,936	11.9%	0.415
Kedah	1,533,200	9.0%	651,879	619,285	8.7%	0.404
K. Lumpur	1,342,500	7.9%	557,921	541,183	7.6%	0.403
Penang	1,237,500	7.3%	540,588	524,370	7.4%	0.424
Kelantan	1,301,100	7.6%	532,551	495,272	6.9%	0.381
Pahang	1,200,600	7.1%	474,594	474,594	6.7%	0.395
N. Sembilan	802,600	4.7%	333,474	310,131	4.3%	0.386
Terengganu	870,700	5.1%	345,971	297,535	4.2%	0.342
Malacca	597,300	3.5%	253,955	236,178	3.3%	0.395
Perlis	200,400	1.2%	86,788	78,977	1.1%	0.394
Peninsular	17,007,900	100%	7,053,645	7,131,836	100%	0.419

Table 4-5 Hospital Care Needs among States in Peninsular Malaysia in 1996

Including Putrajaya

* Constructed based on population and average utilisation rate of 18 age- and sex-specific groups

** Further adjusted by multiplying with Standardised Mortality Rate of population under 65 years old

Similar to the few exceptions that a state with a lower population has larger hospital care needs than a state with a higher population in 1996, Terengganu's hospital care needs was lower than Malacca in 2011 (Table 4-6). Aggregated hospital care needs for Kelantan was lower than not only Penang and but also Pahang in 2011 (Table 4-6). In addition, estimated hospital care needs for Kedah was lower than Kuala Lumpur despite a larger population.

Population		Hospital Care Needs				
State	(Persons)	(Proportion)	*Crude Needs (Bed-days per year)	**Adjusted Needs (Bed-days per year)	Adjusted Needs (Proportion)	Per Capita Needs (Bed days per capita)
Selangor [#]	5,653,800	24.5%	2,066,108	2,603,296	29.4%	0.460
Johore	3,401,800	14.8%	1,257,102	1,257,102	14.2%	0.370
Perak	2,397,600	10.4%	925,296	860,525	9.7%	0.359
K. Lumpur	1,694,500	7.4%	642,030	815,379	9.2%	0.481
Kedah	1,973,100	8.6%	739,108	665,197	7.5%	0.337
Penang	1,593,600	6.9%	617,368	660,584	7.5%	0.415
Pahang	1,524,800	6.6%	557,407	473,796	5.4%	0.311
Kelantan	1,615,200	7.0%	588,268	470,614	5.3%	0.291
N. Sembilan	1,042,900	4.5%	391,322	348,277	3.9%	0.334
Malacca	833,000	3.6%	316,590	316,590	3.6%	0.380
Terengganu	1,074,000	4.7%	387,059	301,906	3.4%	0.281
Perlis	237,500	1.0%	92,590	73,146	0.8%	0.308
Peninsular	23,041,800	100%	8,580,249	8,846,412	100%	0.384

 Table 4-6: Hospital Care Needs among States in Peninsular Malaysia in 2011

Including Putrajaya

* Constructed based on population and average utilisation rate of 18 age- and sex-specific groups

** Further adjusted by multiplying with Standardised Mortality Rate of population under 65 years old

Tables 4-7 and 4-8 show the state population number and estimated primary care needs in 1996 and 2011, ranked according to state aggregated primary care needs (i.e. OPD visits needed). On average, 5.110 and 3.930 primary care visits per capita were needed for Peninsular Malaysia in 1996 and 2011 respectively. State per capita hospital care needs varied between 4.247 (Terengganu) and 5.910 (Selangor) primary care visits in 1996 and between 3.002 (Terengganu) and 4.818 (Kuala Lumpur) primary care visits in 2011.

Generally, the larger the state population size was, the larger the state aggregated primary care needs. Similar to the pattern for hospital care needs, Kelantan and Terengganu's primary care needs were lower than Penang and Negeri Sembilan respectively despite a larger population in 1996 (Table 4-7). Kedah's estimated primary care needs was lower than Kuala Lumpur despite a larger population in 2011 (Table 4-8). It was shown that primary care needs for Kelantan and Terengganu were also lower than Penang and Negeri Sembilan respectively in 2011 (Table 4-8).

	Population		Primary Care Needs			
State	(Persons)	(Proportion)	*Crude Needs (Primary care visits)	**Adjusted Needs (Primary care visits)	Adjusted Needs (Proportion)	Per Capita Needs (Primary care visits per capita)
Selangor [#]	3,371,100	19.8%	17,027,748	19,922,465	22.9%	5.910
Johore	2,503,900	14.7%	12,612,969	13,622,007	15.7%	5.440
Perak	2,047,000	12.0%	10,407,183	9,990,896	11.5%	4.881
Kedah	1,533,200	9.0%	7,780,656	7,391,624	8.5%	4.821
K. Lumpur	1,342,500	7.9%	6,852,819	6,647,234	7.6%	4.951
Penang	1,237,500	7.3%	6,376,121	6,184,837	7.1%	4.998
Kelantan	1,301,100	7.6%	6,492,166	6,037,715	6.9%	4.640
Pahang	1,200,600	7.1%	5,928,112	5,928,112	6.8%	4.938
N. Sembilan	802,600	4.7%	4,018,902	3,737,579	4.3%	4.657
Terengganu	870,700	5.1%	4,299,484	3,697,556	4.3%	4.247
Malacca	597,300	3.5%	3,026,507	2,814,652	3.2%	4.712
Perlis	200,400	1.2%	1,021,559	929,619	1.1%	4.639
Peninsular	17,007,900	100%	85,844,226	86,904,294	100%	5.110

Table 4-7: Primary Care Needs among States in Peninsular Malaysia in 1996

Including Putrajaya

* Constructed based on population and average utilisation rate of 18 age- and sex-specific groups

** Further adjusted by multiplying with Standardised Mortality Rate of population under 65 years old

	Populations			Primary C	are Needs	
State	(Persons)	(Proportion)	*Crude Needs (Primary care visits)	**Adjusted Needs (Primary care visits)	**Adjusted Needs (Proportion)	Per Capita Needs (Primary care visits per capita)
Selangor [#]	5,653,800	24.5%	21,247,472	26,771,815	29.6%	4.735
Johore	3,401,800	14.8%	12,930,675	12,930,675	14.3%	3.801
Perak	2,397,600	10.4%	9,286,873	8,636,792	9.5%	3.602
K. Lumpur	1,694,500	7.4%	6,428,922	8,164,731	9.0%	4.818
Kedah	1,973,100	8.6%	7,610,084	6,849,076	7.6%	3.471
Penang	1,593,600	6.9%	6,112,067	6,539,912	7.2%	4.104
Kelantan	1,615,200	7.0%	6,254,216	5,003,373	5.5%	3.098
Pahang	1,524,800	6.6%	5,831,420	4,956,707	5.5%	3.251
N. Sembilan	1,042,900	4.5%	3,983,200	3,545,048	3.9%	3.399
Terengganu	1,074,000	4.7%	4,133,971	3,224,498	3.6%	3.002
Malacca	833,000	3.6%	3,202,821	3,202,821	3.5%	3.845
Perlis	237,500	1.0%	930,050	734,740	0.8%	3.094
Peninsular	23,041,800	100%	87,951,773	90,560,187	100%	3.930

Table 4-8: Primary Care Needs among States in Peninsular Malaysia 2011

Including Putrajaya

* Constructed based on population and average utilisation rate of 18 age- and sex-specific groups

** Further adjusted by multiplying with Standardised Mortality Rate of population under 65 years old

It is noted that there were similar patterns of ranking of hospital and primary care needs among states in Peninsular Malaysia in 1996 and 2011. This is not unexpected as most indicators used to construct primary and hospital care needs estimation were the same: namely population numbers, demographic compositions and under-65-year-old standardised mortality rate. Only the national average utilisation rates of 18 age- and sexspecific groups of primary and hospital care were different.

In short, findings from Table 4-5 to Table 4-8 demonstrate that, when taken into consideration, the effect of demography and Under-65-year-old standardised mortality rate (as the proxy of healthcare needs over and above demography), can influence the ranking of states by estimation of state aggregated healthcare needs. It is important to note that, in the geographic equity assessment method, which is explained in Chapter 5, the geographic population were ranked according to per capita healthcare needs and

average household income of the state. It was not ranked according to state aggregated healthcare needs.

4.4 Choices of Healthcare Resource Indicators

As discussed in the literature review (Section 2.2.1), human resources, physical healthcare facilities and recurrent financial expenditure were chosen as the three indicators that would capture overall resources input into the health system. A review and search of available (published and unpublished data) data were carried out to identify appropriate indicators for hospital and primary care for the above-mentioned three principle categories. The search and identification of health resources indicators are reported here.

4.4.1 Human Resources

Number of doctors, assistant medical officers (AMO)₁₆, nurses and community nurses at each state were considered as proxy for MOH primary care services. AMOs, nurses and community nurses not only assist doctors at Health Centres, they also diagnose and treat patients with mild illness or uncomplicated pregnancy in 1Malaysia Clinics and Community Clinics. For private primary care facilities, only doctors were considered to be the proxy. This is because nurses are fewer and do not assume primary role in patient

¹⁶ Assistant medical officers are diploma holders who are trained to diagnose and treat milder disease and to perform or assist doctor in performing certain procedures in Malaysia. They mainly served in hospital settings, independently or with limited supervision of doctors. Recent years, their place of services have been expanded to primary care and more often their services are supervised by doctors.

care like their counterparts in the public sector and AMOs and community nurses are not allowed to practise in the private sector.

However, published MOH data on human resources only provides overall numbers of doctors and allied healthcare workers by states, without details of whether they serve in a hospital or a primary care setting. From the researcher's communication with MOH Health Informatics Centres, such data could not be generated from their database17. The researcher found no other sources and hence no appropriate human resources data that could provide valid comparisons for hospital and primary care were obtained.

4.4.2 Healthcare Facilities

Hospital facilities come in different sizes. Hospital beds that cater for acute illness are considered to be a good proxy of the capacity of a hospital's facility. However, hospital beds in special medical institutes which are used to provide care for chronic psychiatric problems, respiratory illnesses (such as tuberculosis) and leprosy were excluded as they are cater for a very specific population for the long-term and were concentrated among few specialised MOH institutes. The Department of Statistics has been publishing the numbers of acute hospital beds by states since 1980s. This data is also verified by published MOH statistics. For analysis in this study, these special medical institutes were

¹⁷ MOH Health Informatics Centres maintain data collection through systems such as e-Health Informatic Management System and Malaysia Health Data Warehouse. Discussion were carried out with Health Informatics Centres and it was made clear to the researcher that there were no comprehensive or systematically collected data that can provide the granularity of doctors number (by public/private, primary/hospital care, and states) required for this study.

excluded from general hospital care to avoid diluting the contribution of other non-MOH general hospital care providers, such as MOE, MOD and private hospitals (Section 3.2.1), to the overall system.

As presented in Section 4.3, state population healthcare needs were estimated for 1996 and 2011 based on NHMS 1996 and 2011. To compare the hospital beds availability with the healthcare needs estimated, this study chose the hospital beds number for 1997 (to compare to health needs in 1996) and 2012 (to compare to health needs in 2011). This resources-to-needs '1-year lag' (i.e. 1997-to-1996 and 2012-to-2011) is chosen based on the rationale that the re-deployment of resources according to health needs would not be able to be done instantaneously and requires some lag time. In this study, the benchmark is set at a 1-year lag.

Primary healthcare facilities are set up quite differently from the public (mainly MOH) and private domain. Private general practitioners are often running solo clinics even though there were more group practices seen in metropolitan areas. MOH health centres are almost always larger than their private counter parts and at least six specifications (size) exist depending on the number of the catchment population. Smaller health centres may have only one doctor while larger centres may be manned by dozens of them. It is argued here that number doctors would be the best available proxy to compare availability of primary healthcare resources for both public and private sectors. Comparing number of facilities between public and private primary care clinics would not be valid because of the amount of services that can be offered each public clinic, especially the bigger health centres, can be substantially higher than each private clinic. Unfortunately, to the researcher's knowledge, no database captures such data consistently and reliably over the time.

4.4.3 Recurrent Financial Expenditure

Recurrent financial expenditure for MOH is publicly available in budgetary documents. However, the expenditure was not reported by categories of hospital and primary care. For the private sector, it is not surprising that there is no aggregated public accounts for all the private hospitals and primary clinics in the country.

It was possible to obtain recurrent financial proxy from the Malaysia National Health Accounts. Malaysia National Health Accounts (MNHA) was first established in 2001. In 2011, Ministry of Health (MOH) Malaysia revised the MNHA using the internationally accepted methodology of the System of Health Accounts (SHA) (OECD, 2000) with some modification to suit the local context (MOH, 2011a). MOH has since then generated and published MNHA data from 1997 to 2016 (MOH, 2018). MNHA tracks each account from its source to the facility (ambulatory and inpatient facilities) and sectors (private and public) it is spent on. Hence, it is able to estimate the total amount spent on types of facilities (private and public), which come from various sources. Data of spending on the private sector were obtained from both primary and secondary sources, i.e. surveys conducted by MNHA and DOSM respectively (MOH, 2018, p. 102). It means the total amount spent by patients on clinics or hospitals were accounted for regardless if it is paid out-of-pocket or by insurance. For spending on MOH, MNHA obtained the data directly from the Malaysia Auditor General which reflects the operating budget spent by MOH in respective years (MOH, 2018, p. 100). Health spending on other agencies in public sectors, such as Ministry of Education, were estimated by the MNHA survey (MOH, 2018, p. 100).

The estimation of expenditure on facilities (by categories and sectors) by MNHA represent the best indicator to assess the overall recurrent financial expenditure spent across the states in Peninsular Malaysia. The researcher approached MOH MNHA Unit and obtained estimation of expenditure on overall and MOH ambulatory clinics and hospitals by states. The former includes all facilities in both private and public (which includes MOH, MOE and others) sectors. These were generated from the MNHA database for the specific purpose of this study upon request and were not available in publication18. Similarly, to keep in line with the 1-year lag principle for resources to be matched to needs, recurrent financial input data of 1997 and 2012 were obtained, to be analysed together with health needs estimation in 1996 and 2011 respectively.

To be specific, the data were generated according to "Providers of Health Care" in MNHA framework (Code: MP) where the MOH hospitals were those under code MP1.1a ("Hospitals (MOH)") and overall hospital care services were those under code MP1.1 ("Hospitals"), which includes MOH, public non-MOH and private hospitals. Psychiatric hospitals (code MP 1.2), specialty hospitals (MP 1.3) were not included. Similarly, MOH primary care services were those coded under MP3.1a ("medical practitioner clinics (MOH)") while overall primary care services were those coded under MP3.1a ("medical practitioner clinics") under MNHA framework. This excluded dental clinics (code MP 3.2), other healthcare professional establishments (MP 3.4), outpatient care centres 19 (MP 3.5),

¹⁸ The non-MOH public sector estimation were not provided. The numbers of facilities non-MOH public facilities were few (at state level) and hence such estimation was possible to be identified as spending of a specific facility (such as a particular university hospital). According to MNHA Unit, such revelation is against the confidentiality agreement with surveyed institutions and hence such breakdown was not provided.

¹⁹ In MNHA, these includes family planning centres, outpatient mental health and substance abuse centres, free-standing ambulatory surgery centres, dialysis centres, and all other outpatient multi-specialty centres.

medical and diagnostic laboratories (MP 3.6), providers of home healthcare services (MP 3.7), and other providers of ambulatory healthcare (MP 3.9). It is also to be noted that nursing and residential care facilities (code MP 2), retail sale and other providers of medical goods (MP 4), provision and administration of public health programmes (MP5), and general health administration and insurance (MP6) were also not included in this study's estimation of healthcare expenditure.

All these exclusions were in line with the study framework set up to evaluate the distribution of primary healthcare and hospital healthcare provision in Malaysia. Psychiatric and specialty hospitals (such as the national respiratory centre which caters for patient who need long-term hospitalisation for pulmonary tuberculosis) are excluded as these services were overwhelmingly depended on MOH in Malaysia. Their inclusion will skew the comparison of other general hospital care resource distribution between MOH and the rest of the healthcare sector. Nursing and residential care were excluded as they are neither considered general hospital care nor primary care. A separate analysis would be more appropriate. Dental clinics and traditional and alternative medicine were not considered western medical services, as defined in this study. In this study, pharmacies, diagnostic laboratories, and other providers of medical goods are not considered as primary care where patients were diagnosed and treated by medical doctors (or sometimes nurses or assistant medical officers in remote small government facilities).

In short:

- The researcher found no appropriate human resources data that could provide valid comparisons for categories of hospital and primary care.
- Number of acute hospital beds (excluding beds from special institutes such as those for chronic tuberculosis and psychiatric inpatient care) obtained from DOSM and MOH are used as proxies of hospital facilities. Number of doctors

was argued to be an appropriate proxy for comparison of primary healthcare facilities between private and public sector, but no data (number of doctors categorised for public and private primary care) were available.

• The expenditure on facilities (by categories and sectors) which was estimated by the Malaysia National Health Accounts (MNHA) is used as a proxy for the overall recurrent financial expenditure spent across the states in Peninsular Malaysia. The researcher has obtained data for ambulatory clinics and hospitals from MOH MNHA Unit.

Hence, the geographic equity analyses were carried out for distribution of (a) hospital facilities (acute hospital beds as proxy) and (b) hospital and (c) primary care recurrent financial expenditure (MNHA expenditure on ambulatory care facilities as proxy) in the next chapter.

4.5 Importance of Processes of Constructing and Identifying Indicators

This chapter has demonstrated the process of the construction of area population healthcare needs and identification of area healthcare resource indicators. The construction of healthcare needs was founded on the debate of definition of healthcare needs and based on the discussion of measurement of healthcare needs for the purpose of resource allocation in different health systems in both developed and developing countries. Drawing from reviewed rationale and empirical evidence on appropriate indicators for healthcare needs, a composite index of state healthcare needs was constructed for Malaysia using the most appropriate available healthcare utilisation, demography and mortality data.

The identification of healthcare resources was based on the healthcare financing framework, which allowed decomposition of overall healthcare resources into recurrent financial expenditure, and capital resources in the form of human resources and healthcare facilities. These resource indicators were not combined as each of these resources were usually allocated their own individual forms (e.g. we build facilities with a budget separated from operation expenditure, and deploy healthcare workers from the cultivated pool of human resources) and the allocative process were often independent from each other. However, choices of proxy were tailored to the context of the Malaysian health system according to available sources.

Documentation of steps and rationales for the construction of needs indicators and choice of resource indicators are not only for the purpose of providing methodology details for the study. In the context of healthcare resource allocation, there were no golden rules of allocation or gold standard of measurements for equity. The "fairness" of the process itself could ultimately provide the legitimacy of the allocation exercise and a legitimate process in turn increases the chance for the resultant allocation decisions to be accepted as fair and equitable. Hence, the process documented in this chapter itself is the justification of legitimacy of the quantitative analysis methodology adopted in this study.

4.6 Conclusion

This chapter addressed the issue of finding valid population healthcare needs estimation and healthcare resources proxies for states in Peninsular Malaysia. Section 4.2 reviewed the various indicators available in Malaysia, which could be considered as healthcare needs indicators. It was found that state population demography and national healthcare utilisation rates of different demographic groups, which were available for 1996 and 2011, were the appropriate indicators to form baseline population health needs across states. This baseline state healthcare needs have to be further adjusted for differential geographic healthcare needs over and above population demography. It was found that state standardised mortality rate for those under 65 years old was an available proxy for this further adjustment. Steps estimating national healthcare services utilisation rates of different demographic groups from NHMS data and formulas for the estimations of state hospital and primary care needs were spelled out. Section 4.3 presented the calculated national average utilisation rates and the state population health needs estimation for 1996 and 2011.

Section 4.4 described the rationale of choice of healthcare resources proxies and the search of available data in Malaysia. Based on the availability of regularly collected data, (a) acute hospital beds and (b) hospital and (c) primary care financial input data were obtained from published and unpublished sources. Section 4.5 highlighted the importance of the detailed construction and identification indicators in providing legitimacy to the result of this analysis.

With these state population healthcare estimations and healthcare resources indicators obtained, the analysis of comparing the healthcare resources allocated in relation to needs was possible and the analysis will be presented in the next chapter.

CHAPTER 5: GEOGRAPHIC HEALTHCARE EQUITY IN PENINSULAR

MALAYSIA

5.1 Chapter Overview

This chapter presents the findings of the quantitative analysis of this thesis, which are the horizontal geographic equity in provision of healthcare and the vertical geographic equity in financing of healthcare across states in Peninsular Malaysia. Section 5.1 details the advantages, concepts and mathematical basis of the two indices, i.e. the Kakwani index (for horizontal equity of healthcare provision) and the 'Difference index' (for vertical equity of healthcare financing) that are used in this thesis. Section 5.2 and Section 5.3 present the findings of geographic horizontal equity and vertical equity across states in Peninsular Malaysia in 1996/1997 and 2011/2012.

5.2 Measuring Geographic Equity Using Concentration and Lorenz Curves

Descriptive analysis and calculation of the Gini index (GI), concentration index (CI), Kakwani index (KI) and Difference index (DI) are done to assess the equity of resource distribution in this thesis. All the four indices used are generated through the use of the concepts of the Lorenz curve (LC) and centration curve (CC). These indices provide single summary estimations (of different meanings) on the equity of distribution of resources.

It is worth noting that, while KI is often used to measure vertical equity of taxation of healthcare financing system (Adam Wagstaff et al., 1989), it is adapted to measure horizontal equity in healthcare provision in this thesis. It was based on the concepts of LC/CC and GI/CI (See more in section 5.2.1). In contrast, the DI is a novel adaptation of "index of horizontal equity" (Adam Wagstaff et al., 1989), which measured the horizontal equity of healthcare utilisation, to measure vertical equity of healthcare financing in this thesis. It is based on the concepts of CC, CI and KI (See more in section 5.2.2).

Other than using single summary measurement, health resources inequity can also be conveniently assessed by comparing the most to the least, such as comparing the health resources of the highest quintile to the lowest quintile, or the highest locality to lowest locality. However, this kind of highest-vs-lowest grouped analysis does not reflect the experiences of the entire population and is not sensitive to changes in the distribution of the population across different localities (A. Wagstaff, Paci, & van Doorslaer, 1991). CC and CI have the advantage of addressing these two problems (O'Donnell et al., 2008). As variants of CI, GI, KI and DI all preserve the same advantages over highest-vs-lowest group analysis.

5.2.1 Kakwani Index for Horizontal Equity in Healthcare Provision

In this study, KI is used as the summary indicator for horizontal equity in provision of the overall healthcare resources across states in Peninsular Malaysia. Kakwani (1977) constructed the index to measure tax progressivity by comparing the LC of tax-payers' income and the CC of tax-payers' contribution to tax. In this thesis, LC of healthcare needs and CC of healthcare resources were obtained to measure equity of healthcare resource provision. The produced coefficient is called KI. The production of LC, CC, and KI are explained below.

First, cumulative share of health needs across states is plotted on the Y-axis against the cumulative number of populations on the X-axis as a Lorenz curve (LC) in a X-Y diagram (Figure 5-1). The population number on the X-axis is grouped according to states and ranked from highest to lowest health needs per capita. If each of the states has the same per capita health needs, the LC will be the diagonal line running from the bottom left corner to the upper right corner. This is known as the line of equality. In this context, what is equal here is that all groups have equal average health needs. It is highlighted here that the population is plotted in groups according to their states on X-axis, and the groups are weighted by the number of population and ranked by the groups' average health needs. It is not ranked and plotted according to individual's health needs.



Figure 5-1 Lorenz & Concentration Curves of Healthcare Needs and Resources

Then, the concentration curve (CC) of the distribution of healthcare resources across states is plotted on top of the LC in the same X-Y diagram (Figure 5-1). The healthcare cumulative share of resources across states is plotted on the Y-axis against the cumulative number of populations on the X-axis, which is ranked according to state per capita health needs, from the lowest to the highest. It is worth noting that the LC plots cumulative share of needs against population ranked according to needs (i.e. needs vs population by needs level), while the CC plots cumulative share of resources against population ranked according to needs level).

Conceptually, the difference between the CC and LC (i.e. the area between LC and CC) implies the gap between the actual distribution of resources and the estimated health needs, in relation to state health needs. The Kakwani Index (KI) is the summary index of this gap. KI is defined as two times the area between LC and CC. Two times the area above the diagonal line is defined as -1. Two times the area below the diagonal line is defined as 1. If the LC or CC runs on top of the diagonal line, there is no space between the curve and diagonal line and hence the area value is zero. As LC is always above the

diagonal line, the value of two times the area between LC and the diagonal line (i.e. Gini index) ranges from -1 to 0. As CC can be above or below diagonal line, the value of two times the area between LC and the diagonal line (i.e. concentration index) ranges from -1 to 1. Mathematically, KI can be calculated by subtracting the Gini index (GI) (ranging from -1 to 0) from the concentration index (CI) (ranging from -1 to 1). Hence, the KI ranges from -1 to 2.

If the CC lies on the LC, the KI value is zero, and it implies that healthcare resources are distributed proportionately according to needs (Table 5-1). If the CC lies everywhere above the LC, the healthcare resources are concentrated or distributed proportionately more among those with poorer health (i.e. with more health needs) and the KI is of negative value. In contrast, if the CC lies everywhere below the LC, the healthcare resources are concentrated among those who have lower needs (or distributed proportionately less among those with more health needs) and the KI is of positive value. Alternatively, CC may cross the LC. In this case, direct visual interpretation is difficult and KI aids the interpretation.

	KI	Interpretations
CC above LC	-1 <ki<0< td=""><td>Concentrated (or distributed proportionately more) among states with more health needs</td></ki<0<>	Concentrated (or distributed proportionately more) among states with more health needs
CC on LC	0	Proportionate distribution according to needs (Ideal overall healthcare resources distribution for horizontal equity in provision)
CC below LC	0>KI>2	Concentrated (or distributed proportionately more) among states with less health needs

Table 5-1: Ranges and Interpretations of Kakwani Index (KI)

In the assessment for objective 3 of this thesis (i.e. to assess if overall (public and private) healthcare resources have been distributed proportionately to population

healthcare needs (i.e. horizontal equity in provision) across the states in Peninsular Malaysia), the ideal overall healthcare resources distribution across states is one that is proportionate to area population healthcare needs. In this ideal situation, CC lies on top of LC. In other words, if overall healthcare resources' KI is zero, it implies equitable distribution of healthcare resources according to the horizontal equity principle of healthcare provision.

This study is not the first to measure healthcare equity using KI. Adam Wagstaff et al. (1989) measured the vertical equity (progressivity) of healthcare financing across different social economic/income groups in the United States, Britain and the Netherlands. They were examining if those from higher socioeconomic/income groups contributed proportionately more (hence vertical equity) in healthcare financing. In contrast, the approach in this thesis was measuring horizontal equity of healthcare provision across different geographical groups using KI. This study examined if healthcare resources were proportionately (hence horizontal equity) made available across states according to healthcare needs. The CC of healthcare resources was compared with the LC of healthcare needs where population were grouped according to states and ranked according to per capita healthcare needs. Then, the CI of healthcare resources and GI of healthcare needs were used to compute KI of horizontal inequity of healthcare resources provision across states in Peninsular Malaysia.

5.2.2 Difference Index for Vertical Equity in Healthcare Financing

Also, this study proposes to use two CCs (for healthcare resources and needs) on the same X-Y graph (plotted against the states ranked by wealth) to analyse if the distribution of healthcare resources had been concentrated or distributed proportionately more among poorer or richer states in accordance to state health needs.

Similar to the concept and computation of KI, cumulative share of health needs across states is first plotted on the Y-axis against the populations grouped by states ranked from poorest to wealthiest (i.e. lowest to highest average per capita income₂₀) on the X-axis as CC for health needs (CCn) (Figure 5-2). Then, the CC of the distribution of healthcare resources across states (CCr) is drawn on top of the CCn. CCr is drawn by plotting the cumulative share of healthcare resources on the Y-axis against the state populations ranked by wealth of states, from the poorest to the wealthiest.

Conceptually, the difference between the CCr and CCn implies the gap between the actual distribution of resources and the estimated health needs, in relation to state wealth (as proxy of ability-to-pay). In this thesis, two times the area between two CCs is defined as the "Difference Index"²¹ (DI). To the author's best knowledge, DI is a novel approach in measuring vertical equity despite utilisation of a similar concept in measuring horizontal equity by Adam Wagstaff et al. (1989). Mathematically, DI can be computed by subtracting CCn from CCr. As both CCn and CCr ranges from -1 to 1, the DI ranges from -2 to 2 (Adam Wagstaff et al., 1989).

²⁰ In this study, per capita income, instead of per capita Gross Domestic Product (GDP), was used as the proxy of ability-to-pay of the population. This is because per capita income better reflects the disposal income that an individual can use. The GDP better reflect the overall value of economic activity but not all GDP value were money that is distributed to people as their income.

²¹ The same concept was used to measured horizontal equity (Adam Wagstaff et al., 1989). It was termed "index of horizontal equity" or "horizontal index (HI)". Since it is used to measure vertical equity in this study, it is demonstrated here that this concept can be used to measure both horizontal equity and vertical equity, depending on the context. As such, adopting terms such as "horizontal index (HI)" or "vertical index (VI)" would be misleading. Hence, a new term "Difference index" is chosen in this thesis to do away either horizontal or vertical equity.



Figure 5-2: Concentration Curves of Healthcare Needs & Resources, Ranked by Household Income

If the CCr lies on the CCn, the DI value is zero, and it implies that healthcare resources are distributed proportionately according to needs (Table 5-2). If the CCr lies everywhere above the CCn, healthcare resources are concentrated (or distributed proportionately more) among wealthier states and the DI is of negative value. In contrast, if the CCr lies everywhere below the CCn, healthcare resources are concentrated among those who are poorer (less wealthy) (or distributed proportionately less among wealthier states) and the DI is of positive value. Alternatively, CCr may cross the CCn. In this case, direct visual interpretation is difficult and DI aids the interpretation.

	DI	Interpretations
CCr above CCn	-2 <di<0< td=""><td>Concentrated or (distributed proportionately more) among states with less wealth (Ideal MOH resources distribution for vertical equity in financing)</td></di<0<>	Concentrated or (distributed proportionately more) among states with less wealth (Ideal MOH resources distribution for vertical equity in financing)
CCr on CCn	0	Proportionate distribution according to needs, regardless of wealth status
CCr below CCn	0>DI>2	Concentrated or (distributed proportionately less) among states with more wealth

Fable 5-2: Ranges and	Interpretations of Difference Index (I	DI)
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For the assessment of objective 4 (i.e. to assess if public healthcare resources have been distributed proportionately more to population healthcare needs among poorer states in Peninsular Malaysia (vertical equity in financing)), it is argued that MOH resources (as the proxy of public sector) should be concentrated among less wealthy states. Hence, in a distribution that is in line with vertical equity principle of healthcare financing, MOH resources' CCr should lie above CCn and DI should be of negative value.

As mentioned earlier, this study is not the first to measure healthcare equity by comparing two CCs or CIs. Adam Wagstaff et al. (1989) measured the horizontal inequity of healthcare expenditure/utilisation among income groups in Italy, the Netherlands and Britain, by comparing CC of healthcare expenditure/utilisation to CC of healthcare needs of each income group. In contrast, CC of healthcare resource availability was compared to the CC of healthcare needs, where population were ranked in geographic groups (states) according to average income, to indirectly measure the vertical inequity of healthcare financing across states in Peninsular Malaysia in this study. In this thesis, this comparison of CCs and the single measurement quantifying the difference between CCs is termed as "Difference index (DI)" for the ease of presentation in findings.

In the Malaysian context, given that KI of overall healthcare resource provision across states is horizontally equitable (i.e. overall resources is distributed proportional to needs), the DI of MOH healthcare resources is an indirect indicator of the vertical equity of healthcare financing (Section 3.4.2).

5.2.3 Application of Variants of CC/LC and CI/GI in the Measurement of Equity/Equality

As discussed earlier, KI and DI in this study were drawn from comparisons between CI and GI and between CI with CI respectively. Hence, KI and DI can be considered as variant combinations of CC/LC and CI/GI. To the best knowledge of the author, this is one of the few studies to utilise the concept of KI to measure horizontal equity in healthcare provision across geographic areas. Munga and Maestad (2009) compared the distribution of healthcare workers to the distribution of healthcare needs across districts (by grouping the population share in to districts) by ranking the population groups according to per capita healthcare workers. It superimposed the CC of healthcare needs over the LC of healthcare workers and compared the CI of healthcare needs with the GI of healthcare workers. However, Munga and Maestad (2009) stopped short of combining CI and GI into a summary index, which was done in this thesis and using the terms of KI. This study also compared the distribution of healthcare needs and resources by grouping the population in geographic groups. In contrast to Munga and Maestad (2009), this study ranked the grouped state population by per capita healthcare needs. Hence, instead of comparing CI of healthcare needs with GI of healthcare resources like Munga and Maestad (2009), this study compared the CC of healthcare resources to GI of healthcare needs.

The aforementioned study by Adam Wagstaff et al. (1989) had also utilised the concept of comparing CC and LC or CI and GI to measure horizontal equity in healthcare provision and vertical equity in healthcare financing. The horizontal equity measurement in both studies were similar in concept and application, except this study measured the inequity across geographic groups while Adam Wagstaff et al. (1989) measured inequity across income groups. However, while the vertical inequity measured by Adam Wagstaff et al. (1989) was a direct measurement of the share of financial resources contributed by income groups, the vertical inequity in this study was measured indirectly by comparing the distribution of public health resources according to the distribution of health needs in relationship to the average income of the states. To the best knowledge of the author, this study is the first to utilise the concept of comparing two CCs in measuring vertical inequity. Adam Wagstaff et al. (1989) measured vertical inequity by comparing CC with LC and measured horizontal inequity by comparing two CCs.

Others had performed the analysis using concentration curves and indices to assess horizontal inequity of healthcare utilisation across individuals in many health systems. (Lu et al., 2007; Somkotra, 2011; E. van Doorslaer, Masseria, et al., 2006). Health systems examined included those in Hong Kong, Taiwan, South Korean, Thailand, and another 21 Organisation of Economic Cooperation and Development (OECD) countries from Europe and the Americas such as Canada, France, Germany, Mexico, United Kingdoms and United states. These studies took the Adam Wagstaff and Doorslaer (2000) approach in measuring horizontal inequity of healthcare utilisation among individual or groups with different levels of income. The concept of CC and CI were used in their approach by plotting the share of healthcare utilisation against the share of population when the population were ranked according to their income levels (either in groups or individually, depending on data availability). In this approach, healthcare utilisation was standardised, either using direct (for group data only) or indirect (for both group and individual data) methods, to remove the effect of differential healthcare needs between population with different income levels. In a direct standardisation approach, CC of needstandardised healthcare utilisation was plotted, and the CI of this standardised healthcare utilisation was the horizontal inequity estimation across income groups/individuals. Application of this approach can be specifically found in a study by E. van Doorslaer, Masseria, et al. (2006). In the indirect standardisation approach, the CC of unstandardised actual healthcare utilisation was compared to the CC of healthcare needs (or needexpected utilisation). Specific application of the indirect approach can be found in studies by Lu et al. (2007) and Somkotra (2011).

The first major difference of this study compared to the other three studies listed in the beginning of the last paragraph (Lu et al., 2007; Somkotra, 2011; E. van Doorslaer, Masseria, et al., 2006) is the perspective of examining healthcare equity. The objective of this study was to examine the inequity across geographical areas while the objective

of the other three studies was to examine the inequity across groups/individuals with different income levels. Hence, the CC and LC in this study were plotted according to the population grouped by geographic areas (ranked by healthcare needs for KI or ranked by state income levels for DI), while CCs in the other three studies were plotted according to the population-groups/individuals by income levels (and ranked by income level). The findings of KI for horizontal equity in healthcare provision (computed by comparing CC with LC) were very similar to the horizontal equity in healthcare utilisation examined in the other three studies (computed by comparing CC with the line of equality in direct standardisation method (E. van Doorslaer, Masseria, et al., 2006) or by comparing two CCs in the indirect standardisation method (Lu et al., 2007; Somkotra, 2011)).

Method-wise, the computation of vertical inequity in this study involved the comparisons of two CCs (between CC of healthcare provision and CC of healthcare needs, ranked by state income level). This is conceptually identical to the comparisons of two CCs in the indirect standardisation method (between CC of actual healthcare utilisation and CC of healthcare needs/expected healthcare utilisation, ranked by groups/individuals' income level) (Lu et al., 2007; Somkotra, 2011). As highlighted earlier, the difference between this study and the study using the indirect standardisation method is that population were grouped by geographic areas while in other studies the population were not grouped by geographic areas.

In other words, plotting and computation of CI, GI, KI and DI in this study applied established mathematical method albeit with different variants. The novelty was in grouping the population according to geographic areas before ranking them by healthcare needs or income levels. As mentioned earlier, grouping by geographic groups was also done by (Munga & Maestad, 2009) but those groups were ranked according to healthcare workers per capita. Why is it important to group population by geographic areas? By grouping and ranking the population according to their residential areas, the analysis provides more direct information for policy or allocative decision making in health systems where healthcare provision and healthcare resources are organised and allocated across geographic areas. Via this method, the healthcare inequity observed is directly attributed to geographic difference.

It is worth noting that method of further decomposition, extended from the indirect standardisation method above, by Adam Wagstaff, van Doorslaer, and Watanabe (2003) can also identify the extent of inequity contributed by geographic areas. This application can be seen in studies by Lu et al. (2007) and Somkotra (2011). However, using the approach in this study, not only the extent of inequity contributed by geographic area can be examined, the discrepancy of share of population health needs and share of healthcare resources provision of each geographic area could be tabulated, observed and comprehended easily by policy makers (See the share of needs and resources for each state in Tables 5-3 to 5-14).

On a side note, Wang and Yaung (2013) also utilised the concept of CC and CI of healthcare utilisation and ranked the population groups according to healthcare needs. In their study, the health needs were obtained from a self-reported five-level Likert category of health status (excellent, good, fair, somewhat poor and poor). Wang and Yaung (2013) claimed that their study established empirical evidence that there was vertical equity in healthcare utilisation, where population with higher health needs received more healthcare, in Taiwan as the CC lies above the line of equality and CI was of negative value. However, it is argued here that their study design was insufficient to establish such vertical equity because the healthcare needs group were ranked according to categorical data with no quantification of level of differential health needs between groups. In their study, they do not know how much higher health needs of the higher needs group than

the lower needs group, hence, there is a possibility that the more healthcare utilisation in the higher categorical needs group was still proportionate or proportionately less than the quantified health needs level. In contrast, population were not only ranked according to their health needs in the examination of horizontal equity in this study, CC of needs were drawn based on the quantified health needs level to be compared with CC of healthcare resources. Hence, it is argued here that Wang and Yaung (2013) might obtain quantified health needs difference among the population and apply the method of comparing two CCs as in this study, to establish the evidence of vertical equity in the healthcare utilisation that they aimed for.22

In short, the application of KI in this study by combining CC and LC to measure the distribution of healthcare resources in relationship to healthcare needs across geographic area in one single graph is unique in its application than all other previous studies. KI provides a single estimation for horizontal equity in this aspect where discrepancy of share of resources and share of needs could be easily observed and understood by policy makers via the tabulation. On the other hand, the proposal and application of DI in this study combined two CCs to measure the distribution of healthcare resources in relation to healthcare needs and the ability-to-pay across geographic area in one single graph. DI provides single quantification for this aspect of healthcare equitability. This study is the

²² It is important to note that the benchmark of healthcare provision across groups with different health needs in this study is different from the benchmark of healthcare utilisation in the study of Wang and Yaung (2013). In this study, it is argued that healthcare provision should horizontal equitable across healthcare needs groups, i.e. provision proportionate to the needs. For Wang and Yaung (2013), healthcare utilisation should be vertical equitable across healthcare needs groups, i.e. utilisation proportionately more than the needs.

first to demonstrate the use of multiple concentration curves (CCr & CCn) to combine three components (healthcare resources, healthcare needs and ability-to-pay) in one equity measurement to provide a novel solution in measuring vertical geographic equity, albeit indirectly, in Malaysia's health system. This may be applicable to other similar health systems where both public and private sectors both have significant presence in provision of healthcare and each public and private sector has a distinctive financing mechanism, where the public sector contribution is linked more to ability-to-pay regardless of health needs (i.e. financed predominantly by progressive general taxation system) and private sector contribution is linked more to the needs of healthcare and less to ability-to-pay (financed mainly by out-of-pocket payment).

5.2.4 Statistical Software

KIs and DIs were computed for hospital care and primary care from data of 1996/1997 and 2011/21012. Area healthcare resources and population health needs were calculated and compiled using Microsoft Excel Spreadsheets. Estimations of KI and DI were done separately in both Stata version 12 and Microsoft Excel Spreadsheets. Results were compared to ensure the accuracy of the calculation process. The calculations on both software were done according to methods detailed in the manual of Analyzing Health Equity Using Household Survey Data (O'Donnell et al., 2008). Plotting of LC and CC were also done using Stata according to the same manual.

5.3 Horizontal Equity of the Distribution of Overall Healthcare Resources among States in Peninsular Malaysia

In this section, tables showing the cumulative proportion of healthcare resources and healthcare needs, Lorenz curves (LCs) of healthcare needs, concentration curves (CCs) of healthcare needs and Kakwani Indices (KIs) are reported to illustrate the horizontal equity of distribution of overall healthcare resources among states in Peninsular Malaysia. Hospital care financial expenditure, hospital beds and primary care financial expenditure for the years 1997 and 2012 are reported. They were analysed in conjunction with hospital care needs and primary care needs in 1996 and 2011.

5.3.1 Horizontal Equity of Hospital Care Financial Expenditure Distribution in 1997 and 2012

Table 5.3 shows the distribution of overall hospital care financial expenditure among states in Peninsular Malaysia in 1997. The states were ranked according to per capita hospital care needs, from the state with most needs to the state with least needs. This ranking of states was used when plotting the needs and resources distribution curves and calculating KI to illustrate the horizontal equity aspect of overall healthcare resource distribution.

Figure 5.3 shows the cumulative proportion of hospital care financial expenditure against the cumulative proportion of hospital care needs for states in Peninsular Malaysia in 1997/1996. The states were ranked according to per capita healthcare needs, from the state with most hospital care needs to the state with least needs. The figure shows that CC of overall hospital care financial expenditure (i.e. plots of cumulative proportion of expenditure) cut across the LC of hospital care needs (i.e. plots of cumulative proportion of needs). KI was 0.1206 with 95% Confidence Interval (CI) of -0.0889 and 0.3301, which means that there was no statistically significant concentration of expenditure at states with less health needs. Together, the CCs, LCs and KIs show that the overall distribution of hospital care expenditure was in line with the principle of horizontal equity.
Table 5-3: Distribution of Overall Hospital Care Financial Expenditure across Sates in Peninsular Malaysia in 1997, Ranked by Per Capita Healthcare Needs

State	Population (%)	Cumulative Proportion of Population	Hospital Care Needs (%)	Cumulative Proportion of Needs	Per Capita Needs (Bed- days per year)	Financial Expenditure for Hospital Care (RM '000)	Financial Expenditure for Hospital Care (%)	Cumulative Proportion of Financial Expenditure
Selangor	20%	20%	22%	22%	0.472	418,239	13%	13%
Johore	15%	35%	16%	38%	0.445	318,344	10%	23%
Penang	7%	42%	7%	45%	0.424	352,246	11%	34%
Perak	12%	54%	12%	57%	0.415	308,366	10%	44%
Kedah	9%	63%	9%	66%	0.404	183,759	6%	50%
K. Lumpur	8%	71%	8%	73%	0.403	881,561	28%	77%
Malacca	4%	74%	3%	77%	0.395	159,343	5%	82%
Pahang	7%	81%	7%	83%	0.395	129,297	4%	87%
Perlis	1%	83%	1%	85%	0.394	28,027	1%	87%
N. Sembilan	5%	87%	4%	89%	0.386	135,564	4%	92%
Kelantan	8%	95%	7%	96%	0.381	181,084	6%	97%
Terengganu	5%	100%	4%	100%	0.342	84,302	3%	100%
Peninsular					0.419	3,180,131		

* Including Putrajaya



Figure 5-3: Cumulative Proportion of Overall Hospital Care Financial Expenditure and Needs among States in Peninsular Malaysia in 1997/1996, Ranked by Per Capita Healthcare Needs

Table 5.4 shows the distribution of overall hospital care financial expenditure across

states in Peninsular Malaysia in 2012 while Figure 5.4 shows the cumulative proportion

of hospital care financial expenditure against the cumulative proportion of hospital care needs for states in Peninsular Malaysia in 2012/2011.

The CC of overall hospital care financial expenditure lay above the LC of hospital care needs. KI was -0.0773 with 95% CI of -0.3393 and 0.1848. Together these show that there was no statistically significant concentration of distribution of hospital care expenditure among states with higher health needs. Hence, the distribution of overall hospital care expenditure in 2012 was in line with the principal of horizontal equity.

Table 5-4: Distribution of Overall Hospital Care Financial Expenditure across States in Peninsular Malaysia in 2012, Ranked by Per Capita Healthcare Needs

State	Population (%)	Cumulative Proportion of Population	Hospital Care Needs (%)	Cumulative Proportion of Needs	Per Capita Needs (Bed- days per year)	Financial Expenditure for Hospital Care (RM '000)	Financial Expenditure for Hospital Care (%)	Cumulative Proportion of Financial Expenditure
K. Lumpur	7%	7%	9%	9%	0.481	3,136,798	20%	20%
*Selangor	25%	32%	29%	39%	0.460	3,416,998	22%	41%
Penang	7%	39%	7%	46%	0.415	1,741,462	11%	52%
Malacca	4%	42%	4%	50%	0.380	688,180	4%	57%
Johore	15%	57%	14%	64%	0.370	1,628,410	10%	67%
Perak	10%	68%	10%	74%	0.359	1,298,078	8%	75%
Kedah	9%	76%	8%	81%	0.337	1,030,976	7%	82%
N. Sembilan	5%	81%	4%	85%	0.334	671,391	4%	86%
Pahang	7%	87%	5%	90%	0.311	785,949	5%	91%
Perlis	1%	88%	1%	91%	0.308	143,999	1%	92%
Kelantan	7%	95%	5%	97%	0.291	834,990	5%	97%
Terengganu	5%	100%	3%	100%	0.281	439,479	3%	100%
Peninsular					0.384	15,816,712		



Figure 5-4: Cumulative Proportion of Overall Hospital Care Financial Expenditure and Needs among States in Peninsular Malaysia in 2012/2011, Ranked by Per Capita Healthcare Needs

5.3.2 Horizontal Equity of Hospital Beds Distribution in 1997 and 2012

Table 5.5 shows the distribution of overall hospital beds across states in Peninsular Malaysia in 1997 while Figure 5.5 shows the cumulative proportion of overall hospital beds against the cumulative proportion of hospital care needs for states in Peninsular Malaysia in 1997/1996.

The CC of overall hospital beds cuts across the LC of hospital care needs. KI was 0.1301 with 95% CI of -0.0328 and 0.2929. This shows that there is no horizontal inequitable distribution of overall hospital beds among states in Peninsular Malaysia in 1997.

State	Population (%)	Cumulative Proportion of Population	Hospital Care Needs (%)	Cumulative Proportion of Needs	Per Capita Needs (Bed- days per capita per year)	Acute Hospital Beds (n)	Acute Hospital Beds (%)	Cumulative Proportion of Beds
*Selangor	20%	20%	22%	22%	0.472	3,523	11%	11%
Johore	15%	35%	16%	38%	0.445	3,471	11%	22%
Penang	7%	42%	7%	45%	0.424	3,555	11%	33%
Perak	12%	54%	12%	57%	0.415	4,979	15%	48%
Kedah	9%	63%	9%	66%	0.404	2,396	7%	55%
K. Lumpur	8%	71%	8%	73%	0.403	6,020	19%	74%
Malacca	4%	74%	3%	77%	0.395	1,655	5%	79%
Pahang	7%	81%	7%	83%	0.395	1,725	5%	84%
Perlis	1%	83%	1%	85%	0.394	404	1%	86%
N. Sembilan	5%	87%	4%	89%	0.386	1,433	4%	90%
Kelantan	8%	95%	7%	96%	0.381	1,986	6%	96%
Terengganu	5%	100%	4%	100%	0.342	1,203	4%	100%
Peninsular					0.419	32,350		

Table 5-5: Distribution of Overall Hospital Beds across States in PeninsularMalaysia in 1997, Ranked by Per Capita Healthcare Needs



Figure 5-5: Cumulative Proportion of Overall Hospital Beds and Needs among States in Peninsular Malaysia in 1997/1996, Ranked by Per Capita Healthcare Needs

Table 5.6 shows the distribution of overall hospital beds across states in Peninsular Malaysia in 2012. Figure 5.6 shows the cumulative proportion of overall hospital beds against the cumulative proportion of hospital care needs for states in Peninsular Malaysia in 2012/2011.

The CC of overall hospital beds approximated the LC of hospital care needs and cut across it several times. KI was -0.0202 with 95% CI of -0.2517 and 0.2113. This shows that the distribution of overall hospital beds among states in Peninsular Malaysia was largely in accordance to the distribution of hospital care needs in 2012.

	Population	Cumulative Proportion of	Hospital Care Needs	Cumulative Proportion	Per Capita Needs (Bed- days per capita	Acute Hospital	Acute Hospital	Cumulative Proportion
State	(%)	Population	(%)	of Needs	per year)	Beds (n)	Beds (%)	of Beds
K. Lumpur	7%	7%	9%	9%	0.519	7,732	18%	18%
*Selangor	25%	32%	29%	39%	0.540	8,878	20%	38%
Penang	7%	39%	7%	46%	0.585	4,020	9%	47%
Malacca	4%	42%	4%	50%	0.620	2,117	5%	52%
Johore	15%	57%	14%	64%	0.630	4,752	11%	62%
Perak	10%	68%	10%	74%	0.641	4,760	11%	73%
Kedah	9%	76%	8%	81%	0.663	2,921	7%	80%
N. Sembilan	5%	81%	4%	85%	0.666	2,087	5%	85%
Pahang	7%	87%	5%	90%	0.689	2,357	5%	90%
Perlis	1%	88%	1%	91%	0.692	404	1%	91%
Kelantan	7%	95%	5%	97%	0.709	2,650	6%	97%
Terengganu	5%	100%	3%	100%	0.719	1,402	3%	100%
Peninsular					0.616	44,080		

Table 5-6: Distribution of Overall Hospital Beds across States in PeninsularMalaysia in 2012, Ranked by Per Capita Healthcare Needs



Figure 5-6: Cumulative Proportion of Overall Hospital Beds and Needs among States in Peninsular Malaysia in 2012/2011, Ranked by Per Capita Healthcare Needs

5.3.3 Horizontal Equity of Primary Care Financial Expenditure Distribution in 1997 and 2012

Table 5.7 shows the distribution of overall primary care expenditure across states in Peninsular Malaysia in 1997. The states were ranked according to per capita primary care needs, from the state with most health needs to the state with least health needs. Figure 5.7 shows the cumulative proportion of overall primary care financial expenditure against the cumulative proportion of primary care needs for states in Peninsular Malaysia in 1997/1996. The states were ranked according to per capita healthcare needs, from the state with most hospital care needs to the state with least needs.

The CC of overall primary care financial expenditure cut across the LC of primary care needs. KI was 0.0008 with 95% CI of -0.0687 and 0.0703. This shows that there was no horizontal inequitable distribution of overall primary care financial expenditure among states in Peninsular Malaysia in 1997.

Table 5-7: Distribution of Overall Primary Care Financial Expenditure across States in Peninsular Malaysia in 1997, Ranked by Per Capita Healthcare Needs

State	Population (%)	Cumulative Proportion of Population	Primary Care Needs (%)	Cumulative Proportion of Needs	Per Capita Needs (Bed- days per year)	Financial Expenditure for Primary Care (RM '000)	Financial Expenditure for Primary Care (%)	Cumulative Proportion of Financial Expenditure
*Selangor	20%	20%	23%	23%	5.910	209,752	21%	21%
Johore	15%	35%	16%	39%	5.440	137,800	14%	35%
Penang	7%	42%	7%	46%	4.998	69,795	7%	42%
K. Lumpur	8%	50%	8%	53%	4.951	162,544	16%	58%
Pahang	7%	57%	7%	60%	4.938	56,201	6%	63%
Perak	12%	69%	11%	72%	4.881	107,225	11%	74%
Kedah	9%	78%	9%	80%	4.821	64,198	6%	80%
Malacca	4%	81%	3%	83%	4.712	48,739	5%	85%
N. Sembilan	5%	86%	4%	88%	4.657	47,050	5%	90%
Kelantan	8%	94%	7%	95%	4.640	50,150	5%	95%
Perlis	1%	95%	1%	96%	4.639	9,773	1%	96%
Terengganu	5%	100%	4%	100%	4.247	42,075	4%	100%
Peninsular					5.110	1,005,301		

* Including Putrajaya



Figure 5-7: Cumulative Proportion of Overall Primary Care Expenditure and Needs among States in Peninsular Malaysia in 1997/1996, Ranked by Per Capita Healthcare Needs

Table 5.8 shows the distribution of overall primary care financial expenditure across

states in Peninsular Malaysia in 2012 while Figure 5.8 shows the cumulative proportion

of overall primary care expenditure against the cumulative proportion of primary care needs for states in Peninsular Malaysia in 2012/2011.

The CC of overall primary care financial expenditure cut across and mostly lay below the LC of hospital care needs. KI was 0.0493 with 95% CI of -0.0709 and 0.1695. This shows that there was no statistically significant concentration of primary care expenditure among states with lower health needs. Hence, the distribution of overall primary care expenditure in 2012 was in line with the principal of horizontal equity.

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Table 5-8: Distribution of Overall Primary Care Financial Expenditure across States in Peninsular Malaysia in 2012, Ranked by Per Capita Healthcare Needs

State	Population (%)	Cumulative Proportion of Population	Primary Care Needs (%)	Cumulative Proportion of Needs	Per Capita Needs (Bed- days per year)	Financial Expenditure for Primary Care (RM '000)	Financial Expenditure for Primary Care (%)	Cumulative Proportion of Financial Expenditure
K. Lumpur	7%	7%	9%	9%	4.818	474,586	12%	12%
*Selangor	25%	32%	30%	39%	4.735	868,532	22%	34%
Penang	7%	39%	7%	46%	4.104	265,799	7%	41%
Malacca	4%	42%	4%	49%	3.845	189,728	5%	46%
Johore	15%	57%	14%	64%	3.801	510,373	13%	59%
Perak	10%	68%	10%	73%	3.602	411,836	10%	69%
Kedah	9%	76%	8%	81%	3.471	290,743	7%	77%
N. Sembilan	5%	81%	4%	85%	3.399	170,720	4%	81%
Pahang	7%	87%	5%	90%	3.251	260,434	7%	88%
Kelantan	7%	94%	6%	96%	3.098	239,237	6%	94%
Perlis	1%	95%	1%	96%	3.094	50,112	1%	95%
Terengganu	5%	100%	4%	100%	3.002	192,640	5%	100%
Peninsular					3.930	3,924,740		



Figure 5-8: Cumulative Proportion of Overall Primary Care Expenditure and Needs among States in Peninsular Malaysia in 2012/2011, Ranked by Per Capita Healthcare Needs

5.4 Vertical Equity of the Distribution of Ministry of Health Healthcare Resources among States in Peninsular Malaysia

In this section, tables showing the cumulative proportion of MOH and overall healthcare resources and healthcare needs, CCs of healthcare needs and MOH and overall healthcare resources, and Difference Indices (DIs) of MOH and overall healthcare needs are reported to illustrate the vertical equity of distribution of overall healthcare resources among states in Peninsular Malaysia. Hospital care financial expenditure (or expenditure), hospital beds and primary care financial expenditure for the years 1997 and 2012 are reported. They were analysed in conjunction with hospital care needs and primary care needs in 1996 and 2011.

5.4.1 Vertical Equity of Ministry of Health Hospital Care Financial Expenditure Distribution in 1997 and 2012

Table 5.9 shows the distribution of MOH and overall hospital care financial expenditure across states in Peninsular Malaysia in 1997. The states were ranked according to state mean household income, from the state with lowest mean household income to the state with the highest. This ranking of states was used when plotting the needs and resources distribution curve and calculating DI to illustrate the vertical equity aspect of MOH healthcare resource distribution.

Figure 5.9 shows the cumulative proportion of MOH and overall hospital care financial expenditure against the cumulative proportion of hospital care needs for states in Peninsular Malaysia in 1997/1996. The states were ranked according to mean state household income, from the state with lowest mean household income to the state with the highest. The figure shows that CCs of MOH and overall hospital care financial expenditure cut across the CC of hospital care needs (i.e. plots of cumulative proportion of needs).

The CC of overall hospital care expenditure (i.e. plots of cumulative proportion of expenditure) lay below the CC of hospital care needs (i.e. plots of cumulative proportion of needs). The DI for overall expenditure was 0.1916 with 95% CI of -0.2484 and 0.6316. There was no statistically significant concentration of overall hospital care resources at states with higher mean household income.

The CC of MOH hospital care expenditure approximated the CC of hospital care needs. The DI for MOH expenditure was 0.0214 with 95% CI of -0.321 and 0.3449. The distribution of MOH hospital expenditure among states in Peninsular Malaysia was not in line with the principle of vertical equity in 1997.

Table 5-9: Distribution of MOH and Overall Hospital Care Financial Expenditure across States in Peninsular Malaysia in 1997, Ranked by Mean Household Income

State	Cumulative Proportion of Population	Hospital Care Needs (%)	Cumulative Proportion of Needs	Overall Financial Expenditure for Hospital Care (%)	Cumulative Proportion of Overall Financial Expenditure	MOH Financial Expenditure for Hospital Care (%)	Cumulative Proportion of MOH Financial Expenditure	Mean Household Income 1997 (RM)
Kelantan	8%	7%	7%	6%	6%	6%	6%	1,249
Terengganu	13%	4%	11%	3%	8%	5%	10%	1,497
Perlis	14%	1%	12%	1%	9%	2%	12%	1,507
Kedah	23%	9%	21%	6%	15%	8%	20%	1,590
Pahang	30%	7%	28%	4%	19%	6%	26%	1,632
Perak	42%	12%	39%	10%	29%	13%	40%	1,940
Malacca	46%	3%	43%	5%	34%	4%	43%	2,276
N. Sembilan	50%	4%	47%	4%	38%	7%	50%	2,378
Johore	65%	16%	63%	10%	48%	14%	64%	2,772
Penang	72%	7%	70%	11%	59%	9%	73%	3,130
*Selangor	92%	22%	92%	13%	72%	9%	81%	4,006
K. Lumpur	100%	8%	100%	28%	100%	19%	100%	4,768

MOH: Ministry of Health

* Including Putrajaya



Figure 5-9: Cumulative Proportion of MOH and Overall Hospital Care Expenditure and Needs among States in Peninsular Malaysia in 1997/1996, Ranked by Mean Household Income

Table 5.10 shows the distribution of MOH and overall hospital care financial expenditure across states in Peninsular Malaysia in 2012 while Figure 5-10 shows the

cumulative proportion of MOH and overall hospital care financial expenditure against the cumulative proportion of hospital care needs for states in Peninsular Malaysia in 2012/2011.

The CC of overall hospital care expenditure lay below the LC of hospital care needs. DI was 0.0813 with 95% CI of -0.1815 and 0.3442. Hence, there was no statistically significant concentration of distribution of overall hospital care expenditure among states with higher mean household income.

The CC of MOH hospital care expenditure mostly lay above the LC. DI was -0.0884 with 95% CI of -0.1896 and 0.0128. There was no statistically significant concentration of distribution of MOH hospital care expenditure among states with lower mean household income in 2012. This was not in line with the principle of vertical equity.

Table 5-10: Distribution of MOH and Overall Hospital Care Financial Expenditure across States in Peninsular Malaysia in 2012, Ranked by Mean Household Income

State	Cumulative Proportion of Population	Hospital Care Needs (%)	Cumulative Proportion of Needs	Overall Financial Expenditure for Hospital Care (%)	Cumulative Proportion of Overall Financial Expenditure	MOH Financial Expenditure for Hospital Care (%)	Cumulative Proportion of MOH Financial Expenditure	Mean Household Income 2012 (RM)
Kelantan	7%	5%	5%	5%	5%	6%	6%	3,168
Kedah	16%	8%	13%	7%	12%	9%	15%	3,425
Perlis	17%	1%	14%	1%	13%	2%	16%	3,538
Perak	27%	10%	23%	8%	21%	11%	27%	3,548
Pahang	34%	5%	29%	5%	26%	7%	35%	3,745
Terengganu	38%	3%	32%	3%	29%	5%	39%	3,967
N. Sembilan	43%	4%	36%	4%	33%	6%	45%	4,576
Johore	58%	14%	50%	10%	43%	12%	58%	4,658
Malacca	61%	4%	54%	4%	48%	4%	62%	4,759
Penang	68%	7%	61%	11%	59%	8%	70%	5,055
*Selangor	93%	29%	91%	22%	80%	20%	90%	7,023
K. Lumpur	100%	9%	100%	20%	100%	10%	100%	8,586

MOH: Ministry of Health



Figure 5-10: Cumulative Proportion of MOH and Overall Hospital Care Expenditure and Needs among States in Peninsular Malaysia in 2012/2011, Ranked by Mean Household Income

5.4.2 Vertical Equity of Ministry of Health Hospital Beds Distribution in 1997 and 2012

Table 5.11 shows the distribution of MOH and overall hospital care beds across states in Peninsular Malaysia in 1997. Figure 5.11 shows the cumulative proportion of overall and MOH hospital beds against the cumulative proportion of hospital care needs for states in Peninsular Malaysia in 1997/1996.

The CCs of both overall and MOH hospital care beds cut across the LC of hospital care needs. DI of overall hospital beds distribution was 0.0463 with 95% CI of -0.2573 and 0.3499, and DI of MOH hospital beds distribution was -0.0456 with 95% CI of -0.3536 and 0.2626. There was neither concentration of MOH and overall hospital beds distribution in states with lower mean household income nor in those with higher mean household income. This was not in line with the principle of vertical equity of MOH healthcare resources distribution.

Table 5-11: Distribution of MOH and Overall Hospital Beds across States inPeninsular Malaysia in 1997, Ranked by Mean Household Income

State	Cumulative Proportion of Population	Hospital Care Needs (%)	Cumulative Proportion of Needs	Overall Acute Hospital Beds (%)	Cumulative Proportion of Overall Hospital Beds	MOH Acute Hospital Beds (%)	Cumulative Proportion of MOH Hospital Beds	Mean Household Income 1997 (RM)
Kelantan	8%	7%	7%	6%	6%	6%	6%	1,249
Terengganu	13%	4%	11%	4%	10%	5%	11%	1,497
Perlis	14%	1%	12%	1%	11%	2%	13%	1,507
Kedah	23%	9%	21%	7%	19%	9%	22%	1,590
Pahang	30%	7%	28%	5%	24%	7%	29%	1,632
Perak	42%	12%	39%	15%	39%	18%	47%	1,940
Malacca	46%	3%	43%	5%	44%	4%	50%	2,276
N. Sembilan	50%	4%	47%	4%	49%	6%	56%	2,378
Johore	65%	16%	63%	11%	60%	12%	68%	2,772
Penang	72%	7%	70%	11%	71%	9%	77%	3,130
*Selangor	92%	22%	92%	11%	81%	7%	84%	4,006
K. Lumpur	100%	8%	100%	19%	100%	16%	100%	4,768

MOH: Ministry of Health



Figure 5-11: Cumulative Proportion of MOH and Overall Hospital Beds and Needs among States in Peninsular Malaysia in 1997/1996, Ranked by Mean Household Income

Table 5.12 shows the distribution of MOH and overall hospital beds across states in Peninsular Malaysia in 2012. Figure 5.12 shows the cumulative proportion of MOH and overall hospital beds against the cumulative proportion of hospital care needs for states in Peninsular Malaysia in 2012/2011.

The CC of overall hospital care expenditure approximated the LC of hospital care needs. DI was 0.0207 with 95% CI of -0.2116 and 0.2530. The overall hospital bed distribution was neither concentrated in states with lower mean household income nor in those with higher mean household income in 2012.

The CC of MOH hospital beds lay above the LC. DI was -0.1388 with 95% CI of -0.2282 and -0.0495. This implies that MOH acute hospital beds distribution was concentrated among states with lower mean household income in Peninsular Malaysia in 2012. This was in line with the principle of vertical equity for MOH resources distribution.

Table 5-12: Distribution of MOH and Overall Hospital Beds across States inPeninsular Malaysia in 2012, Ranked by Mean Household Income

					Cumulative		Cumulative	
	Cumulative	Hospital		Overall	Proportion	MOH	Proportion	Mean
	Proportion	Care	Cumulative	Acute	of Overall	Acute	of MOH	Household
	of	Needs	Proportion	Hospital	Hospital	Hospital	Hospital	Income
State	Population	(%)	of Needs	Beds (%)	Beds	Beds (%)	Beds	2012 (RM)
Kelantan	7%	5%	5%	6%	6%	6%	6%	3,168
Kedah	16%	8%	13%	7%	13%	9%	15%	3,425
Perlis	17%	1%	14%	1%	14%	2%	17%	3,538
Perak	27%	10%	23%	11%	24%	13%	30%	3,548
Pahang	34%	5%	29%	5%	30%	8%	38%	3,745
Terengganu	38%	3%	32%	3%	33%	5%	43%	3,967
N. Sembilan	43%	4%	36%	5%	38%	6%	48%	4,576
Johore	58%	14%	50%	11%	48%	14%	62%	4,658
Malacca	61%	4%	54%	5%	53%	4%	66%	4,759
Penang	68%	7%	61%	9%	62%	7%	73%	5,055
*Selangor	93%	29%	91%	20%	82%	19%	92%	7,023
K. Lumpur	100%	9%	100%	18%	100%	8%	100%	8,586

MOH: Ministry of Health



Figure 5-12: Cumulative Proportion of MOH and Overall Hospital Beds and Needs among States in Peninsular Malaysia in 2012/2011, Ranked by Mean Household Income

5.4.3 Vertical Equity of Ministry of Health Primary Care Financial Expenditure Distribution in 1997 and 2012

Table 5-13 shows the distribution of MOH and overall primary care financial expenditure across states in Peninsular Malaysia in 1997. Figure 5-13 shows the cumulative proportion of MOH and overall primary care financial expenditure against the cumulative proportion of primary care needs for states in Peninsular Malaysia in 1997/1996. In both Table 5-13 and Figure 5-13, states were ranked according to mean state household income, from the state with lowest mean household income to the state with highest.

Figure 5-13 shows that CC of overall primary care expenditure (i.e. plots of cumulative proportion of healthcare resources) lies below the LC of primary care needs (i.e. plots of cumulative proportion of needs). The DI of overall expenditure was 0.1002 with 95% CI of -0.0685 and 0.2690. There was no statistically significant concentration of overall primary care expenditure among states with higher mean household income.

The CC of MOH primary care expenditure lay above the LC of primary care needs. The DI was -0.2802 with 95% CI of -0.3571 and -0.2033. The distribution of MOH primary care financial expenditure among states in Peninsular Malaysia was concentrated among states with lower household income and was in line with the principle of vertical equity in 1997.

Table 5-13: Distribution of MOH and Overall Primary Care Financial Expenditure across States in Peninsular Malaysia in 1997, Ranked by Mean Household Income

State	Cumulative Proportion of Population	Primary Care Needs (%)	Cumulative Proportion of Needs	Overall Financial Expenditure for Primary Care (%)	Cumulative Proportion of Overall Financial Expenditure	MOH Financial Expenditure for Primary Care (%)	Cumulative Proportion of MOH Financial Expenditure	Mean Household Income 1997 (RM)
Kelantan	8%	7%	7%	5%	5%	11%	11%	1,249
Terengganu	13%	4%	11%	4%	9%	9%	20%	1,497
Perlis	14%	1%	12%	1%	10%	2%	22%	1,507
Kedah	23%	9%	21%	6%	17%	10%	32%	1,590
Pahang	30%	7%	28%	6%	22%	11%	43%	1,632
Perak	42%	11%	39%	11%	33%	14%	58%	1,940
Malacca	46%	3%	42%	5%	38%	5%	63%	2,276
N. Sembilan	50%	4%	47%	5%	42%	7%	69%	2,378
Johore	65%	16%	62%	14%	56%	14%	84%	2,772
Penang	72%	7%	69%	7%	63%	5%	88%	3,130
*Selangor	92%	23%	92%	21%	84%	12%	100%	4,006
K. Lumpur	100%	8%	100%	16%	100%	0%	100%	4,768

MOH: Ministry of Health

* Including Putrajaya





Table 5-14 shows the distribution of MOH and overall primary care financial expenditure across states in Peninsular Malaysia in 2012 while Figure 5.14 shows the

cumulative proportion of MOH and overall primary care financial expenditure against the cumulative proportion of primary care needs for states in Peninsular Malaysia in 2012/2011.

The CC of overall primary care expenditure cut across the LC of primary care needs. DI was -0.0374 with 95% CI of -0.1589 and 0.0841. There was neither concentration of distribution of overall primary care expenditure among states with higher mean household income nor among those with lower mean household income.

The CC of MOH primary care expenditure lay above the LC. DI was -0.2944 with 95% CI of -0.3966 and -0.1922. Consistent with the distribution pattern in 1997, MOH primary care financial expenditure among states in Peninsular Malaysia was concentrated among states with lower household income in 2012. This was in line with the principle of vertical equity for the distribution of MOH healthcare resources.

Table 5-14: Distribution of MOH and Overall Primary Care Financial Expenditure across States in Peninsular Malaysia in 2012, Ranked by Mean Household Income

State	Cumulative Proportion of Population	Primary Care Needs (%)	Cumulative Proportion of Needs	Overall Financial Expenditure for Primary Care (%)	Cumulative Proportion of Overall Financial Expenditure	MOH Financial Expenditure for Primary Care (%)	Cumulative Proportion of MOH Financial Expenditure	Mean Household Income 2012 (RM)
Kelantan	7%	6%	6%	6%	6%	10%	10%	3,168
Kedah	16%	8%	13%	7%	14%	10%	20%	3,425
Perlis	17%	1%	14%	1%	15%	2%	22%	3,538
Perak	27%	10%	23%	10%	25%	14%	36%	3,548
Pahang	34%	5%	29%	7%	32%	10%	46%	3,745
Terengganu	38%	4%	32%	5%	37%	7%	53%	3,967
N. Sembilan	43%	4%	36%	4%	41%	5%	59%	4,576
Johore	58%	14%	51%	13%	54%	14%	72%	4,658
Malacca	61%	4%	54%	5%	59%	6%	78%	4,759
Penang	68%	7%	61%	7%	66%	6%	85%	5,055
*Selangor	93%	30%	91%	22%	88%	15%	100%	7,023
K. Lumpur	100%	9%	100%	12%	100%	0%	100%	8,586

MOH: Ministry of Health



Figure 5-14: Cumulative Proportion of MOH and Overall Primary Care Expenditure and Needs among States in Peninsular Malaysia in 2012/2011, Ranked by Mean Household Income

5.5 Summary of Horizontal and Vertical Equity of Healthcare Resources

Distribution in Peninsular Malaysia in 1997 and 2012

Table 5-15 summarises the KI of overall healthcare resources and DI of MOH healthcare resources in 1997/1996 and 2012/2011. Three available healthcare resource indicators had been identified and analysed, i.e. financial expenditure for hospital care, acute hospital beds, and financial expenditure or primary care.

Healthcare Resources	Horizontal/ Vertical Equity	19	97	2012		
	Kakwani Index of Overall Resources	0.1	.21	-0.077		
Financial	(95% CI)	(-0.089	0.330)	(-0.339	0.185)	
Expenditure for Hospital Care	Difference Index of MOH Resources	0.021		-0.088		
	(95% CI)	(-0.302	0.345)	(-0.190	0.013)	
	Kakwani Index of Overall Resources	0.1	30	-0.020		
Acute Beds Number for Hospital Care	(95% CI)	(-0.033	0.293)	(-0.252	0.211)	
	Difference Index of MOH Resources	-0.046		-0.139*		
	(95% CI)	(-0.354	0.263)	(-0.228	-0.049)	
•	Kakwani Index of Overall Resources	0.001		0.049		
Financial	(95% CI)	(-0.069	0.070)	(-0.071	0.170)	
Primary Care	Difference Index of MOH Resources	-0.280*		-0.294*		
	(95% CI)	(-0.357	-0.203)	(-0.397	-0.192)	

Table 5-15: Horizontal Equity of Distribution of Overall Healthcare Resourcesand Vertical Equity of Distribution of MOH Healthcare Resources among states in
Peninsular Malaysia in 1997 & 2012

MOH: Ministry of Health

* P < 0.05

As explained in Section 5.2.1, a KI of zero implies that there was neither concentration of resources among states with more healthcare needs nor concentration among states with less healthcare needs. The 95% CI of all three indicators in both 1997 and 2012 includes zero. This implies that overall healthcare resources for primary care and hospital care were distributed proportionately to the healthcare needs among states in Peninsular

Malaysia in 1997 and 2012. In other words, the distributions of three healthcare resources identified in 1997 and 2012 were in line with the principle of horizontal equity.

State mean household income was used as the proxy of the wealth of people in each state in the calculation of DIs. As explained in Section 5.2.2, a DI between 0 to -2 indicates that healthcare resources are concentrated among states where people were less wealthy.

DIs of primary care financial expenditure were -0.280 and -0.294 in 1997 and 2012 respectively. The 95% CIs are of negative values and do not include zero. Hence, there is statistically significant concentration of primary care financial expenditure among less wealthy states in Peninsular Malaysia in 1997 and 2012.

DIs of hospital care financial expenditure were 0.021 in 1997 and -0.088 in 2012. DIs of acute hospital beds were -0.045 and -0.139 in 1997 and 2012 respectively. In other words, point estimate of DI of hospital care financial expenditure and acute hospital care was closer to -2 in 2012 than in 1997. However, based on the 95% CIs, the concentration of resources in less wealthy states was only statistically significant for the distribution of acute hospital beds in 2012.

In short, the distributions of primary care financial resources in Peninsular Malaysia were in line with the principle of vertical geographic equity. For the distribution of hospital care resources, the same can only be claimed for the distribution of acute hospital beds in 2012. Nevertheless, there were no concentration of hospital care resources in wealthier sates noted.

5.6 Conclusion

Section 5.2 detailed the concepts and applications of KI and DI as the measurement of horizontal equity for healthcare provision and vertical equity of healthcare financing in

the context of Peninsular Malaysia. Section 5.2 further explained that KI and DI in this study was computed based on a well-established and commonly used method and compared and highlighted the difference and novelty of application comparisons of CC and LC as a measurement of geographic horizontal and vertical healthcare equity.

Findings from Section 5.3 to 5.5 provided a health system level review on the geographic equity of distribution of healthcare resources in Peninsular Malaysia from 1997 to 2012. The results indicate that primary healthcare resources in Peninsular Malaysia were distributed in accordance to the principles of geographic equity defined in this research, i.e. horizontal equity for provision and vertical equity for financing. All states were receiving overall financial expenditure for primary care according to their population healthcare needs. The less wealthy states were also receiving more MOH healthcare resources.

At the same time, the distribution of hospital care resources in Peninsular Malaysia was in line with the principle of horizontal equity for provision as well. Hospital care resources (financial expenditure and acute hospital beds) were made available for all states according to their population healthcare needs. For the vertical equity for financing, the distribution of hospital care resources had become more equitable as well in 2012 as compared to 1997. There were more MOH hospital beds, relative to healthcare needs, made available among states with lower income.

The findings showed that Malaysia performed very well in geographic equity in both primary care and horizontal geographic equity in hospital care in 1997 and 2012. Nevertheless, there is still room for improvement for geographic vertical equity in hospital care provision. In the next chapter, the allocative process of healthcare resources will be explored and the mechanism of ensuring equitable allocative process will be identified.

CHAPTER 6: FAIRNESS OF RESOURCES ALLOCATIVE PROCESS

6.1 Chapter Overview

Chapters 4 and 5 provided a quantitative assessment on the geographic equity of distribution of healthcare resources in Malaysia, in terms of horizontal provision geographic equity and vertical financial geographic equity in 1997/1996 and 2012/2011. A health system healthcare allocative process (or the lack of it) directly influences healthcare resource distribution. Other external factors will also indirectly influence the distribution patterns. Given the lack of understanding and evidence in allocative processes in Malaysia, this chapter seeks to "explore factors influencing the allocative process of public healthcare resources in Peninsular Malaysia" (the specific objective 5 of this thesis) and to "develop recommendations to improve the healthcare resource allocative process in Peninsular Malaysia and ensure geographic healthcare equity" (the specific objective 6).

Section 6.2 details the qualitative method in answering the above two specific research questions. Section 6.3 presents the internal and external factors influencing the distribution of healthcare resources. Section 6.4 evaluates the fairness of Malaysia's healthcare resource allocative processes against the benchmark of A4R. Drawing from the findings of section 6.3 and 6.4, recommendations to improve the allocative processes are made in Section 6.5.

6.2 Method

Qualitative inquiry is a suitable method of answering the fifth and sixth specific research objectives which are descriptive (what was the current allocative process and thus where was the gap benchmarking against the A4R framework), explanatory (what was the underlying principles of the current allocative process) and exploratory (what are

the contextual factors influencing the allocative process) (Gilson, 2012). A case study approach (Hesse-Biber & Nagy, 2011) was adopted. A case study approach was appropriate because this approach allows the researcher to understanding the problem within its social, political and ethical contexts (Hesse-Biber & Nagy, 2011). The case in this study was the Ministry of Health Malaysia. The concerned issue was the healthcare resource allocative process. Because allocative processes happen in different administrative levels and departments and determine different types of resources, respondents that were involved in a comprehensive set of resource allocative activities were sampled (see more in Section 6.2.1.1).

Two data collection methods were used in this case study. The researcher conducted in-depth interviews with the decision makers in the allocative processes and reviewed documents relating to the allocative processes studied.

6.2.1 In-depth Interview (IDI)

In-depth interview (IDI) was chosen as the main method of data collection. Interviews were conducted during the period between December 2014 and February 2016.

6.2.1.1 Sampling Method

The respondents were recruited through purposive sampling. The potential respondents were active decision makers who were responsible for or involved in the healthcare resource allocative process in MOH during the period of study. The criteria of purposive sampling were (1) respondents involved in either one of two broad categories of healthcare services (i.e. hospital care and primary care), (2) respondents from all administrative levels (i.e. national, state and district/hospital), and (3) respondents involved in different types of resource allocation (human resources, operating expenditure, establishment of new facilities/programmes).

As discussed earlier in Section 3.5.3, the focus of this thesis is mainly at the macrolevel of the health system and to a lesser extent, at the meso-level. The decision makers at the national and state levels also posed as decision makers at the macro-level of healthcare resource allocation. The district/hospital managers were at the top of the mesolevel resource allocation and at the same time interact with national and state actors to obtain resources. Hence, district/hospital managers also provided valuable data to be triangulated with those collected from macro-level decision makers.

IDI data collection started at the national headquarters level and later moved on to states and districts/hospitals. For the choice of states, a preliminary analysis was carried out to identify the states in Peninsular Malaysia which were most resource constrained (See Section 6.2.1.2). Then, contrasting characteristics of districts/hospitals were considered during the sampling of districts/hospitals based on the size of the districts/hospitals. In order to protect the confidentiality of respondents, two states were sampled. Following the same reason, at least two different districts and hospitals were sampled in each of the states. The rationale behind the sampling of states and districts/hospitals is presented in the following sections.

6.2.1.2 Rationale of Sampling of States

A preliminary quantitative analysis was carried out to determine which states were to be sampled in 2013. This allowed the interviews to be carried out from December 2014 to February 2016. It should be noted that this preliminary analysis was separated from the main quantitative analysis of the thesis reported in Chapter 5. The last pieces of data needed for the main quantitative analysis were only obtained in early 2016. Hence, the result of quantitative analysis was not available early enough to inform the sampling of states in this qualitative inquiry. The healthcare resources considered in the preliminary analysis were number of hospital beds as proxy of healthcare facilities, number of doctors as proxy of human resources, and healthcare expenditure in 2011 and 2009, which were the latest available data then in 2013.

Resource allocation is about how to prioritise all the competing interests with the limited resources available. Hence, the states with the least MOH healthcare resources, in proportion to the number of populations it serves, are likely to face more difficulties in allocating MOH resources. Following this rationale, states with the least MOH resources per capita were identified in a preliminary analysis as states to be sampled.

Also, Malaysia has a private-public mixed system, where the main contributor for the public sector is the MOH. The non-MOH healthcare resource input (including the private sector and non-MOH public sector) is likely to be an important factor to be considered during the allocative process to ensure an equitable distribution of overall healthcare resources. Hence, the significance of non-MOH providers is the second consideration in sampling of states.

Tables 6-1 to 6-3 show the actual (MOH and overall health system) per capita hospital beds, doctors, and healthcare expenditure among the states in Malaysia. Table 6-4 is the summary table of the ranking of each state in Peninsular Malaysia by their per capita resources (from lowest to highest resources). A ranking score is calculated by summing up the ranks in each resource category. The states are then ranked according to the final ranking scores.

	*MOH	Non MOH	Public	**Private		Total		Total Beds	Public Beds	MOH Beds
	Hospital	Hospital	Hospital	Hospital	% of private	Hospital	Population	per 10,000	per 10,000	per 10,000
	Beds	Beds	Beds	Beds	hospital beds	Beds	size ('1,000)	population	population	population
Selangor	4,495	1045	5,540	3,584	39%	9,124	5,577.4	16.4	9.9	8.1
Kelantan	1,652	0	1,652	169	9%	1,821	1,615.2	11.3	10.2	10.2
Johor	3,610	36	3,646	1,006	22%	4,652	3,401.8	13.7	10.7	10.6
Kedah	2,314	0	2,314	516	18%	2,830	1,973.1	14.3	11.7	11.7
Melaka	1,006	144	1,150	813	41%	1,963	833.0	23.6	13.8	12.1
Pulau Pinang	1,930	747	2,677	2,022	43%	4,699	1,593.6	29.5	16.8	12.1
Terengganu	1,372	0	1,372	20	1%	1,392	1,074.0	13.0	12.8	12.8
Pahang	1,996	0	1,996	264	12%	2,260	1,524.8	14.8	13.1	13.1
¹ Kuala Lumpur	2,229	1203	3,432	2,937	46%	6,369	1,694.5	37.6	20.3	13.2
Perak	3,470	147	3,617	994	22%	4,611	2,397.6	19.2	15.1	14.5
Negeri Sembilan	1,527	0	1,527	482	24%	2,009	1,042.9	19.3	14.6	14.6
Perlis	404	0	404		0%	404	237.5	17.0	17.0	17.0
¹ Putrajaya	278	0	278		0%	278	76.4	36.4	36.4	36.4
Malaysia	33,812	3,322	37,134	13,568	27%	50,702	28,964.2	17.5	12.8	11.7

 Table 6-1: Numbers of Hospital beds by sector and state at 31 December 2011

Source: Health Indicators 2012

¹Federal Territories

*Note: Excluding special medical institutes (1 respiratory, 1 leprosy and 4 psychiatrics institutes)

**Note: Excluding private maternity home and private maternity home, nursing home, hospice and ambulatory care centre

									Public	МОН
	Public	Public	Public					Total doctor	doctor per	doctor per
	MOH	Non-MOH	Total	Private	% of private	Total	Population	per 1,000	10,000	10,000
	doctors	doctors	doctors	doctors	doctors	doctors	size ('1,000)	population	population	population
Johor	1904	6	1910	1135	37%	3045	3,401.8	8.95	5.61	5.60
Kelantan	971	678	1649	228	12%	1877	1,615.2	11.62	10.21	6.01
Selangor	3610	645	4255	2883	40%	7138	5,577.4	12.80	7.63	6.47
Terengganu	745	3	748	195	21%	943	1,074.0	8.78	6.96	6.94
Kedah	1407	3	1410	484	26%	1894	1,973.1	9.60	7.15	7.13
Pahang	1100	3	1103	292	21%	1395	1,524.8	9.15	7.23	7.21
Perak	2127	15	2142	885	29%	3027	2,397.6	12.63	8.93	8.87
Pulau Pinang	1440	43	1483	982	40%	2465	1,593.6	15.47	9.31	9.04
Melaka	824	3	827	419	34%	1246	833.0	14.96	9.93	9.89
Negeri Sembilan	1191	21	1212	402	25%	1614	1,042.9	15.48	11.62	11.42
Perlis	280	1	281	37	12%	318	237.5	13.39	11.83	11.79
¹ Kuala Lumpur	2458	1839	4297	1967	31%	6264	1,694.5	36.97	25.36	14.51
¹ Putrajaya	1613	0	1613	14	1%	1627	76.4	212.96	211.13	211.13
	22,4									
Malaysia	37	3,408	25,845	10,762	29%	36,607	28,964.2	12.64	9	7.75
Source: Health Ind	licators 201	2								
¹ Federal Territorie	S									

 Table 6-2: Number of Doctors by state and sector at 31 December 2011

State	MOH Per Capita (RM)	Public Sector Per Capita (RM)	Private Sector Per Capita (RM)	Overall Per Capita (RM)	State Population (Thousands)
Kelantan	359	651	222	873	1,639
Selangor	359	406	582	988	5,034
Johor	365	376	513	890	3,269
Kedah	390	404	322	726	1,943
Pahang	437	472	275	748`	1,517
WP KL	437	1,757	1,454	3,211	1,703
P. Pinang	460	524	980	1,504	1,580
Perak	464	483	419	902	2,428
Terengganu	465	474	157	631	1,036
Malacca	497	516	705	1,221	762
N. Sembilan	539	572	345	918	1,000
Perlis	682	695	275	970	237
Source: MNHA (& MOH	sub-account) 1997-2009				

 Table 6-3: State Population and Per Capita Health Spending by Public and Private Sector, 2009

					Total per	MOH per		U		
	Total per	MOH per			capita	capita				
	capita	capita	Total per	MOH per	financial	financial	Total	MOH	Total	MOH
	hospital	hospital	capita	capita	expenditure	expenditure	ranking	ranking	resources	resources
	beds	beds	doctors	doctors	(2009)	(2009)	score	score	rank	rank
Kelantan	1	2	5	2	4	1=	10	5	3=	1=
Selangor	6	1	7	3	8	1=	21	5	7	1=
Johor	3	3	1	1	5	3	9	7	2	3
Kedah	4	4	4	5	2	4	10	13	3=	4
Terengganu	2	5	2	4	1	8	5	17	1	5
Pahang	5	6	3	6	3	5	11	17	5	6
Perak	8	9	6	7	6	7	20	23	6	7
Pulau Pinang	11	10	10	8	11	6	32	24	11	8
Melaka	10	7	9	9	9	9	28	25	9	9
N. Sembilan	9	8	11	10	10	10	30	28	10	10
Perlis	7	11	8	11	7	11	22	33	8	11

Table 6-4: Ranking of allocated resources among states in Peninsular Malaysia (from lowest to highest) in 2011

First, the ranking of allocated resources of each category are explored. Table 6-1 showed that Selangor had the lowest MOH and public hospital beds per population ratio in Malaysia. Thirty nine percent (39%) of hospital beds in Selangor were provided by the private sector, while 41% and 43% respectively were in Malacca and Penang. After accounting for private hospital beds, the overall hospital beds per population ratio increased drastically to 16.4 beds per population, which ranked at 6th among the 11 states in Peninsular Malaysia. (See "total per capita hospital beds" in Table 6-4)

On the other hand, Johor appeared to be the state with the lowest doctors to population ratio in Peninsular Malaysia, when only public sector doctors were accounted for (Table 6-2 and 6-4). Even though up to 37% of doctors work in the private sector in Johor, its total doctor to population ratio was still the lowest (Table 6-2 and 6-4). This implies that the human resources supply in Johor were the lowest per capita even when non-MOH supply were considered.

Table 6-3 shows the expenditure of the per capita financial resources. The three Peninsular Malaysia states with the least MOH per capita health expenditure were Selangor, Johor, and Kelantan in 2009 (Table 6-3 and 6-4). When the total private and public expenditure were accounted for, Kedah, Terengganu and Pahang were found to be the states with lowest total health expenditure per capita (Table 6-3 and 6-4).

From the summary of table 6-4, it is noted that Kelantan, Selangor and Johor were the three states out of all the states in Peninsular Malaysia with the least MOH resources when all three categories of resource were taken into consideration. If total healthcare resources (all resources from public and private sectors) were accounted for, Johor and Kelantan remained among the top three states with the least resources, joined by Terengganu (ranked number 1) and Kedah (jointly ranked at number 3 with Kelantan). It is interesting to note that, the overall ranking of Selangor changed from 1st (the state with
least resources) to 7th when MOH and total healthcare resources were accounted for. This implies that non-MOH resources play a significant role in Selangor. It is also important to note that, the overall ranking of Johor and Kedah changed the least (from 2nd to 3rd and from 3rd to 4th respectively) when non-MOH resources were taken into consideration.

In short, Selangor, Kelantan and Johor were the three states with the least MOH resources. While the healthcare resources input from the private sector and other non-MOH public sector improved the ranking of the total health system resources in Selangor, it did not do so for Johor and Kedah.

Hence, Selangor is a good case study on understanding how the distribution of healthcare facilities is planned within a state where there is plenty of resource input from the private sector. On the other hand, Johor is an interesting case to look at in order to understand how a MOH state health department (SHD) meets the health needs of its population when healthcare resources face heavy constraint.

In view of the above analysis, Kelantan, Selangor and Johor were considered for the case studies because they were the states with the most MOH resource constraint. Among these three states, non-MOH resources were most significant in Selangor and least significant in Johor. Hence, in line with principle of 'contrasting case sampling', Selangor and Johor were chosen to explore the allocative process in two states with two contrasting scenarios: one, where non-MOH (mainly private) sector healthcare resources altered the overall resources input significantly and the other, where it does not alter significantly.

6.2.1.3 Rationale of Sampling of Districts/Hospitals

As mentioned earlier, contrasting characteristics of districts/hospitals were taken into account during the sampling of districts/hospitals. In choosing hospitals, contrasting specialist (which also has significantly more beds and high bed occupancy rate) and nonspecialist (which has much fewer hospital beds and lower bed occupancy rate) hospitals were sought after in different states. Specialist hospitals with large bed numbers and high bed occupancy rates were sampled as well as non-specialist/district hospitals with small bed numbers and low bed occupancy rates. At the same time, urbanised district health offices which covers more population (both in terms of absolute number and density per land area covered) were chosen together with rural district health offices which covers less populated health areas. These characteristics were also suggested by respondents at the national and state levels, as the conditions that would bring unique resource management and allocation challenges at district office or hospital levels. Lastly, practical considerations such as logistics and receptivity of collegial contacts as respondents were also considered at this stage of sampling.

The number of the sampling was determined by the "saturation of data" according to the on-going data collection and analysis. Saturation of data was deemed to be reached when there were no more new themes emerging from two or more subsequent interviews from respondents of similar characteristics (by levels of administration, types of service provided, and types of resources handled).

6.2.1.4 Qualitative Data Collection

The data was collected from face-to-face interviews. The researcher conducted the interview. The choice of medium for the interview was English. However, Malay language was used whenever the respondent prefers. The interviews were audio-recorded. The audio-recorded conversations were transcribed verbatim in their original languages (Malay and English). Malay transcripts were translated into English whenever it was quoted in the thesis.

In the (rare) event that the respondent refused to be audio-recorded, the interview was still conducted. The responses from the interviewee were recorded by taking notes. The researcher then produced a transcription immediately (on the same day or next working day) by recalling the conversation with the guide of the notes taken. The reproduced transcription was sent to the interviewee to be checked for accuracy.

A semi-structured interview guide was used (Appendix A). The questions were not delivered verbatim. The sequence of the questions was not rigid, however all questions were covered by the end of each interview. The interview guide was pilot tested with a group of ex-MOH officers who were previously involved in the allocation of MOH resources. The interview guide was reviewed throughout the data collection period as new themes emerge.

6.2.1.5 Data analysis

Data analysis for IDI in this study proceeded "simultaneously" with data collection (Hesse-Biber & Nagy, 2011). The transcripts were analysed using a thematic analysis technique. This means that "patterns" within the data were identified, analysed and reported (Hesse-Biber & Nagy, 2011). The aim was to identify any predominant and important "pattern" (theme) for the readers in the final report. The six-step thematic analysis technique (Braun & Clarke, 2006) was used as a guide for the analysis. The coding process was assisted by a coding software, NVivo10.

6.2.2 **Review of documents**

The second method of data collection was the review of relevant documents. The researcher searched for published and unpublished documents related to the resource allocative process. The relevant documents reviewed included policy documents, budgetary report, needs assessment documents, budget request report and minutes of resource allocation meetings. Principles and guidelines for resource allocation were collected from policy documents and documents quoted or referred by the respondents.

All the data collected from the document review was analysed using thematic analysis and was used to triangulate with the data collected from the interviews.

6.2.3 Quality and rigour of qualitative inquiry

A lot of effort and care were taken to ensure the quality and rigour of data collected from and analysis resulting from qualitative inquiry.

First, two different methods of data collection, namely interviews and document reviews, were used. Also, respondents from different administrative levels were interviewed as they represented actors on different sides of the resource allocative process from national headquarters to states and from states to districts/hospitals. The national level decision makers were at the 'giver' end, the district level managers were at the 'receiver' end, while the states actors were on either side, depending on the process. Second, all transcripts were checked for accuracy and completion by repeatedly listening to the audio record after the initial transcription. Third, the interview data were coded at least twice and one week apart. Fourth, the initial interpretations of interviews and observations were sent back to participants for member checking. This was to ensure the interpretation of data was not biased by the researcher's own perceptions. Fifth, there were deliberate considerations of contradictory evidence to confirm the emerging themes. Six, the preliminary analysis report was reviewed by a supervisor. Any doubts and difference of opinions were resolved through discussion. Seven, the conclusion was drawn from evidence. Direct quotation was included in the reporting. Lastly, a clear record of data collection, analysis and constant reflection was kept for the audit trail.

6.2.4 Ethical considerations in qualitative research

6.2.4.1 Voluntary participation and informed consent

The participation of a respondent in the study was completely voluntary. The researcher made initial contact with the respondents before the formal interview session

to brief the respondent on the study (and the questions if the respondent preferred to know in advance). At the formal interview session, the respondent was briefed again together with an information sheet about the study. The respondent was told clearly that their participation was voluntary, they could choose not to answer any questions, they could stop from participating at any time during interview, and they could withdraw from the study at any point of the study. A written informed consent was obtained before the interview could be conducted. The audio recording was done with prior consent from the respondent as well. If the respondent refused audio recording, the interview was carried out and data was collected by note-taking.

6.2.4.2 Confidentiality of respondent Identity

Given the nature of qualitative inquiry, it is difficult for the data collection process to be completely anonymous. Hence, steps were taken to ensure the confidentiality of the identity of the respondents. All the potential respondents were informed and assured of the treatment of the data that contain their identity.

First of all, the researcher avoided addressing the respondent's name during the interview. The respondent was advised not to mention names, or to use pseudo-names, when he/she referred to other individuals in the interview. These were to minimise the capture of sensitive issues. If a name was mentioned, it was replaced by a pseudo-name during transcription.

All the data including audio records and transcripts were kept in digital form by the researcher. The computers were protected by passwords. Handwritten field notes and printed transcripts were only accessible to the researcher and supervisors.

Description of detailed characteristics of an event or person was sometimes unavoidable because it was needed to provide the context of the reality. Hence, information that would reveal the identity of respondents was not reported in the published report. In some instances, those data were reported by combining "stories" from different events and individuals (Silverman, 2010) to enable reporting of findings while protecting the confidentiality of respondents' identity.

6.2.4.3 Ethical Considerations

Ethics approvals have been obtained from the Medical Research Ethic Committee MOH (NMRR-14-220-19235) and the Medical Ethical Committee of University of Malaya Medical Centre (MEC ID: 201401-0701).

6.2.5 Characteristics of Respondents

As mentioned in Section 6-2, purposive and snowballing sampling techniques were applied to maximise the diversity of the background of respondents interviewed, in terms of types of allocative/regulating processes (human resources deployment, establishment of new facilities or programmes, and operating budget; allocation of MOH resources and regulation of distribution of private sectors resources), levels of allocative/regulating decision (macro- and meso-levels; national, state and district/hospital levels), and sizes of district or hospital.

Table 6-5 is the summary of the roles of respondents according to types of services (primary and hospital care) and levels of administration (national, state, and district/hospital).

Lf	Turney of Service Involved		
Levels of	i ypes of Service Involved		
Administration	Primary Care	Both Services	Hospital Care
National	Family Health Development Division	Planning Division	Medical Development Division
		Finance Division	Private Medical Practice Regulating Section
		Development Division	National Heads of Service of Specialties
State	*Family Health Development Unit	Human Resources Unit	*Medical Development Unit
		Development Unit	State Heads of Service of Specialties
District/Hospital	Medical Officers of Health		Directors of Specialist Hospital Directors of Non- specialist Hospital

Table 6-5: Roles of Respondents by Types of Service & Levels of administration

* The "unit" might not be found in official organisation chart, but relevant scopes of work were assigned to the officers

The number of respondents at each administrative level and brief description of their roles are as below:

1. Seventeen (17) decision makers at MOH headquarters (National level)

MOH has a huge organisation structure that consists of more than 30 divisions

(Figure 6-1). Interviews revealed that seven groups of officers played crucial roles in

the allocative process of MOH hospital and primary care healthcare resources and in the regulating process of private healthcare resources. The respondents at headquarters level were:

- a. Officers from the Medical Development Division: They were involved in deciding what new MOH facilities were to be established, allocating financial and human resources to national hospital and medical institutes, and receiving resource allocation requests from state and district hospitals. They compiled and amended the requests for hospital care and submitted them to the Planning and Development Divisions.
- b. Officers from the Family Health Development Division: They received human resources, budget and facility establishment requests from health centres via states, then amended and submitted the requests for primary care to the Planning and Development Divisions.
- c. Officers from the Planning Division: They received budget requests from the above two departments. They compiled and amended budget requests (for both hospital and primary care) and submitted them to the Finance Division.
- d. Officers from the Finance Division: They received budget requests from the above Planning Division. They compiled and amended the budget requests (for both hospital and primary care) and submitted them to the Ministry of Finance (MOF).
- e. Officers from the Development Division: They received requests for establishing new facilities (or projects) from the Family Health Development and Medical Development Divisions. They compiled and amended the requests (for both hospital and primary care) and submitted them to the Economic Planning Units (EPU).

- f. Officers from the Private Medical Practice Regulating Section (Cawangan Kawalan Amalan Perkhidmatan Swasta): They regulated the distribution of private healthcare facilities by granting or refusing permission to establish private healthcare facilities. This unit was under the Medical Practise Division.
- g. National Heads of Service of specialties (such as surgery and paediatrics) under hospital care: They were clinicians who were serving in hospitals while carrying out macro level resource distribution for their respective specialties' hospital service programmes throughout the country. (This group is not marked in the Ministry of Health organisation chart.)



Figure 6-1: Organisation Chart of Ministry of Health Malaysia

Source: Ministry of Health Official Website (MOH, 2013)

- 2. Eighteen (18) decision makers at state levels
 - a. Officers who were involved in hospital service resource allocation: this included allocating resources to state hospitals, receiving resource requests from district hospitals and submitting them to national headquarters.
 - b. Officers who were involved in primary care resource allocation: this included receiving resource requests from district health offices and submitting them to national headquarters.
 - c. State Heads of Service of specialties under hospital care: They were involved in the process of determining the allocation of resources for the respective services within states. They were clinicians who were serving in hospitals while carrying out macro level resource distribution for their respective specialties' hospital service programme throughout the states.
- 3. Four (4) decision makers at district/hospital levels
 - d. Directors of specialist hospitals who were involved in specialist hospital service resource allocation. They submitted resource requests to the state.
 Specialist hospitals provided more hospital beds and generally had higher bed occupancy rates.
 - e. Directors of non-specialist hospitals who were involved in non-specialist hospital service resource allocation: They submitted resource requests to the state. Non-specialist hospitals generally have fewer beds as well as lower bed occupancy rates.
 - f. District Health Officers involved in district health office service resource allocation: They submitted resource requests for Health Clinics and Community Clinics. District Health Officers from districts with larger and smaller populations were chosen.

The respondents sought after in district/hospital level were fewer because these officers were at the 'receiving end' and played minor roles at macro level resource allocation. Their inputs to the study were nevertheless important in order to triangulate the information provided by the actors at the 'distributing end' (i.e. those at national and state administrative levels) of macro level resource allocation.

All thirty-nine respondents had at least one year's experience in healthcare resource allocation. Twelve (12) of them had more than five years of experience, eight (8) had more than 10 years of experience, and four (4) had more than 15 years of experience. Table 6-6 lists the general roles and years of experiences of respondents in resource allocation. The list of specific roles of the respondents can be found in table 6-5. The specific roles were not listed in table 6-6 to avoid the respondent being identifiable. When the respondents are quoted in this thesis in later sections, their specific roles are listed out. However, the years of experience for those who had more than three years' experience and above were listed as "more than 3 years", "more than 5 years", "more than 10 years" or "more than 15 years". The specific years of experience was not listed out to avoid identification of respondents.

Codes of	Organisation Level in	Related to Hospital or	Years of Experience in
Respondents	MOH structure	Primary Care	Resources Allocation
001	State	Hospital Care	1
002	State	Primary Care	1
003	State	Both	5
004	National	Hospital Care	3
005	State	Primary Care	3
006	National	Both	12
007	National	Primary Care	5
008	National	Both	1
009	National	Hospital Care	8
010	State	Primary Care	7
011	National	Both	7
012	State	Both	1
013	National	Primary Care	10
014	National	Both	3
015	National	Both	2
016	National	Both	12
017	State	Both	5
018	State	Both	2
019	National	Primary Care	3
020	National	Both	20
021	National	Both	10
022	National	Both	10
023	National	Hospital Care	8
024	National	Both	18
025	State	Hospital Care	11
026	State	Primary Care	20
027	State	Hospital Care	5
028	State	Both	5
029	State	Both	1
030	State	Both	1
031	State	Both	8
032	District	Primary Care	8
033	State	Hospital	4
034	State	Primary Care	1
035	District	Primary Care	2
036	Hospital	Hospital	10
037	Hospital	Hospital	5
038	National	Hospital	13
039	State	Hospital	20

Table 6-6: General Roles and Years of Experience of Respondents

6.3 Allocative Process, Guiding Principles of Decision-making, and Factors Affecting the Allocative Decision

In the following sections, descriptive findings of the allocative/regulating process are presented first in Section 6.3.1. Guiding principles and factors affecting the

allocative/regulating process are then reported in Sections 6.3.2 and 6.3.3. Verbatim quotations from the respondents were provided in Section 6.3 and 6.4 as evidence of the findings. Long verbatim direct quotations were those typed in italics and put in individual paragraphs. Related quotations were put immediately after each paragraph of findings. The findings were written in a way that allows readers of this thesis to understand the thesis without the need to read the quotations in this thesis.

In some instances, multiple quotations can be found after a findings paragraph because the quotations refer to different findings or themes reported in the same paragraph. This is to avoid breaking the findings report paragraph into multiple sentences to maintain the structure and flow of the reporting.

Also, there were multiple quotations provided for a finding or theme in two scenarios. First, when the quotations were given by respondents from different levels of organisation (i.e. national, state and district/hospital). Second, when the quotations were referring to the same finding or theme but for a different type of healthcare (i.e. primary and hospital care). Here, multiple quotations were provided to affirm that the described finding or theme were likely to be applicable to different levels of the resource allocative process and to both primary and hospital care.

6.3.1 Allocative/regulating process of Healthcare Resources

In this section, the allocative process of MOH healthcare resources are broken down into establishment of new facilities or projects, allocation of financial resources to provide service and deployment of human resources. These allocative processes were not mutual exclusive. The section will end by describing the MOH regulating process on the private healthcare sector and the extent of private healthcare resource distribution determined by this regulating process. Healthcare services provided at MOH facilities include preventive, promotive, curative and rehabilitative care which encompasses different programmes for primary care (such as maternal and child care, acute or chronic outpatient care, HPV vaccination, and domiciliary care programmes) and hospital care (such as general paediatrics care, general orthopaedic care, cardiothoracic care for ischemic heart disease, and chronic renal replacement therapy programmes).

"... ...You know that our health clinics provide a comprehensive range of services. They not only provide Family Health services, they also have an outpatient component which delivers acute care, chronic care, preventive services, promoting services plus the 14 services as well like the laboratory, X-ray....."

(Officers with more than 5yrs' experience, Family Health Development Division, MOH)

As described in Section 3.2, MOH hospital care was delivered via Major Specialist Hospitals, Minor Specialist Hospitals, and Non-specialist Hospitals located throughout the country. They were under the purview of the Deputy Director-General (Medical). Resource allocation-wise, MOH hospital care was also organised into "Services or Discipline" matching respective clinical specialties or subspecialties (e.g. general internal medicine, nephrology, obstetrics and gynaecology, nuclear medicine). National or state head of those specialities were hence called National or State Head of (hospital specialty) Services. On the other hand, MOH primary care was delivery via its Health Clinics and Community Clinics network. The District Health Office managed these clinics. The District Health Office also oversaw a range of other non-clinic based public health services such as disease control, food and water safety and health promotion and prevention. Primary care and public health services were put together under the purview of Deputy Director-General (Public Health). In regard to resource allocation, different public health and primary care functions were often referred to as different "Activities or Programmes 23" (e.g. outpatient care, maternal and child services, school healthcare, disease control etc). Often, MOH officers referred to Hospital Care and Public Health as two "Programmes".

After the head of the programme making the decision on how much the money goes to each place. Then you distribute it accordingly to, for the example of 'Programme' Perkembangan Perubatan (Medical Development).

(Officers with more than 5yrs' experience, Finance Division, MOH)

The MOH allocative process was guided by the federal government budgeting system. Current budgeting system channelled the financial resources via establishing new healthcare projects or facilities and allocating financial and human resources in maintaining the established services. These financial resources were distributed in the form of capital investment to build the physical healthcare facilities such as hospitals and clinics, expenditures on consumables and utilities to run the Activities/Programmes, and remuneration of healthcare workers who provide the services.

Figure 6-2 is the schematic flow of the MOH financial resource allocative process, which was summarised from themes that emerged from the in-depth interviews. The schematic flow is explained in detail in the following three sections.

²³ Depend on context, "Programmes/programmes" could refer to Public Health or Hospital Care Programme as a whole or refer to various Activities/Programmes under Public Health Programme.



Figure 6-2: Schematic Flow of MOH Financial Resources Allocative Process

As discussed earlier in Section 4.2, provision of healthcare services is only possible when trained healthcare workers are placed at appropriate healthcare facilities with needed equipment and consumables to provide service to patients who need it. This is illustrated in the 'Healthcare Service' triangle in Figure 6-2.

The establishment of new MOH Activities/Services or facilities depended on planning and implementation of a 'development budget/expenditure' 24, while the continuous provision of existing services depended on the execution of an 'operating

²⁴ Development and operating 'budgets' are the amounts that are planned to be spent; while development and operating 'expenditures' are the amounts that are actually spent. Although these two figures (budget and expenditure) are not exactly the same, they are usually not much apart.

budget/expenditure'. The nature of development expenditure was one-off because it was capital expenditure used to build up facilities or set up new projects. At the same time, operating expenditure was 'recurrent' because remuneration, utilities and consumables were repeatedly paid if services were to be continued. 'Recurrent' did not mean that the same amount was provided every year. Operating expenditure would be adjusted according to changing consumable cost, remuneration and inflation. As illustrated by the two arrows pointing towards the 'healthcare service' triangle in Figure 6-2, these one-off and recurrent expenditures ensured all three necessary components for healthcare service provision were available.

"You know we have this 'operating budget' and 'development budget'. Okay. The 'operating budget' is something that you have to finish within that year. The 'development budget' is something that you can bring forward... ..."

(Officer with more than 5 years' experience, Finance Division, KKM)

Both development and operating expenditure, which eventually reached district health offices and hospitals, were allocated according to Services/Activities of Primary Care and Hospital Care Programmes. Hence, when the district health offices and hospitals received the budget, the portion to be spent on each Service/Activity was specified. The budget allocation at national and state level was also, in principle, confined to each Service/Activity.

"For the budget, normally they come by code. 201 is for Management, 202 is for Primary Care and Child and Maternal Health, and then the 203 is under Disease Control. The 205 is under Health Promotion. And then, they have another sub for Nutrition, Food Quality Control, Pharmacy and Engineering. So, for 201, it comes in a lump sum but normally, when we send down (to District Health Office), we already divided it... ... So, that means when the warrant goes to the district, it is only allocated to that particular district. That is for 201. So, it is same with 202 and 203."

(Officer with more than 5 years' experience, Family Health Development Unit, SHD)

When the budget for Hospital Care and Public Health Programmes could not be fully utilised due to savings or other reasons, it could be *vired25* to other Service/Activities within the Programmes. Certain financial procedures ought to be followed through for the *virement*. Nevertheless, this process of re-allocating the budget between Services/Activities involved state and national level officers of respective Programmes and took time to be completed.

"For example like what I said just now, to change the budget in between disciplines. They know there is surplus here and deficits there. We want to make it same. We need to go to the top (to apply). So the process of go to the top and come down again took a long time. But that's beyond our control. Some (approvals) are fast and some are slow.

(Hospital director with more than 5 years' experience)

It is also worth noting that, the budgeting system that was being used by the Malaysia government during the study period included "modified budget system" (1990-2010) and "outcome-based budgeting" (2011-2018) (Myers & Boothe, 2018). The researcher had asked a few experienced respondents, including finance department officers, to discuss the difference of two systems. None of respondents were able to indicate changes of the allocative process and decisions due to budgeting system.

6.3.1.1 Establishment of New MOH Facilities or Projects

As shown in Figure 6-2, development budget was, in general, crafted out based on five-yearly strategic plans which were documented in Malaysian Plans (MPs). The implementations of the MPs were carried out with yearly implementation and

²⁵ Vire is a term often use in finance or accounting, which means to transfer fund allocated for one purpose so that it can be used for a different purpose.

modification (called "rolling plans") of development projects since the 10th MP (year 2011 to 2015). Before that, it was decided at the beginning and reviewed once in every 5-year cycle (called "mid-term review"). Under the MPs, funds were given to establish new facilities or projects, or to carry out major expansion of facilities or Activities/Services. Number of "posts" of needed human resources by categories were also considered and approved at this stage accordingly.

"So, in the process of a (development) project implementation or (development) budget allocation, actually we have received a directive from EPU26 to Development Division up there, directly to Secretary General of course. So, they have indicated how much, how many billion, that being allocated for, let say for next year. Last time they gave, they approved allocation every five years, but for since MP 10 they called it rolling plan, that every year we have to do the same (approval) exercise again and again."

(Officer with more than 10 years' experience, Planning Division, MOH)

Once the facilities or projects were established and provision of services began, the required human resources were deployed or re-distributed based on the approved posts and the availability of new "bodies" (i.e. trained human resources). The financial input needed for the extra consumables, utilities, and staff remunerations was factored into the budgeting of the subsequent operating budget (as the project continued to exist and facilities continued to be used). Hence, the establishment of new facilities and projects dictated the subsequent operating expenditure in the long-term. This is illustrated as the arrow between 'development expenditure' and 'operating expenditure' in Figure 6-2.

²⁶ Economic Planning Unit (EPU) is a main Malaysia government agency responsible for preparing economic development plan for the country, including the preparation, execution and revision of five-year Malaysia Plans. Establishment of new healthcare facilities are usually planned and executed under there Malaysia Plans.

The allocations for development budget involved both "top-down" and "bottom-up" processes (illustrated as two arrows on the left of the 'development budget' box in Figure 6.2). The "top-down" process started from the setting up of a 5-yearly Ministry-level strategic plan. The Economic Planning Unit (EPU) of the Prime Minister's Department coordinated this high-level process (which the Health Minister, Secretary General, and Director General are involved) and the eventual decision was reached after a cabinet meeting and published in the Malaysia Plans. This provided broad strategic objectives, which eventually translated into projects (new or expansion of facilities or Services/Activities) in bi-yearly rolling plans by states.

"That (5-yearly MP) was decided according to EPU main broad objectives, technical objectives, and strategic objectives and so on. And then, we have Planning (Division) cascade down to Ministry. And we (Developmental Division) come out with our own Health Strategic Plan Direction and so on. This is then given to the State and yearly objectives will come from them."

(Officer with more than 5 years' experience, Development Division, MOH)

Even though it was a "top-down" process, policy suggestions made by respective MOH Divisions could be products of engagements with "people on the ground". Initiatives or suggestions of front-line services managers that had potential to be expanded into nationwide programmes were well received by the national level managers. Decisions to establish new projects or facilities in a particular geographic area were also complemented by local input for the best location within the chosen geographic area.

"When I say top down... ... there is also the engagement with people on the ground. So, this is where the State Health Department come to. So, it is an interactive process. Of course, the final decision on the plan and so on is decided by the Ministry level... ... But there is an engagement process with the people on the ground. Top down in that sense."

(Officer with more than 5 years' experience, Development Division, MOH)

"From the point of choosing the location (of building a new facility), we are the one giving input. District Health Office will give suggestion on the location... ... Then the people from Ministry will come down and check if the width of the (proposed) site is suitable... ... Another example, they said District A need to build a 1Malaysia Clinic, so we suggest the place lah"

(District Health Officers with more than 2 years' experience)

The annual determination of the priority list for implementation of development projects was a relative "bottom-up" process. District health offices submitted requests for the implementation of development projects to the Family Health Development Unit. Hospitals submitted requests to the Medical Development Unit via the State Head of Services. The Development Unit at SHD would help the Medical Care and Public Health Programmes to compile, prioritise and submit the list to Headquarters. The State Health Director, State Family Health Development Unit and State Head of Service played important roles in prioritising the requests from districts and hospitals at state level. At National level, inputs from state representatives for Programmes and national Heads of Services were sought after state by state. The Development Division coordinated this process. Eventually, Head of Programmes would prioritise between Programmes and come out with a final project priority list. That was done during committee meetings and largely by consensus. The list was then submitted to EPU.

"It (the application of new clinic from District Health Office) will go to Development Unit, and then Development Unit will go to have some sort of meetings by the committee. They will compile from Public Health, Medical, Dentistry, Pharmacy (Programmes) and everything. So, they will have a meeting at Development Unit and they will call us to be involved as Head of Programmes."

(Officer with more than 3 years' experience, Family Health Development Unit, SHD)

"At here, let's say we have received 11 requests, we will screen at this level first. We will sit down with the director (of SHD) and see which one we think we can (support) So, he will look at it according to priorities. Which one is the, people say, most 'urgent'... ... From there we will select, and we are given 'ceiling'... means certain amount of budget given by MOH... we will select the project that will be considered appropriate."

(Officer with more than 2 years' experience, Development Unit, SHD)

"The new project, each state will then send us a list of the (potential new) projects. And we told them, please prioritise. They send 30 new facilities, maybe 4 new facilities and the rest to be upgraded, please prioritise according to your needs. So, they will do it which one the most (needed). And then, we will have a meeting with Development Division, Planning Division, ourselves and all the end users. End users mean SHD. They have sent their representative. Usually, the representative they sent... the top 5 priorities... they will send the Hospital Directors (of top priorities), whatever."

(Officer with more than 5 years' experience, Medical Development Division, MOH)

"Right now, the 'screening' process (of implementation of development projects is very much on bottom up process. It starts from the lowest level of the Ministry structure,... ... the District level

and then, it goes up to the State. And State does necessarily vetting. And then it comes to Ministry. And we do the final vetting process here, bringing up to our management before send it out to Economic Planning Unit for their perusals."

(Officer with more than 5 years' experience, Developmental Division, MOH)

The list was justified by not only the broad Ministry-level strategic plans but also local factors in districts and states and was approved by EPU before it was executed. The final decisions from EPU were disseminated to MOH Divisions and State Health Departments (SHDs) with no specific justification even when the list was not identical to the one submitted.

6.3.1.2 Allocation of MOH Financial Resources to Provide Healthcare Services

The year-to-year allocations of the operating budget for all the existing programmes/services/activities were prepared by the Ministry of Finance (MOF) and debated and approved by the Parliament each year (see Figure 6-2). The "ceiling" or "expenditure target (ET)" for Programmes/Services/Activities at state level was provided after consultation with decision makers at national level. District/hospital ET was given via SHDs or State Head of Services (for hospital care). State Head of Services and SHDs, in principle, were given the authority to adjust and reallocate the budget to hospitals and district offices within Activities/Services. As mentioned earlier, between Services/Activities, reallocation of budget needed to be approved by the Finance Division before virement could be done. Operating budgets were generally based on preceding expenditure and adjusted according to increment of emolument and inflation of consumables cost. It is worth noting that the operating budget allocated (at the beginning of the year and any additional budget throughout the year) was not necessarily the same as the eventual operating expenditure (budget that is actually spent).

[&]quot;For example, vaccine, everybody is in surplus. Then my duty is to ask for permission from MOH (headquarters) to change from vaccines to other usage. I just ask permission from MOH to reverse it. Switch it from, let say vaccine to reagent."

⁽Officer with more than 5 years' experience, Family Health Development Unit, SHD)

"As you know, money is always historical budget. Actually, the money that comes to Medical Programme is already set up. When the money comes from Finance Division, it is already there. This discipline will get this much and this much, you know? And I do not make any (decision), the distribution is already been done.

(Officer with more than 3 years' experience, Medical Development Division, MOH)

"Usually, in early of the year, we will receive ceiling from the Treasury. Let's say MOH has been given RM20 billion for 2015... ... Usually, we will see to what are the budget normally allocated in the previous year. And then, we will see the trend of expenditure, to determine where more (expenditure was used). Usually if there is increment of 1-2%, it is more on emolument"

(Officer with more than 3 years' experience, Finance Division, MOH)

However, if the operating budget had run out early because of reasons such as increased workload, front-line managers could apply for additional funding during the mid-term review of the operating budget. This review was often carried out in the middle of the year (i.e. the middle of annual budget year). This is not to be confused with the mid-term review of MP, which is often carried out in the 3rd year of a 5-year MP. Often, the additional budget needed for the continuation of essential services, such as those needed to purchase basic consumables, medicines and reagents, would be approved. Some of the additional allocation distributed after the mid-term review was the portion of annual MOH operating budget which was reserved by the national or state level administration at the beginning of the financial year. The Finance Division purposely practised this "two-stage" allocation of the annual budget because this allowed current-year adjustment of operating budget which was predicted a year before. Similarly, some managers at state level also reserve a small portion of the allocated budget as a small back-up fund for any district or hospital that incurred unplanned expenditure.

"You should request on something that you must have it to run the services. But, some people want technology thing, better ultrasound, 3D, this and that... ... So, there are people asking for syringe pump, got people asking for monitor. which is a must now? If we have money, we always go for, we always try to give them the things that they need to run the service."

(Officer with more than 3 years' experience, Medical Development Division, MOH)

"In our HQ level, we distribute the budget by two times; in the early year, this amount and then, in the second half, this amount... ... This is because we need to study back this operational budget... ... Let's say you need the money in 2016, you have start to prepare and apply by 2014. In 2015, there will be a long process of how to present the budget, how to get the budget. And maybe the prediction in 2014 for 2016 is not accurate. So, in the mid of the circle, we try to review back what the actual need is. This is our perception."

(Officer with 2 years' experience, Finance Division, MOH)

"When I dished out (operating budget), I didn't give all to district. I reserved around twenty percent with me. Because, let say something bad happened to a district, at least I have some reserved to give. If I don't have, I have to take from somebody else."

(Officers with more than 5 years' experience, Family Health Development Unit, SDH)

In a situation where operating cost was foreseen to have substantial increment due to

a larger or more experienced work force, augmentation of patient loads, or plans to

expand certain services, extra budget would be applied through "New Policies" (Dasar

Baru)27. Once a New Policy is approved, the amount needed would be added into the

subsequent years' operating budget.

"When the New Policy request comes, we send it out to everyone. Now, everybody (i.e. Head of Department/Service in each hospital) will get the New Policy (request) and everybody will submit (their request). Each of them will submit to their (Head of) state and then I'll allow their (Head of) state to prioritise by state so by times it comes to me it already has been prioritised state by state.

(National Head of Service with more than 5 years' experience)

"Usually budget allocated are same (with previous year) except those with New Policy or Oneoff approved. This is because New Policy is carried forward from the previous year and we will add the allocation for subsequent year"

(Officer with more than 3 years' experience, Finance Division, MOH)

Interviews with officers in the Finance Division revealed that operating budgets could

be adjusted and reviewed according to actual operation need on the ground annually and

five yearly. When there was savings in the operating budget, whether due to better

²⁷ In Malaysia government budgeting system, the budget needed to fund long-standing (as opposed to one-off) activities or programmes were categorised into "Existing Policy (*Dasar Sedia Ada*)" or "New Policy (*Dasar Baru*)". For example, to build a new hospital or start a new clinical service next year, allocation has to be approved and given as a "New Policy" in next year budget. As the new hospital or the new service are expected to continue functioning in the subsequent years, allocation will need to be given under "Existing Policy" in the following years.

efficiency or discontinuation of some services, it could be reflected in subsequent budgeting. However, this process involved the coordination among end user, state and national officers for the respective programmes. Despite these mechanisms, most of the non-finance officers still described the process as "historical". This is depicted in the selffeedback loop of the Annual Operating Budget in Figure 6-2. It was perhaps due to the difficulty in implementing this "long way process".

"Actually, in our final perception, actually we want to know what your need is and what your shortage is. These are two important things that we need to know... ... This is a 'long way process'. Everything will come from the end user. The end user will discuss with PKD (District Health Office), and then later JKN (State Health Office). If they want to involve the Heads of Activity (of Public Health or Hospital Care), they can do so."

(Officer with more than 2 years' experience, Finance Division)

"They (non-financial division MOH officers) should review. Sometimes the way that they do things, probably... ... I mean, is there any savings? Sometimes that kind of treatment is not being done anymore, they should review lah because they keep asking for extra allocation every year. They should review the process lah... ... The enforcement of it is not strict enough. I mean the every five-year review (of operating budget).

(Officer with more than 10 years' experience, Finance Division)

The operating budget allocation was not only mostly described as "historical" but also often described as "incremental". This is again illustrated in the self-feedback loop of the Annual Operating Budget in Figure 6-2. The reasons of "incremental" budgeting might be due to (a) persistent annual increment of MOH expenditure from 2005 to 2014 (MOH, 2016c, p. 19), in which study respondents served most of their years, and (b) increment of population size during the years the respondents were involved in budget allocation. Procedural wise, the MOH budgeting system itself might also contribute in perpetuating incremental expenditure as (a) the New Policy would be introduced every year according to expansion of services and added into the subsequent operating budget, (b) "performance" of managers were often tied to ability to spend the allocated budget (in which savings were not particularly lauded or might even be seen as incompetency in planning), (c) managers inclined to avoid the challenge of managing with decreased budget in following years after savings (because of "historical" allocation of budget

according to expenditure) by not having savings in current year, and (c) managers opting

to spend the potential savings rather than going through the "long process" of virement to

reallocate funds to other Services/Activities.

"Operating budget, usually it is based on what we have spent a year before (i.e. Current Policy), and plus the New Policy... ... based on what you have spent for the hospital last year, then they top up maybe another 10% or something."

(State Head of Services (for hospital care) with more than 15 years' experience)

"The budget is given top-downed by headquarters and SDH largely based on last year expenditure. There are usually 5-10% increased to the expenditure of previous year. If the total state hospital care budget decreased, usually hospitals of same categories (i.e. non-specialist, minor or major specialist hospitals) will get the same cut proportionately."

(Hospital Director with more than 10 years' experience)

"They (non-finance divisions officers) said that they would get penalised if they were not spending... It is not like you will be rewarded for not spending. I don't know whether it is because our budget system or what... So, all will try to spend whatever that is allocated, including on items which are not necessary (in order to finish the budget).

(Officers with more than 3 years' experience, Finance Division, MOH)

"But sometimes, when we people just spend 50 percent, but deliver 100 percent, they don't get the recognition... ... if they managed to fund well but deliver the same amount as people that double their funds, they should get some rewards for that. But because our thinking in government if you don't spend 100 percent, you don't do your work. If you spend 100 percent, yes you do it."

(Officer with more than 10 years' experience, Finance Division, MOH)

6.3.1.3 Deployment of Human Resources across MOH facilities

As healthcare services provision is 'labour intensive', more than half of the MOH operating budget was used to pay for remuneration of staff. Fifty four percent (54.2 %), 62.9% and 63.1% of the operating budget were estimated to be spent on emolument in 2015, 2016 and 2017 respectively (MOF, 2015, 2016). Operating expenditure for emolument followed the numbers, categories and ranks of the deployed healthcare workers. Making sure the staff were paid timely according to their salary schemes was one of the top priorities of the government in allocating the operation budget. The MOH operating budget allocation was designed to always have enough funds for remuneration allocated to hospitals and district offices. Hence, the allocation of emolument for human resources was largely "untouchable". The managers were not allowed to adjust the

payment of monthly remuneration. One exception was the operating budget for 'overtime' for MOH staff that operated outpatient departments or clinics outside normal office hours. It could be adjusted by restricting or increasing 'overtime' operation hours.

The deployment of human resources depended on newly recruited healthcare workers, the need for more staff, and the availability of staffing posts at healthcare facilities. Most of the healthcare workers recruited, including medical officers, nurses or paramedics such as physiotherapists, were distributed from national pool to states, and then deployed by SHDs to districts or hospitals. Specialists and management officers were the minorities that were deployed directly to healthcare facilities or district or state health offices by MOH headquarters.

"OK, basically before the meeting (of deployment of new staff), we have two sources (of data referencing). Frist, it's from our Human Resources (Unit), they have database. So, they will look at their database and see where are the vacancies. At the same time, we will ask for the information from hospital directors regarding who is more critical (in terms of staff shortage)... ... from there, we will decide which hospital need more staff at that time"

(Officer with more than 1 year's experience, Medical Development Unit, SHD)

"The allocation of new 'bodies' are largely allocated from Headquarter to SHD and then from SHD to hospitals. Depends on the categories of staff, the allocation of staff will be done by supervisor of each categories of staff at SHD and facility level."

(Officer with more than 10 years' experience, Hospital Director)

If additional human resources were needed (e.g. based on increment of workload) in certain facilities but posts were only available in others, state offices or national headquarters might facilitate short-term staff re-deployment. It was done by 'borrowing' the posts from facilities where the needs of new staff were less critical. The deployment could then be formalised by 'relocate/change of details' (*pindah butiran*) or through allocation of a new post.

"If you need more, I give you more. You don't need staff, I don't give you staff.....But those days, when (there was) a lot of vacant posts, I would ask for reallocation of the post.....I took the post from where they have less patient, less load. So I tag there and I distribute... ...We call it 'amending details'... ... And we also have new post request. For that, we have to analyse if after the 'amending details' still not enough, then we put in request of new posts. We have to justify that (request of new post)."

(Officer with more than 5 years' experience, Family Health Development Unit, SHD)

Each new project or facility establishment was planned in detail including the number and type of healthcare workers required. Hence, whenever there were new projects or facilities being established, new posts were usually provided. On the other hand, MOH also regularly and on an *ad hoc* basis allowed managers to request for new posts in accordance with growing staffing needs. The application for new posts was also prioritised within Programmes, Services and Activities at state and headquarters level. Head of Programmes, Services and Activities were consulted in the prioritisation of new post applications.

"If there is new programme or new building, Ministry (headquarters) also gives (new posts) also. So from the top, it already know where to give (new posts), programme and facility. But at the same time, they also... Responsibility Centres (Pusat Tanggungjawab, PTJ; i.e. District Health Office, Hospitals) have to make application as well."

(Officer with more than 5 years' experience, Human Resources Unit, SHD)

For example, like we were instructed to develop for domiciliary care services. So we came out with our plan. This year, how many clinics. Next year, how many clinics. With that, there is an expansion of the programmes. We also look at the numbers of human resources required to run the program... ... Like, for example, how many officers, yes, we tell them, we want these officers

(Officer with more than 5 years' experience, Family Health Development Division, MOH)

"Establishment of posts, usually when Responsibility Centre want to request for new posts they will send the application to us for us to compile together (for the whole state). After that we will bring it to the meeting which are attended by Head of Programmes. We will discuss again... ... He/She (Head of Programmes) will comment on what is needed and what is not."

(Officer with more than 5 years' experience, Human Resources Unit, SHD)

However, there was a general perception that the establishment of new posts were not

keeping up with the demand of new staff by MOH medical facilities managers. The choice

of phrase of "who is more critical" (instead of terms such as "where it is needed"),

perhaps, implied the 'chronicity' of MOH human resources shortage.

"But what is requested by Responsibility Centres and what is being (deploy) down (from headquarter) are usually not same lah. We usually request a lot but only get a little bit, don't we?"

(Officer with more than 5 years' experience, Human Resources Unit, SHD)

"But I think there are needs to have a lot of improvements in the central Ministry in terms of keeping up to the number. Because I think, too many... ... nobody knows who is there, who has

gone, who has come, how many post is there. So the post is usually... the number (of posts) is always lower than your actual needs. That means, the way your workload goes (up) is faster than your post."

(State Head of Service, more than 15 years' experience)

"We will ask from all departments. What is their requirement and plan (for new posts). After that hospital will decide which one is actually the **critical** part. And then we send (to SHD) lah."

(Hospital Director with more than 5 years' experience)

The process of regular new posts applications appeared to have gone through some changes in recent years. District health offices and hospitals were no longer asked to submit applications for new posts in the last two years (from the interview). There was no clear indication on the reasons for the change. This change in policy put the responsibility of requesting posts into the hands of state health offices. Surprisingly, the district office and hospital managers largely welcomed the changes. Perhaps, it was because few posts were given despite repeated applications which involved a large amount of paperwork.

"Towards the end of the year, we have to sit down, we have to see the filling of posts (i.e. how many vacancies left), we have to see the performances of our district, of each Health Clinics and then we have to fill up the ABM 8 (application form for new posts) which is to me time consuming lah... ... we no longer do that... ... state is doing it and they will ask how many posts do you want and where you want to put... ... There is not much different between the new and old process though"

(District Health Officer with more than 2 years' experience)

"Yes, that one is the old 'ABM' (Anggaran Belanja Mengurus; i.e. application process for new posts under 'Maintaining Expenditure Estimation')... ... Very thick book and all that, nobody want to read, nobody want to see. (After sending the applications) Something (i.e. some posts) comes down, but frustrating."

(Officer with more than 5 years' experience, Medical Development Unit, SHD)

Sections 6.3.1.1 to 6.3.1.3 described the allocative process of MOH healthcare resources. As illustrated in Figure 6-2, the distribution of healthcare resources started from the allocation of the development budget in the form of establishing new facilities or projects. The established facilities and projects dictated where the healthcare services would be provided and where the healthcare workers would be deployed. As the allocation of the operating budget was largely historical and incremental, distribution of

development expenditure had long-term effects on the distribution of operating expenditure in the subsequent years. However, this does not mean that allocation of the operating budget was not adjustable at all.

6.3.1.4 Regulating Distribution of Private Healthcare Resources

As described in Section 3.5.2, MOH had the power to regulate the establishment of new non-clinic private healthcare facilities, according to the principle of ensuring equitable geographic accessibility to services. MOH used this clause to prevent inequitable distribution or over-concentration of private healthcare facilities, such as hospitals and haemodialysis centres, in any geographic area (see more in section 6.4). Other than that, the government had no authority to influence the distribution of healthcare human resources or private healthcare expenditure across the states directly.

This "zoning" power of MOH on non-clinic private healthcare facilities was not extended to the establishment of new clinics, which were meant for providing primary care. The decision was reached because the relevant stakeholders did not think "zoning" of private clinics was necessary. It was believed that the "market force" mechanism would allow private primary care doctors to decide where to practise and, at the same time, ensure people have access to primary care. The relevant stakeholders, which included healthcare practitioner associations and private sector representative, agreed for such an arrangement when the Private Healthcare Facilities and Services (PHFS) Act was drafted.

(Officer with more than 10 years' experience, Private Medical Practice Regulating Section, MOH)

[&]quot;So, what they feel at that time it should be allowed as a market forces to decide where the doctors want to set up private clinic because it basically just a primary care. So, people must have access to primary care."

[&]quot;... It (i.e. clinics) is a simple facilities, in that sense lah. It provides outpatient services. So and at that time ermm, when during the drafting of the law itself, the stakeholder does not want it to be zoning, in that sense, because they are saying that at that time, there are shortage of such facilities, such services... ... the stakeholders at that time comes from the drafting committees, the

drafting committees comes from the private sectors as well, their representatives from the private sectors, from the professional bodies as well, including Malaysia Medical Association."

(Officer with more than 10 years' experience, Private Medical Practice Regulating Section, MOH)

The acceptance (or rejection) of applications to establish non-clinic healthcare facilities was considered periodically by MOH. The information submitted were verified by relevant officers before the applications were tabled in the evaluation committee. The meetings were conducted on a monthly basis. The committee comprised of representatives from different Divisions such as the Planning Division, Pharmaceutical Division, Dental Service Division and National Head of Nephrology Services (for the application for Haemodialysis Centre) and was chaired by the Deputy Director-General (Medical). The committee then provided recommendations of acceptance or rejection to the Director-General (DG) of Health.

"So, here, our officers actually process... ... because we are going to verify (the information provided in application)... ... The formal procedure we have to present it to the evaluation committee and this evaluation is actually monthly... ... We send the recommendation to our Director General (after committee evaluation), and then we prepare... we said when we process these are the things that we'd taken into consideration. So we 'support' or otherwise."

(Officer with more than 10 years' experience, Private Medical Practise Regulating Section, MOH)

As stipulated in the PHFS Act, the DG of Health held the power to approve or reject applications. On the rare occasion that the DG was not satisfied with the recommendation, he would usually send the application back to the committee for review with suggested considerations.

"So, normally our Director General will read our proposal. Most of the time he agrees. But then in certain area he asks us to consider 'other matter'... ... if you read under section 9 (of PHFS Act), he has... the E -- "other matters". So, sometimes, he just suggests that we can consider this thing. So, they send back (to the committee). But most of the time actually, he will depend on our suggestion."

(Officer with more than 10 years' experience, Private Medical Practise Regulating Section, MOH)

If the applications were rejected, the applicants could appeal to the committee, or to the Minister of Health. In both situations, the applications were reviewed based on the additional information or justifications provided by the applicants. "Based on my experience, minister rarely actually contravene the DG's decision. But then, maybe what actually minister does, they discuss actually... other matters. Normally the applicant will add in more information why they want to appeal. But then, if they provide similar information, normally the same decision will be maintained."

(Officer with more than 10 years' experience, Private Medical Practise Regulating Section, MOH)

In order for an application for the establishment of new facilities to be approved, the

minimum staffing requirement had to be met. Through this mechanism, private sector

healthcare workers' distribution was regulated to a limited extent.

"When you submit Form 1 (approval for establishment), you have to explain to us regarding the (human) resources that you are going to hire, to provide this (service). So indirectly you mention about how many physicians, how many surgeons, how many nurses, how many this one. When you applied for the licence then we have ratio, we have norms. Like for example acute services, ICU, CCU -- you have to provide one to one nurse. And then it depends on your discipline -- you have to provide post basic. If for O&G, for example, we (ask for) midwifery (post-basic training), for haemodialysis the post-basic (training required) is dialysis."

(Officers with more than 10 years' experience, Private Medical Practise Regulating Section, MOH)

"If the hospital wants to provide such a service or in a certain discipline, there must be a specialist readily available lah... ... So in that manner, it... the specialist or the consultant or the doctor must be there lah... ... Likewise in term of the nurses there's a norm with regards to the number or the service provided... ... So the norms is, let say for example, 1 nurse to 4 beds of patients. So, for that matter the allocation is based on the norms lah."

(Officers with more than 10 years' experience, Private Medical Practise Regulating Section, MOH)

This section described the limit of MOH's regulating power on private healthcare resources. MOH regulation could restrict over-concentration of non-clinic facilities in some areas and indirectly lessen the over-concentration of private sector human resources and financial expenditure in those areas. However, distribution of private clinics and primary care work force and financial expenditure were left to market forces.

6.3.2 Guiding Principles and Determinants of Allocation

Section 6.3.1 is the report on the process of allocating MOH resources and the process of regulating private resources distribution were reported. In this section, implicit and explicit rules, principles and values upheld during the allocation processes were described. Themes emerged as guiding principles and factors were later summarised in Figure 6-3 and Table 6-7 in Section 6.3.2.7.

6.3.2.1 Geographic Planning Units and Catchment Areas

The allocation of primary care resources, as explained earlier in Section 2.2 and 8.3.1, was being done through SHDs and District Health Offices to MOH Primary healthcare facility network, which included Health Clinics, Rural Clinics, and 1Malaysia Clinics. The basis of the allocation was, in general, according to the administrative boundaries of district. Each district was covered by a number of Health Clinics.

"... there are some discrepancies but generally speaking, we do tend to follow the administrative district (in arranging the coverage of district health office) and when there is a change in the administrative district, usually we will ask for that change in Health District (in accordance to the administrative district)"

(Officer with more than 5 years' experience, Family Health Development Unit, SHD)

The distribution of the hospital care network had largely achieved the "one district, one (non-specialist) hospital" and "one state, one specialist hospital" objectives for Peninsular Malaysia.

"Last time, our mutual understanding was, 'at least we have one district hospital.' I think we have almost covered that except in Sabah and Sarawak whereby for that district itself has very scanty population. If you establish a hospital also, there won't be enough patient, you know."

(Officer with more than 15 years' experience, Planning Division, MOH)

"We already come to the stage where every state has already got a hospital. And we has also achieved every, almost every, district (with at least one hospital). I think there is only remainder of two districts which are relatively new, new develop district."

(Officer with more than 15 years' experience, Planning Division, MOH)

Since then, the policy focus was to ensure accessibility of specialty and sub-specialty hospital services. After decades of planning and development since the 3rd Malaysia Plan (1976-1980), major specialist services were not only provided at state referral hospitals but also established at other larger hospitals throughout the country. It was explicitly documented in the Specialty and Subspecialty Services Strategic Framework of MOH that the first two major guiding principles of distribution of specialty services were related to geography (MOH, 2011b, p. 7). First, where there were enough specialist or subspecialists, the services were to be provided for every state. MOH set the target of

providing a minimum of 20 resident specialty services and 25 resident subspecialty services in Hospital Kuala Lumpur (National Referral Centre) and each of the 13 State Hospitals under the 10th Malaysia Plan (2011-2015). Fewer resident specialty and subspecialty services were also set for other 26 Major Specialist and 27 Minor Specialist Hospitals respectively. As of August 2011, the availability of target services in Hospital Kuala Lumpur and State Hospitals were of variable degrees from 17 to 41 services (out of the target of 45). On average, 70.3% of target services were available then (MOH, 2011b).

Second, where there were not yet sufficient human resources to be deployed to each and every state, the services would be developed according to six geographic regions throughout the country (MOH, 2011b, p. 7). The concept of regionalisation of hospital specialist service started as early as the 3rd Malaysia Plan. For the distribution of specialist and subspecialist services developed over subsequent Malaysia Plans and at the end of the 8th Malaysia Plan (2001 to 2005), Peninsular Malaysia was divided into Northern, Central, Southern and Eastern regions and East Malaysia was divided into Sabah and Sarawak. Each peninsular state was included in a region except Perak, which was covered by both the North (northern part of Perak) and Central region (southern part of Perak). Each region was to be provided with 26 identified specialty and subspecialty services.

Taken together, the policy of 'one district, one hospital' for non-specialist hospitals and the policies of 'specialty services for each state, where human resources are enough' and 'specialty services for each region, where there were no sufficient human resource for every state' for specialist hospitals, geographic administrative boundaries were clearly the basis of planning and distribution of MOH hospital care services. The population needs of these administrative boundaries were used in the justification of priority setting in establishing MOH hospitals (see more on population needs in Section 6.4.2.3). In this sense, administrative areas were the "catchment areas" for MOH hospitals resource allocation. Nevertheless, there was no strict restriction for people to seek MOH services outside the district and state in which they reside.

For regulation of establishment of private hospitals under the PHFS Act, a different perspective of catchment area was adopted. It was published in the MOH zoning guideline that the 30 km radius around a private hospital in Peninsular Malaysia was considered its catchment area. A fifty kilometres radius was applied for a private hospital in East Malaysia. A similar MOH zoning guideline indicated that the 30 km radius around a private haemodialysis centre was considered its catchment area.

"... the applicant need to submit 'feasibility study' of proposal of establishment of private hospital which includes the following details... (a) List of all private and public hospitals and amount of hospital beds situated and (b) Estimation of population (in the coming 3 years) contained, within 30km (50km for Sabah and Sarawak) radius of the proposed location"

(Section 2 (v), Application Procedure of Zoning (Location) Approval for Establishment of Private Hospital, Version 2, Published since 1st October 2015)

""... ... the applicant need to submit 'feasibility study' of proposal of establishment of private hospital which includes the following details... (v)(a) List of all private and public haemodialysis centres/units including those in public and private hospitals (and the total of dialysis chairs) which is located within 30km from the proposed site (of establishment)"

(Section 2 (v), Application Procedure of Zoning (Location) Approval for Establishment of Private Haemodialysis Centre/Unit, Version 2, Published since 1st October 2015)

This section has demonstrated that geographic area was the basis of distribution of healthcare resources. MOH's primary healthcare network was structured and administrated according to district and state administrative boundaries. MOH hospital care services were again distributed according to geographic areas such as district (for non-specialty services), state (for specialty and subspecialty services) and 'regions' (for rarer subspecialty services). Private non-clinic facilities were regulated in a way that there would be no over-concentration of facilities in geographic areas of a certain radius from the proposed facility site.
6.3.2.2 Basic Values and Principles

From the interviews, principles or values described as guiding the resource allocation decisions and process, were identified. The values guiding allocation decisions were those used to justify the prioritisation of one allocation instead of another. The principles guiding the allocative process described were those used to determine how the allocative process should be.

Decision makers quoted **norms** of clinic type and size and hospital beds to catchment population ratio as guides to establishing or expanding new MOH facilities. For the regulation of establishment of private hospitals, maximum hospital beds to population ratio was also used as an allocation criteria, on top of the geographic catchment area described earlier.

"The needs, when it comes to primary care facilities, usually it's based on the population size. This is because for Rural Clinic, for example, right now, it is 1:4,000 population. When it comes to a Health Clinic, it is 1:20,000 population."

(Officer with more than 5 years' experience, Family Health Development Division, MOH)

"... ... just a guide and mutual agreement between us and Family Health Planning Division. Ok, let say Type-3 Health Clinic, between 25,000 to 30,000 population. Anything above 30 000, between 30,000 to 50,000, we say Type-2 Health Clinic. More than 50,000 population we build Type-1 Health Clinic."

(Officer with more than 15 years' experience, Planning Division, MOH)

"Our baseline, guideline will be our bed population ratio, then the clinic population ratio... ...Now we have started to increase our bed population ratio to about 2.5. That's what we want to achieve by 2030... ... It (this new norm) is supposed to be in the next RMK"

(Officer with more than 15 years' experience, Planning Division, MOH)

"7. The factors that among others being considered in the zoning process (for the establishment of private hospital) includes 7.2 the need of healthcare services and facilities for an area that is 2.5 beds : 1000 population in the radius of 30 km in Peninsular Malaysia and 50km for Sabah & Sarawak"

(Section 7, Application Procedure of Zoning (Location) Approval for Establishment of Private Hospital, Version 2, Published since 1st October 2015)

Furthermore, the **norm** of human resources to facility size ratio was used when considering creation of new "posts". Hence, the population size determined the size of the facility and in turn guided the human resources that could be deployed.

"What we do is we have our own facility norm (for number of specialists) where we ourselves develop it... ...we somehow put certain numbers, so that we can achieve."

(Officer with more than 5 years' experience, Medical Development Division, MOH)

"Effectiveness" and "cost-effectiveness" not only guided the introduction of new methods and technology, but also helped to rationalise the allocation of hospital care resources. The latter was important in justifying allocation of additional hospital resources to underserved densely populated urban areas, rather than establishing a new hospital in a less densely populated area with no existing services. MOH decision makers also felt that the regionalisation of subspecialty services helped to improve accessibility in a cost-effective way, as compared with setting up services in every state.

"Expansion of service can be because of the better technology, Safer, and **more cost-effective** and more efficient... ...when you want to introduce of course we have to spend a bit, but in long run you gain more."

(Officer with more than 5 years' experience, Medical Developmental Division, MOH)

"For example, we have written the new policies to change the methods for reading Pap smears slides... ... We know that liquid base is efficient compared to conventional method, so we manage to get that approved. Basically, that is something a new technology that is **more effective**."

(Officer more than 3 years' experience, Family Health Development Division, MOH)

"If we build (the health clinic) but its utilisation is low, that's a loss. So we will find where we think the residencies are dense. And for example there is school, there is Public Higher Education Institution, where we think after we build up the clinic, the usage and utilisation will be satisfactory."

(District Health Officer with more than 2 years' experience)

"If a lot of state asking for the same thing, what we'll do is (to ask): can we lump all of yours together? Instead of giving state-by-state, we make it regional. So instead of 10 states, can I make it into 3 regional areas? You see, so that, the service is being made available, but not at every place. But, rather in a place where it is accessible, but at the same time cost effective."

(National Head of Services with more than 5 years' experience)

When allocating resources to new Programmes or Services, MOH decision makers would prioritise those bringing an **impact to a larger population**.

"(We prioritise) where the benefit is to a larger cross section of the population, than the benefit is very small group. Okay. Let's say now talk about this service. So one group asked (us) to setup a centre. Another group asked (us) to set up another centre. Now which is going to benefit the population more?"

(National Head of Services with more than 5 years' experience)

When considering establishing new MOH facilities or projects, **sustainability** was an important factor to be considered. Also, for the regulation of establishment of private hospitals, one of the objectives of "zoning" was described as ensuring sustainability of the established private hospital.

"Usually, where there is an application, there will be a research on suitability and needs for establish a health facility in that area."

(Officer with more than 3 years' experience, Family Health Development Unit, SHD)

"To ensure that established private hospital can get better development which is viable with fair competition"

(Section 6.3, Application Procedure of Zoning (Location) Approval for Establishment of Private Hospital, Version 2, Published since 1st October 2015)

While "effectiveness" and "cost-effectiveness" were important criteria in prioritising, the value of **equity** was also factored in. Equity was described as everyone getting the same treatment or services according to their illness, regardless of their geographic location (rural or urban). Equity was also described as ensuring **accessibility** of services regardless of **physical** (travel distance) or **financial** (ability to pay) barrier. Physical and financial accessibility are described in turn in the following paragraphs.

Regionalisation of hospital subspecialty care was one of the key national level policies to improve accessibility of services. One of the general objectives of the Specialty and Subspecialty Services Strategic Framework of MOH was to "improve access to Specialty and Subspecialty Services appropriate to the needs and resources available" (MOH, 2011b, p. 6). For MOH officers, 'regionalising' subspecialty services distribution increased the accessibility of people to such services. Patients throughout the country could acquire services at the nearest regional subspecialty centre. Otherwise, patients would have to travel to Hospital Kuala Lumpur (as the national referred centre for most specialties), which is located in the centre of the west coast of Peninsular Malaysia.

"for example we start with IJN (i.e. National Heart Institution) (to provide) the cardiology services. Everything was in IJN, right? People flew in from Sabah and Sarawak... ... So, now we have ten hospitals that provide the cardiology services... ... So, Sabah people don't have to fly in to Kuala Lumpur, Sarawakians can stay in, and the people in North will go to Penang, people in South can go to JB... ...that cuts a lot of the patient travelling, that is the **accessibility**."

(Officer with more than 3 years' experience, Medical Development Division, MOH)

"For example, for every region, we want to have a complement of, like a regional centre, we want to have a full complement of subspecialty that are available in each region. So you don't have to be sending patient all over... So now we are aiming to try and find all these regional centres and identify to build up. So that's how we based on the equity in terms of distribution la"

(State Head of Services with more than 15 years' experience)

MOH services were also made available in rural populations despite a relatively sparse

population, to ensure accessibility of services for the rural population. Logistic factors

such as mode of transport available in the geographic area were considered in determining

the physical accessibility of services.

"Equity means fairness for your whole population that they get what other people get as well because they are living in the town, isn't it? That means they are ill at the same time. Ok, this illness, like kidney failure does not respect any geography. That means it can happen in the village, it can happen in the town"

(State Head of Services with more than 15 years' experience)

"If look at the Klang Valley, you look at the hospitals and clinics, they are all bursting with the needs... ... at the same time, you cannot ignore the needs of the people in the **rural population**. There might not many people there but there is an interest in **equity** and all that. Because we are very equity based. Government philosophy is very much based on the equity."

(Officer with more than 5 years' experience, Developmental Division, MOH)

Physical accessibility was quoted by numerous decision makers as the principal value upheld in the process of allocating MOH healthcare resources and regulating the distribution of private healthcare resources. It was explicitly expressed in document that the principle of ensuring equal access to haemodialysis centres was one of the objectives of 'zoning' (i.e. regulation of establishment of new haemodialysis centres). "We also (allocate resources) based on the geographical access. Even though a smaller population might be less than 20 000, but in term of **accessibility**, they have a very difficult accessibility like no road they have difficulty to **access** by boat and all that, so we say, never mind, we need to establish a static clinic there. But a smaller version because the population is small."

(Officer with more than 15 years' experience, Planning Division, MOH)

"I believe that when they draft this regulation (for the regulation of establishment of private healthcare facilities), this act, this requirement, they take into consideration of the WHO requirement. Then the accessibility, equitability... ... Because I believe that Malaysian intention is actually to ensure that all the people have **accessibility** to get that (i.e. health services).

(Officer with more than 10 years' experience, Private Medical Practise Regulating Section, MOH)

"7. The purpose of zoning for the establishment of private haemodialysis unit or centre is being carried out for: 7.1 encourage private sector establish private haemodialysis unit or centre yang more needed area and help the Government to ensure equal **accessibility** to private haemodialysis unit or centre which is in line with the wish of World Health Organisation"

(Section 7, Application Procedure of Zoning (Location) Approval for Establishment of Private Haemodialysis Centre, Version 2, Published since 1st October 2015)

As the country became more urbanised, logistic consideration such as connection via

public transformation for urban MOH facilities were emphasised to ensure the

accessibility of services for the urban poor. Urban traffic congestion was factored in, as

it weakened the accessibility of patients to facilities located in congested areas. Provision

of MOH services in urban areas, which were not short of private service providers, was

to ensure the physical and financial accessibility of service for the urban poor.

"On one hand, we have the urban population who is poor... we got quite (a lot of) **urban poor** here. That is becoming a problem... That is the big challenge."

(Officer with more than 5 years' experience, Developmental Division, MOH)

"Because to build a clinic, you must have access of the public to the clinic. So, that is another consideration... ... We must make sure there are public transportations. There are some areas that we already set up facilities where there are no public transportations. So, it becomes complaint."

(Officer with more than 5 years' experience, Family Health Development Unit, SHD)

"If I want to, say, I want to look at the (private) clinics (when decide on MOH clinics locations), Klang valley doesn't need clinic. But isn't it if you look at the reality, all (MOH) health clinics have overflow (of patients). Why? Because not everybody has access to private clinic. This is **financial access**. Now issue here, is issue financial access."

(Officer with more than 15 years' experience, Planning Division, MOH)

It is thought that more **subjective** judgement was required in making decisions that was in line with the equity principle (as compared to objective criteria such as effectiveness and cost-effectiveness). In contrast, other decision makers found that **objective** measurements such as a resources to population ratio should be used in evaluating the equity of resource distribution.

Of course, like I said, we can be as objective as we want. But, once you hold on the equity principle, *it is never easy to be objective all the time*.

(Officer with more than 5 years' experience, Developmental Division, MOH)

A paper on the equity of manpower (for my specialty) in the whole country was prepared... ... So based on the calculation of population, we would see glaringly the ratio of doctor to population is very deficient in certain areas... ... because they asked how can you say subjectively, so we have come with the **objective** way... ... Our equity is -- we based on statistics. Something have facts that nobody can argue."

(State Health of Services with more than 15 years' experience)

It was well understood that to achieve equity in resource allocation, cost-effectiveness sometimes needed to be disregarded.

"(Businessman) will never dream of set it (dialysis centre) up in Kota Tinggi (a relative smaller city). He won't make any money from it. But the government has the second responsibility; it is the equity, isn't it? That means even though you make loss of it... ... equity means fairness for your whole population that they get what other people (those living in the bigger town) get as well."

(State Head of Service with more than 15 years' experience)

Besides "equity", many mentioned "**fair**" or "**fairness**" as their core principles in the decision-making process. When asked to elaborate, being fair commonly meant to allocate proportionately according to some indicators or factors that usually represents the health needs of the people. It also meant the same criteria should be used for everyone, be it in deployment of human resources or the allocation of additional resources according to financial prudence of managers.

"By right has to took into states with more workload (and give more allocation)... ... have to be fair and follow work load"

(Officer with more than 5 years' experience, Human Resources Unit, SHD)

"Well, most of the time they will look at the population... ... So they **proportion** out, so usually Perlis will be the least. Labuan (a state with least population) will get the very least. Johor and Selangor will get the higher proportion because of the (larger) populations."

(Officer with more than 3 years' experience, Family Health Development Division, MOH)

"(for deployment of specialists), we said okay, please go for six months. After that, you can apply to come back and I will give you the place. ... It is difficult because it is not just that person; we have to see the spouse, the parents and the children. So, we have to relook at all things... ... And a lot of people maybe don't like us and we try to be **fair** to everybody."

(Officer with more than 10 years' experience, Medical Development Division, MOH)

"the principle is, we have to be **fair** to all, I think we just use that principle la. Fair to all. And if you don't know how to spend, we will take back the money... ... I say, I am not being fair to other district if I give it to you... ... other people, they control their budget, spending wisely and all that. You (are) so lavish, for what I want to give you (the allocation)?"

(Officer with more than 15 years' experience, Family Health Development Unit, SHD)

Other decision makers acknowledged that consistency of the decision-making process

was important when it came to the deployment of staff.

"Okay so we have to be fair at all level (weather the application of transfer is from hospitals or from individuals. The most importantly we must be **consistent** (in how we make our decisions)."

(Officer with more than 5 years' experience, Medical Development Unit, SHD)

As described in the above section, norms (of resource to need ratio), effectiveness, cost-effectiveness and impact (of services), sustainability (of new facilities or projects) and equity were the principles upheld when making allocative decisions. For MOH decision makers, equity meant there should be no physical and financial barriers for people to access needed healthcare. While some opined that subjective judgements were needed to achieve equitable allocation, others thought a fair distribution could only be achieved by using objective criteria and a consistent allocative process.

6.3.2.3 Population Health Need

Population healthcare need was an apparent factor considered in the allocative process. Various needs factors had been identified. **Population size** of the catchment area was the primary reference for most of the resource allocation. The number of general population was used in justifying the allocation of operating budget to facilities and in the prioritisation of establishment of new facilities. It was assumed that the larger the population, the higher the general health needs.

"There are 13 states... ... So, we divide it (i.e. operating budget allocated). Our state always gets X%. In terms of population wise, we also have X% out of the whole population So, we always compare about it, per capita. So, if they will allocate you about X% of the total, then we shut up (and not asking for more)."

(State Head of Services with more than 10 years' experience, MOH)

"Hospital services in Malaysia, most of the patient, for inpatient care, a lot of people will seek care at our (MOH) hospital... ... So, when the **population** increases, the demand also increases. It is simple, isn't it?"

(Hospital Director with more than 5 years' experience)

"Two years ago, there was an attempt to have a GIS (Geographic Information System) for our Primary Care facilities. We put into the database, the private facilities, our Rural Clinic, our IMalaysia Clinic as well as Health Clinics. And then, we can **map it to population size**.."

(Officer with more than 5 years' experience, Family Health Development Division, MOH)

Local population change such as development of a new township was an important indicator considered at the meso-level of priority setting. Input of local population

changes from District level managers was important because macro population projection

done by the Department of Statistics might not well reflect those local changes. Aside

from studies conducted by District Health Offices, local governments or authorities

played an important role in providing information on changes in local demography.

"Let's say there was a research said the population in that area actually had doubled maybe due to **housing area**. Then, the existing facility cannot cope with the additional number in that area. So, that is why they identify that as an area for clinics and all that"

(Officer with more than 3 years' experience, Family Health Development Unit, SHD)

"Demand comes from the population increase. Is there any **new town** or **new university** or whatever? The burden of diseases and of course, the facilities nearby."

(Officer with more than 5 years' experience, Medical Development Division, MOH)

"The population number we get it from Statistic Department and also projection (of population change)... ...sometimes the **local authority** develops that area not as what actually been projected by the (Department of) Statistic. So, we do consider actually if they have additional information on that area."

(Officer with more than 10 years' experience, Private Medical Practise Regulating Section, MOH)

"(When choosing location for new clinic, we consider) whether it is a growth area, whether there is any plan for **State Government**, for example, to bringing up the area as a growth centre? And so on. These are the criteria that we look at"

(Officer with more than 5 years' experience, Planning Division, MOH)

Size of specific population group is used in the allocation of operating budget for services that involve a specific population group. For example, allocating a budget for disease screening for newborns and allocating a budget for maternal health services for productive age women.

"But what we have done quite recently... ... We want the budget to be more for example like (screening of) congenital hyperthyroidism (at birth). So we have looked into the budget that we have distributed to the states, it must be based on the (number of) newborns in the states.

(Officer with more than 3 years' experience, Family Health Development Division, MOH)

"That (number of population) is affecting (the allocation of budget) through the Maternal and Child Section (under Family Health Development Unit). So, based on their **population** -**reproductive age group, estimated live birth** of each district, the allocation will be depending on those"

(Officer with more than 1 year's experience, Family Health Development Unit, SHD)

Besides the above, burdens of disease and mortality and morbidity rates among the

populations were also indicators used by MOH decision makers in allocating recurrent

expenditure or in prioritising establishment of new programmes.

"And then the **burden of disease**, because when you compare among **patients** in District A, B, C and D, it is far more than District E. So, we consider that (as having more needs)."

(Officer with more than 5 years' experience, Family Health Development Unit, SHD)

"if you look at our **morbidity** and **mortality**, the IHD (Ischemic Heart Disease) is coming up really high, cancer is also coming up, industrial pollution, urbanisation, the psychiatric problem is also coming up... ... another thing that we now focus on a lot of emergencies and trauma"

(Officer with more than 10 years' experience, Family Health Development Division, MOH)

"Workload and then density of residents and also **incidence of disease**.... Cases which need attention such as **maternal and child death** also... based on **workload** also (to justify the application of more posts)"

(District Health Officer with more than 2 years' experience)

In some instances, MOH officers used utilisation data as the proxy of population need.

Workload data such as patient loads, number of attendances to outpatients, waiting time

and bed occupation rates of existing MOH healthcare facilities were often considered as proxy of population needs for their catchment areas. Other than current or recent data, projection of future workload was considered as well, especially in the allocation of human capital resources, because the deployed personnel would serve at the facilities for the long term.

"I really use a lot the written workload (when I distribute staff). And I try to make an average. Let say District A, your average **daily patient per doctor**. Di Daerah B, average daily patient (per doctor). For all the health clinics, I will calculate."

(Officer with more than 5 years' experience, Family Health Development Unit, SHD)

"We take in total, what is our clinic attendance, what is our **BOR** (Bed Occupancy Rates). And based on that we will see when is enough or when is our bed not enough la."

(State Head of Services with more than 15 years' experience)

"I mean during the Special Director General (meeting), they discuss There are so many factors. For example, like waiting time; you see the **waiting time** is too long, you know, you have to add (more allocations)."

(Officers with more than 5 years' experience, Finance Division, MOH)

"Okay we know that human resource is a capital in any industries... ... So we must put prioritise. Not only based on (current) data, but based on another 5 years **projection**"

(Officers with more than 5 years' experience, Medical Development Unit, SDH)

Allocations were also prioritised according to the general purpose of expenditure. Usually expenditure related to **patient survival**, **safety** and **services** were prioritised over expenditure on non-life saving treatments or on administrative purposes. For servicerelated expenditure, **essential** reagents for laboratory test, medicine and consumables, and basic equipment needed to ensure continuation of existing service were given priority over more advanced and non-essential modalities. Allocations to **maintain existing services** were prioritised over those to set up new services.

"Another thing about budget is that every midyear review, we can ask for budget... ... Usually, after so many years in states, number one, if you ask for medicines, guarantee you will get. You ask for reagent... guarantee you will get. Consumables... guarantee you will get. But you don't ask for anything else. These three things to run for a program, guarantee you will get them"

(Officer with more than 3 years' experience, Family Health Unit, SHD)

"The, we prioritise... ... we have to look at the patient first. If its office upgrade, usually we will bring down (the priority) After that, in terms of safety... Usually our hospital will look at safety first."

(Officers with more than 3 years' experience, Medical Development Unit, SDH)

"Our job is to **save life** isn't it? So, the first thing you better make sure you have enough money to save lives first, correct? That is the basic principle... ... But then, the second will be the quality of life... ... The cardiologist is likely to get a lot of money because we know, if we don't deal with it, he will die."

(State Head of Services with more than 25 years' experience)

"We always feel that **if you already started the service, we shouldn't stop it**. You have started a service and now, the equipment is broken down or cost is not enough. So, that is a priority. But, if somebody wants to expand or want to start something new, he says let me start these services here. I think that is not being a priority compared to this"

(Officer with more than 3 years' experience, Medical Development Division, MOH)

Additional allocations needed following **emergency events** or **disasters** were usually given priority. State and National level managers usually kept a small portion of allocation with them in case of these events. These extra expenditures sometimes would

encroach into planned allocation to other services or programmes.

"Unless there will be so called emergency project, **emergency**, **disaster**, we will top up from the Unit level because we do keep some money here"

(Officers with more than 5 years' experience, Family Health Development Unit, SDH)

"Sometimes because there were **outbreak** or **disaster**, we used whatever money and pump into that. So to replace whatever that we have used, we have to slow down a bit in implementing what was approved earlier."

(Officers with more than 15 years' experience, Planning Division, MOH)

For the approval of establishment of private haemodialysis centres, number of (endstage renal failure) patients in the area was considered 'current need' and 10% of Diabetic Mellitus patients at risk of developing renal failure was considered 'future need'. These were explicit rules stated in the Zoning Application Guidelines for Private Haemodialysis Centre. (MOH, 2015a)

"Current need for haemodialysis service in a proposed area depends on the number of existing patients and new patients which need the service. Future need for haemodialysis service depends on the number of diabetic patients in the area (10% of patient with diabetic mellitus are considered high-risk in getting renal failure)"

(Section 8.1 & 8.2, Application Procedure of Zoning (Location) Approval for Establishment of Private Haemodialysis Centre, Version 2, Published since 1st October 2015)

From the above section, it is obvious that population health needs was a major consideration in resource allocation. MOH decision makers saw population size (of each locality or specific groups), burden of disease (including morbidity and mortality rate) and workload data (such as patient numbers and bed occupancy rates) as indicators of population needs. MOH decision makers also prioritised patient survival, patient safety, essential and existing service, and emergency or disaster when there were multiple needs but limited resources.

6.3.2.4 Existing supplies

The available healthcare resources had a complex influence on additional resource allocation. Factors such as **existing hardware and software capacities** set limits to allocation of additional resources. For example, expansion of service was only possible when there was enough space in existing facilities, while establishment of a new facility or project was only possible when there were enough trained healthcare workers.

"Let say, emmm, Medical Development Division has sent specialist, the specialist is coming back next year. So that project is priority, how can you allow specialist come back, (but) no specialty (programme or facility) for them to work? This is, things like this lah. We are matching (the human resources with establishing of new programmes/facilities), match everybody."

(Officer with more than 15 years' experience, Planning Division, MOH)

"When it comes to (setting up new) services, it is not only the specialist, it is also the nurses, the equipment, and the space. And all these need to be considered."

(Officer with more than 5 years' experience, Medical Development Division, MOH)

Administratively, the **availability of vacancy** (or "posts") was also a prerequisite of deployment of "body" of human resources. However, higher-level managers could get

around this temporarily by "transferring bodies"₂₈ between facilities that were under the managers. Anyway, these deployments had to be "formalised" periodically by transferring existing posts or creating new posts. (See more quotes in Section 6.3.1.1 deployment of MOH human resources)

"They apply through Human Resources (Unit), and then the Human Resources (Unit) will table it in the committee meeting. But, Human Resources (Unit) will also provide to us with the number by state, the number of filled posts. How many posts (available), how many posts are already filled up? And with that, we will then approve the (deployment of) medical officer based on the vacancy

(Officer with more than 10 years' experience, Hospital Development Division, MOH)

The availability of government-owned land was an important prerequisite for the

establishment of new facilities. This was an often-mentioned hurdle for establishing new

health clinics in urban areas.

"When you put up this project, is the land available? You know, if the land is not available, you have to solve the land (problem) first... ... Because if you approve (this project) for this year also we won't be able to implement, because no site."

(Officer with more than 15 years' experience, Planning Division, MOH)

"We have so called certain criteria that have been set for project identification. One, it must have land, that is the most important criterion. If you don't have land, then automatically the project is rejected. We never submitted that to EPU because EPU guidelines are also very clear. You must have land and the land must be written up with a title. The land must be already registered to the Land Commission."

(Officer with more than 5 years' experience, Development Division, MOH)

The unavailability of existing resources was not always a restrictive factor. In instances

where programmes could be rolled out by partly sharing existing facilities, human

^{28 &}quot;Body" refers to the person that is employed and deployed to fill up the "post" (i.e. vacancy) available. The "post" is often facility- and programme-specific. When a manager re-deploys a person to another programme or facility which is not aligned to the scope of the original post, the person or "body" is "transferred" (but the "post" is still as the original scope). Hence, this practice is termed "transferring bodies".

resources and operating budget, the **existing resources** facilitated the allocation of additional resources. Allocation of additional resources optimised the usage of existing resources. In this case, available resources justified the allocation of additional resources.

"Some of the activity you can already absorb (part of the expenditure). For example, if we do services at home, you know domiciliary care, part of the services that we do would be like taking sample of glucose (level), Hb (haemoglobin level), for example. All of this you can account it in the other (programme's) reagent (budget).

(Officer with more than 3 years' experience, Family Health Development Division, MOH)

"The running of the clinics, at district level, there are a lot of resources. Not only from Family Health Section, not only from Family Health Development Division. We have resources from Diseases Control, also from Foods (Food Safety and Quality Division) it will also reach the clinics. Not in terms of budget and money, but in terms of resources, like reagent, our rapid test kit for HIV... ... So actually, to certain extend, we are sharing budget."

(Officer with more than 3 years' experience, Family Health Development Division, MOH,)

"You already have specialist and you've also planned which hospital you want to put. So, anything they need is equipment (for the specialist at that hospital). So, that becomes a priority."

(Officer with more than 3 years' experience, Medical Development Division, MOH)

The overall budget that was made available for New Policies limited the number of

new programmes or services that could be introduced each year. In rare instances that an

external fund was available to fund specific new MOH project, the project would be on

high priority as MOH only needs to utilise minimal existing resources (such as providing

specialists support).

"You can ask for as many as fifteen new policies a year. It depends, you see. But at the end of the day, it depends on the budget that our government has and also I think basically it depends on whether the stakeholders feel that that programme is of priority and a worth of national interest, I guess."

(Officer with more than 3 years' experience, Family Health Development Division, MOH)

"Unless they are willing to come out with funds... ... they said they are getting sponsorship from Company A. Then we said by all means... ... We can now support you with other things. You know. Balance good... ... that's a win-win situation."

(National Head of Service with more than 5 years' experience, MOH)

In our dual public-private healthcare system, another important consideration during

MOH healthcare resource allocation was the availability of other public non-MOH and

private healthcare resources. Most of the respondents, but not all, suggested that the

establishment of new hospitals took existing beds of all sectors into account; while the establishment of Health Clinics only took existing MOH clinics into consideration. Availability of private clinics was not taken into account because MOH Health Clinics were thought to be providing more comprehensive services than private clinics. However, the establishment of 1Malaysia Clinics 29 in areas with existing private clinics were generally avoided because the scope of primary care services covered by 1Malaysia Clinics was more limited than MOH Health Clinics.

"We will read through in terms of the population, the existing **hospital** available, existing beds available in the **private sector** and also the government sector. And based on that, we will see whether there is a need for a hospital there... ... If you look at other district, smaller district, they are basically served by the government hospital lah. Because, I think it's not lucrative for the private sector to build hospital there. So, we have to take the lead to provide the service there."

(Officer with more than 15 years' experience, Planning Division, MOH)

"Demand, it is more on demand and supply. Where the demand is coming from? So, the demand, as I said, it comes from... ...and of course (the supply), the facilities nearby. Is there other **private hospital** nearby? Is there our own (MOH) hospital nearby? We do not to duplicate because we want to optimise our resources.

(Officer with more than 5 years' experience, Medical Development Division, MOH)

"Clinics, we are, is a bit more tricky. Because, for clinics, we don't look into the private sectorWe are not looking at the private sector because the private sector is providing is not a comprehensive service. They are providing mainly outpatient service, based on demand. So, we want a comprehensive service, one stop centre for our health service lah."

(Officer with more than 15 years' experience, Planning Division, MOH,)

"(To decide which **1Malaysia Clinic** application were given priority, we) Check whether (the application) fulfils the requirement for its area. There are a few parameters. First, the area must be urban, urban poor, not so close to (private) general practitioner. There are two three more criteria..."

²⁹ In general, 1Malaysia Clinics were small clinics run by Assistant Medical Officer (*Penolong Pegawai Perubatan*) and provide treatment for uncomplicated acute illness on outpatient basis.

(Officer with more than 15 years' experience, Family Health Development Unit, SHD)

Some other officers claimed that they disregarded the private sector's presence during establishment of MOH hospitals and clinics because not everyone could afford to pay for private services.

"And then, like I said, also the funding. You know, a lot of money that private hospital is taking (from patient to provide treatment), **not everybody can afford**. Not everybody can afford to take insurance, private insurance. That is the reason why sometimes, we tend not to look at the private sector expansion in our planning of government infrastructure, public health infrastructure, we tend not (to) look at it."

(Officer with more than 5 years' experience, Planning Division, MOH)

"But it depends, because not all people in the town are rich. We have **urban poor**; therefore that is why they went for 1Malaysia Clinics... ... at least you can give access to those urban poor. So, that is something to me, something laudable which does give some improvement to equity."

(Officer with more than 5 years' experience, Family Health Development Division, MOH)

The difficulty in ascertaining the financial accessibility to private facilities seems to be the major reason that private facilities availability was not (or was only partially) considered in the allocation of MOH resources. It was also hoped that a healthcare financing reform that "merged the public and private" system could eventually "optimise the utilisation of private facilities". This would perhaps provide a solution for the dilemma of distributing MOH resources with or without consideration of private sector resources.

"Actually, so far, we have not done that (i.e. considering availability of private facilities) yet. Obviously, the private hospital is blossoming. They have not settled the problem of the government hospital "bursting at the scene" (i.e. overcrowding of government hospital)... ... Also the funding, you know, a lot of money that private hospital is taking (from patient), not everybody can afford. Not everybody can afford to take insurance, private insurance. That is the reason why, sometimes, we tend **not** to look at the private sector expansion in our planning of government infrastructure, public health infrastructure."

(Officer with more than 5 years' experience, Development Division, MOH)

"But, if you look at our health system, ok, we have the private sector and government sector run parallel and they not much of complimenting each other. So, when we build government hospital, there is always a demand for that. Because you are actually drawing the patients from the private sector. Ok, so the demand is always there. But we always do planning based on the availability of the facilities readily available in the area. Ok, either private or government. Because at the end of the day, what we plan is to have these two systems merge and we can optimise the utilisation of facilities. Ok, so that is also coming lah."

(Officer with more than 15 years' experience, Planning Division, MOH)

On the other hand, the existence of both public and private facilities in the area was

considered for the acceptance or rejection of the establishment of new private hospitals

and haemodialysis centres.

"So, basically the concept is that to establish such facilities, we have to look into the need of such facilities within the locality where the population are and actually compared to the other existing facilities, similar facilities, that provide similar services."

(Officer with more than 10 years' experience, Private Medical Practise Regulating Section, MOH)

"(Submission of) Feasibility study for the request for the establishment of private hospital with the following issues presented: (a) listing all public and private hospital (together with number of beds)"

(Application Pocedure 2. (v), Application Procedure of Zoning (Location) Approval for Establishment of Private Hospital, Version 2, Published since 1st October 2015)

"8. The issue that is being considered during the zoning including: 8.1 the level of the existing haemodialysis facility or service by considering (a) number of haemodialysis chairs in government hospital (and number of patients and treatment shift); (b) number of haemodialysis chairs in private (and number of patients and treatment shift; and (c) number of haemodialysis chairs in licensed private haemodialysis centre)....."

(Section 8, Application Procedure of Zoning (Location) Approval for Establishment of Private Haemodialysis Centre, Version 2, Published since 1st October 2015)

This section has demonstrated that the availability of existing resources such as trained workers and facilities could be either restricting or promoting factors for allocation of more resources. Available staffing posts and earmarked external fund encouraged allocation of more resources. Due to different service coverage between the public and private sector and financial barriers in assessing private healthcare services, the availability of private resources was inconsistently considered during allocation of MOH resources.

6.3.2.5 The individual factors

Some individual factors and characteristics also influenced the allocation. Firstly, the **preferences of individuals** were taken into considerations in order to keep a happy workforce.

These individual preferences appeared to be one of the reasons of mal-distribution of

MOH human resources. This not only influenced the deployment of "bodies" but also

informed the establishment of new "posts".

"For human resources deployment, even though we have circulations... sometimes, it is difficult for us to follow because human resources... obviously involve personal feelings... ... let say we are firm, you cannot go to City A, you have to go to City B, sometimes it makes the staff unhappy... they express it on social media, they put the dissatisfaction on newspaper... ... these are challenges for us"

(Officer with more than 1 year's experience, Human Resource Unit, SHD)

"Also same for the nurses. We look at what's her post-basic (qualification)... ... If we don't put her at where she doesn't utilise her post-basic (qualification), sometimes they make noise... ... If you are put at where you have the post-basic (qualification), they will be paid (extra) allowance."

(Officer with more than 1 year's experience, Human Resource Unit, SHD)

"Some of the (medical) officer prefer cardiothoracic (surgery specialty). So, we can specify the hospital which has this (specialty) activity (and send him there). If he is interested in haematology..... from there, we look at what's the (medical) officer's request."

(Officer with more than 1 year's experience, Medical Development Unit, SHD)

"We are human, you know? Human has different needs, has parents, has their kids, and has different issues that are attached to human. And while we want them to be at that place, they can say no, they cannot go. So, in the end, one place has more. That is why we have like, "geographically missed", what they call it? The "mal-distribution". Because we also need to see the person needs. If the person is not happy at that place, he will not give 100%"

(Officer with more than 10 years' experience, Medical Development Division, MOH)

"We will adjust (the allocation of human resources to) where the most required place are. Of course, we want to put Sabah and Sarawak. But, even I put the post in Sabah and Sarawak, people are not going there. So, we tally it (i.e. post) in a way that what is the number of people ("the body") going there. So that, the vacant posts still can be utilise maximally. So, there is a lot of thought process going. It is not simple as like there is not enough people, so create the posts."

(Officer more than 5 years' experience, Family Health Development Division, MOH)

On another note, the negotiation skills and efforts of the individual managers play an

influential role. The managers who put in the extra effort to lobby for allocation or who

had better soft skills were more likely to get what they asked for.

"Our people, our doctors, do not know how to negotiate. They are very straight forward.....But, when you move into a manager post, there are a lot of things that you can get if you know how to communicate and negotiate. You need to network (with others), you need to communicate (with others). Your political skill needs to be there"

(Officer with more than 5 years' experience, Medical Development Division, MOH)

"We are using not only political, we are using certain channel. We discuss with central agency. We discuss with Public Service Department (which dedicate how much human resources MOH can get), we request the time, for us to go there and discuss with them."

(Officer with more than 5 years' experience, Medical Development Division, SHD)

"Actually, you need to keep on in a good side with the people who are doing the allocation lah. Or else, they might forget about you. You have to keep... you have to make sure you have good terms with the person who does the allocation, right? Otherwise, you might get nothing at all."

(State Head of Service with more than 15 years' experience)

6.3.2.6 External Influence

Stakeholders outside of MOH also contributed allocation decision at various levels,

via different routes and forms. Agencies such as local authorities and state governments

were engaged by MOH district and state officers. Their opinions were brought up through

the "bottom-up" process. Researchers at universities and non-government organisations

(NGOs) were consulted at National level during the process of drawing up policies. Local

communities could also channel their interests through MOH hospital and Health Clinic

Advisor Panels30 and their elected representative (i.e. Member of Parliament or State

Assembly Representative).

"Civil society, their input, we have our, what we call that, Advisor Panel for our hospital, our district health offices, all that. And they are also giving input on what project they think is... the requirement for their constituency or district or mukim (i.e. sub-district geographic administrative area)"

(Officer with more than 15 years' experience, Planning Division, MOH)

"Input and also **UPEN**, **State Economic Planning Unit**. They will give input to State Health Department. So when we receive a list from SHD, it has all input from State Economic Planning Unit and also state government lah, state government. So we match lah and we try to rearrange lah. that is the process"

³⁰ Advisor Panel constituted of appointed representatives from local community and MOH healthcare facility. Its role was to facilitate communication between facility and local community (MOH, 2002).

(Officer with more than 15 years' experience, Planning Division, MOH)

"Normally, we encourage the State (Health Department), before they send (priority list) to us, to engage with these **people on the ground** because normally the **stakeholders are on the ground**... *At least, they are aware and their interest has been taken care of.*"

(Officer with more than 5 years' experience, Medical Development Division, MOH)

"In this area, they have an **established community channel** of information from grassroots to the district office... ... They have what do we call it, **Village Head**. Through them... and then they will bring to the sub-district. Sub-district will gather the information and bring to the district office. So the District Officer will bring this, the people's voice to the State (Health Department)."

(Officer with more than 5 years' experience, Medical Development Unit, SHD)

"Yes, there are always the stakeholders outside the Ministry in every decision we made. If I run programme for 'Child to Elderly', when I called the Children Technical Meeting because we want to make technical decision, there will be kindergarten people, police people, because they are related to child problem and the adolescent....During the meeting, there are a lot of discussions, contributions, ideas, and comments, so there will be the actions. Sometimes, it escalates (into national policy)."

(Officer with more than 10 years' experience, Family Health Development Division, MOH)

"So, I think we need to see as a whole at State and need to re-map the area for the future. I am sure that in **Development Unit at State (Government) level**, there will be a planning on new cities development. So, we (State Government) need to plan together with the Health Sector Under State Government, the **Town Planning Unit**... ... This means (establishment of) clinic must be parallel with the State Government planning. Must be coordinated."

(Officer with more than 5 years' experience, Family Health Development Unit, SHD)

"We also bring in the **universities**. We bring in all the public universities in this service into our progress meetings at times, because they also provide service. And now as of last year, I have also invited Ministry of Defence."

(National Head of Service with more than 5 years' experience)

Political influence appeared to be more noticeable in the establishment of new

facilities and deployment of human resources. Strong professional leadership and written

policy forbidding external influence in human resources helped in reducing the impact of

such influence.

"And also the political, our country is more of incline towards that. So, we do have certain requests from certain, you know, that will influence the posting (i.e. human resources deployment) towards the needs of the individuals. But our role is to give to the committee what we feel is the right thing. But, of course, somehow, it will be influenced by other external factors which we cannot do anything. So, this is giving rise to that mal-distribution."

(Officer with more than 10 years' experience, Medical Development Division, MOH)

"Constituency boundary, it is different from administrative boundary. So, they (elected representative) tend to make sure that their constituency has got some forms for health facilities.

That's a challenge for us. Other than that, I think, some because of political mileage, they make promise with people, without consulting us, you know, and then they try to fulfil the promise."

(Officer with more than 15 years' experience, Planning Division, MOH)

"Because now actually unit integrity SHD has written there (in official notice): 'cannot use external influence...' so we disseminate that notice and now looks like no more (such external influence)

(Officer with more than 3 years' experience, Medical Development Unit, SHD)

"So whoever using the 'support letter' we will give (him/her) warning. Using 'cable' (i.e. connection with influential person) whatever we will give out warning letter as well... ... Yes we usually has no problem with the influence from outside for our decision (on deploying staff) because our director... doesn't care about (influence from outside)"

(Officer with more than 5 years' experience, Human Resources Unit, SHD)

For the establishment of new MOH facilities, MOH managers and decision makers

would go through the needs assessment, feasibility study and allocation request process

to justify or prioritise the political request. Nevertheless, when the political influence was

in tandem with the decision maker's priority, then political influence was welcomed or

made used of by the decision makers.

"Sometimes, of course if the Minister visits the area, there would be some promises. But, usually we would still be getting the feedback from the Programmes whether they actually need it or not... ...Although there are the political influences, we will still be getting the real needs for the projects before we apply to EPU"

(Officer with more than 1 year's experience, Development Division, MoH)

"But, you must understand also since a lot of decisions are politically motivated. That is the truth. We cannot run away from that, right? Everything is politic. It is how best you overcome those things... ... And the (state) Chief Minister will inform (state health director) that I want this hospital, things like that... ... They will write justifications and all that. If it doesn't fall in our plan, we tell that it doesn't fall in our plan... ... But we tell them. There is always a room for discussion, for negotiation."

(Officer with more than 5 years' experience, Medical Development Division, MOH)

"We throughout the year, we will receive application letter from elected representatives to build, that's request from the people. Still we go and look at our programme lah.... ...in fact, it is true that our clinic is overcrowding. So we actually now (it is overcrowded) and we reply lah, we are now we are in the process of developing new clinic for that area, bla bla bla. So they accept it lah. Actually, that is in our planning we need to increase the number of Health Clinics for the area where population is very high-density population. That is in the pipe line lah."

(Officer with more than 15 years' experience, Planning Division, MOH)

"Not necessarily all the political wish we have to... I mean have to entertain lah. Depends on matching, for me the matching our policy, matching our service. But, like (the example) just now, elected representative help to (request for) upgrade for our Health Clinic, that we surely welcome lah!"

(District Health Officer with more than 2 years' experience)

"And then, you can see politicians have another intrigue. But sometimes, it does benefit you. But sometimes, it doesn't. So, when it benefits you, you shut up (and accept/support the request)."

(State Head of Service with more than 15 years' experience)

Non-MOH stakeholders' influence on allocation of MOH operating budget was less

apparent. Anyhow, the macro MOH development and operating budget plans were

heavily directed by EPU and MOF and were mandated by Ministers and the Cabinet.

Ministers and Cabinet members are politicians elected to office.

"Like I mentioned to you, the mandates (are influences from outside MOH). And also, NBOS (National Blue Ocean Strategy; from Prime Minister Department). That is not within the Ministry of Health but they actually great influence our processes... ... No, no. Politicians, not really (influencing the allocation of operating budget). That maybe (is true) in terms of, like, infrastructure, yes. Because I, remember, I was basically in charge of programme and there will be no special programme for you (i.e. individual politician). No. If you want it like that, then it should be for a country program."

(Officer with more than 3 years' experience, Family Health Development Division, MOH)

"Political influence will get from the Parliament. There will be a lot of decision from the Parliament; that is the political (mandate). We will have a lot of decision from Cabinet meeting, because the Cabinet meeting is turned up by our Minister, so the Cabinet decision will be brought to the Minister when he chair our meeting every week. So, that is the political decision."

(Officer with more than 10 years' experience Family Health Development Division, MOH)

Sometimes, public outcry or discussions in the mass media brought attention to lack

of certain funding. This kind of public pressure often facilitated the allocation of funds.

It is because we don't treat them, they die. So, that goes into the paper. The politicians get involved. It becomes a big emotional with the relatives go and seek newspaper... ... we get what we want to save lives. So, the family not complaining that he hasn't that kind of treatment, isn't it right?

(State Head of Service with more than 15 years' experience)

"Some times in certain condition we receive grumbling..... sometimes those things, it was added with roles from media, newspaper, tv... so it become a polemic to us. So, we have to carry out a survey to answer back the issue, and at certain level, we have had to fulfil their request. Meaning that not because of other reason, but due to residence's insistence"

(Officer with more than 2 years' experience, Planning Unit, SHD)

This section showed that MOH officers and the deployed healthcare workers themselves might exert some influence on allocative decisions. External engagements were actively sought from NGOs, healthcare experts and local communities. Political influence could come in the forms of 'requests' or government mandates. MOH officers dealt with these types of influence mainly during the process of establishing new facilities and deployment of work force.

6.3.2.7 Summary of Guiding Principles and Determinants of Allocation

The guiding principles and determinants of allocation that emerged from the interviews are summarised in Figure 6-3 and Table 6-7.



Figure 6-3: Determinants of Allocative Decision

Key Themes Emerged	Related Sub-Themes	Notes		
Geographic Planning Units	Regions	Unit of distribution of specialty and subspecialty services		
	States	Unit of distribution of specialist hospitals		
	Districts	Unit of distribution of (non-specialist) hospitals & health clinics		
	Radius of Geographic Area	Unit of establishment of private non-clinic healthcare facilities (e.g. hospitals, haemodialysis centre)		
Basic Values and Principles	Norms	Such as population-to-facility ratio, facility-to-staff(or vacancy) ratio		
	Effectiveness, cost-effectiveness, larger population	Rationale of introduction of new treatment services, facilities, and health Programmes.		
	Sustainability	Rationale of private facilities "zoning"		
	Equity - physical accessibility	Rationales of private haemodialysis centre "zoning", rural area MOH facilities establishment despite lower cost-effectiveness, and specialty and subspecialty services "regionalisation"		
	Equity - financial accessibility	Rationale of establishment of MOH facilities at areas with rural and urban poor.		
	Fair and consistent	Using same principle/criteria to all involved parties over time		
Existing Supplies	Available healthcare workers vacancy	Pre-requisite of human resources deployment		
	Available government-owned land	Pre-requisite of establishment of new MOH facilities		
	Capacity of existing facility/human resources	Could either limit of facilitate the establishment of new services/facilities		
	External fund	Would generally be given priority if external fund secured		
	Existing private and non-MOH public facilities	Informing establishment of MOH facilities		
	Existing public facilities	Informing establishment of private facilities		
Table 6-7, Continued				

Table 6-7: Determinants of Allocative Decision

Key Themes Emerged	Related Sub-Themes	Notes
Population Health Needs	Population size	These were often used as proxies of population health needs
	Change of population size	
	Size of specific population group	
	Burdens of disease, mortality and morbidity	
	Workloads of facilities	
	Patient survival, safety ,and services (vs administration)	These were often prioritised
	Essential and existing services	
	Emergency events or disasters	
Individual Factors	Preference of Individual	Preferences of healthcare workers were considered during deployment
	Negotiation skill and effort	Skill and effort of officers helped in obtaining desired allocation
External Influence	Stakeholders outside of MOH	Local authorities, state governments, university researcher, non-government organisations, MOH facility Advisor Panels and local elected representatives were engaged
	Political influence	Influencing establishment of new facilities and deployment of MOH human resources. It could be mitigated by strong professional leadership
	Economic Planning Unit, Ministry of Finance, Minister, Cabinet	Determining MOH overall development and operating budget

Not surprisingly, it appeared that the healthcare resources were distributed, either by direct allocation of MOH resources or indirect regulation of distribution of private resources, over different levels of geographic planning units such as regions, states, districts, or within certain radius of geographic areas (Section 6.3.2.1). The allocative/regulating processes were guided by a heterogenic group of principles and values (Section 6.3.2.2). Many of the principles and values were operating on the basis of the above-mentioned geographic units. For example, population-to-facility ratio was applied on district basis when new Health Clinics were to be established. Existing supplies of healthcare resources (Section 6.3.2.4) and population health needs (Section 6.3.2.3) greatly informed the allocative decision. Again, existing supplies and population health needs were often defined according to the geographic units. For example, existing healthcare facilities or services in a specific geographic area informed the establishment of new facilities or services in the same specific geographic area. Hence, the circles of "basic values and principles", "existing supplies" and "population health needs" are adjacent to the circle of "geographic planning units".

Lastly, individual factors from MOH officers (Section 6.3.3.2) and influences external to MOH (Section 6.3.3.1) could contribute to the healthcare resource allocative decisions. In general, these two themes mainly emerged in conversations when the respondents were probed by the interviewer, and do not often relate to geographic units. Hence, the circles of "individual factors" and "external factors" are not immediately adjacent to the circle of "geographic planning units".

It is worthy to note that the three most experienced respondents in this study had been involved in resource allocation for more than 20 years while eight others had more than 10 years' experience. They did not indicate any major changes of the above-mentioned allocative process during their years of involvement in resource allocation. The geography-based healthcare resource allocative/regulating process has been sketched out in Section 6.4. The next concern is to examine if there were potential areas of improvement to ensure equitable MOH allocative/regulating process.

6.4 Evaluating MOH Healthcare Resource Allocative/Regulating Processes

The objective of this section is to examine MOH practises in allocating human resources, operating and development budget according to four conditions of accountability for reasonableness (A4R).

As discussed in Section 2.2.10, A4R is a conceptual framework developed by N. Daniels and Sabin (1997, 1998). It was suggested that the resource allocative process could be considered legitimate or fair if the four conditions of A4R were met (N. Daniels & Sabin, 1997). The four conditions of A4R (Norman Daniels, 2008) are relevance, publicity (or transparency), revision (or appeals), and regulation (or enforcement). The definitions of these four conditions are listed in Table 6-8.

Relevance:	The rationales for limit-setting decisions should aim to provide a
	reasonable explanation of how the organisation seeks to provide
	"value for money" in meeting the varied health needs of a defined
	population under reasonable resource constraints.
	Specifically, a rationale will be "reasonable" if it appeals to evidence,
	reasons and principles that are accepted as a relevant by ("fair
	minded") people who are disposed to find mutually justifiable terms
	of cooperation.
Publicity (or	Decisions regarding both direct and indirect limits to meeting health
Transparency):	needs and their rationales must be publicly accessible.
Revision (or	There must be mechanisms for challenge and dispute resolution
Appeals):	regarding limit-setting decisions, and, more broadly, opportunities for
	revision and improvement of policies in the light of new evidence or
	arguments.
Regulation (or	There is either voluntary or public regulation of the process to ensure
Enforcement):	that above three conditions are met.

Table 6-8: Conditions of Accountability of Reasonableness (Norman Daniels, 2008)

As briefly described in Section 1.5, the four conditions are set to ensure a fair allocative process (see *publicity, revision, regulation*) rather than to provide objective criteria for fair allocation outcome. This is because "fair allocation" is a value-laden concept which individuals with different values may disagree on what principles should be used (i.e. distributive fairness). Hence, no "external" fair-distribution criteria are used here to examine the process. Instead, the "rationale" is deemed to be fair if it is accepted by the entrusted decision-makers (see *relevance*).

Based on the interview findings, the MOH allocative/regulating processes of healthcare resources in Malaysia are evaluated in the following four sections.

6.4.1 Relevance

At MOH (headquarters) level, the priorities and allocations were largely decided during discussions and meetings between stakeholders from different divisions and from states. The principles and guiding factors used in the processes were described in previous section. The decisions were often described as "**mutual agreement**" and "**consensus**". The decisions were often made during meetings among national level Programme managers, and between national level managers and state level managers for each Programme.

"During the interaction (with SHD) we call also the program, so we match. Sometimes we will find that some project which is identified by us is not in the project list, and sometimes the project which is important to them is not in our list. Sometimes like that. So we interact each other and get the agreement. **Mutual agreement** that is important."

(Officer with more than 15 years' experience, Planning Division, MOH)

"Another challenge is like you said, it is difficult to get more. Like Medical Development Division, they will say they are the most important programme here. But as you know, even Public Health Division, Pharmaceutical Division, sometimes they have their own justification why they really need the project. So, coming out with the priorities is one of the main challenges. But, I think, at least during the meeting because everybody is there, so usually they **come out with one decision**."

(Officer with more than 1 year's experience, Development Division, MOH)

"At our level, between the State with the Clinical Head, (and) the top-level officers such as Director of Medical Development Division or Deputy Director General... ... Look, money is this much, we need it now. So, it is more on the rationalizing. So, he makes decision, of course ultimately we have to agree and come to a **consensus**."

(Officer with more than 5 years' experience, Medical Development Division, MOH)

"Every year, there's always a feedback la because we have a national paediatrician meeting, where we come together of the 13 states, with our national heads, and then we discuss what is the national (operating) budget. And what is our Dasar Baru (i.e. new policy/programmes). And then we will agree as who gets the priority in each of those states la... ...So I think all the head of service so far in the country are quite vocal la in their speaking up. So usually, we are also quite closely knitted, so most people will speak up la for their needs so their ideas heard and based on the **consensus**, and then we will negotiate as to who gets what first la."

(State Head of Service with more than 15 years' experience)

As described in Section 6.3, throughout the interviews, no respondents described any

opposing rationale in decision-making except the dilemma of whether to consider the

availability of private resources when distributing MOH healthcare resources. Hence, it

seems that the rationales used in the allocative processes were largely acceptable by

stakeholders within MOH. It is important to note that, all the MOH prioritisation decisions required final approval and mandate from agencies higher up, namely MOF and EPU.

MOH decision makers felt that their allocation decisions were usually well received by lower-level managers because the decisions were made according to relevant info provided by lower-level managers themselves.

"Usually, **they do agree** (with our allocation) because when we do our decision, it is not we simply put (without proper justification). Like I have explained to you, how we come out with this proportion based on workloads, because all the inputs are coming from them only."

(Officer with more than 3 years' experience, Family Health Development Unit, SHD)

However, there were some lower level managers that expressed otherwise. They sometimes doubted if the allocative decisions were justifiable. Nevertheless, the dissatisfaction seems to originate from lack of publicity of the decision justifications rather than a disagreement on the rationale used. This is related to the second condition of A4R – publicity, which is discussed next.

"But sometimes I'm not sure whether the amount given to state A is justified for state A... ... Because when I look, that's where I don't have access, we don't get information. Like I see, during the national level meeting, we produce a lot... ... but our budget sometimes less than state B (which produce less). That one I'm not really happy. How others are spending? In what way Ministry control? I want to know that. Are we given fair (amount of allocation)?

(Officer with more than 15 years' experience, Family Health Development Division, SHD)

6.4.2 **Publicity (or Transparency)**

As described in Section 6.3, some guiding principles were published and made available to the public (e.g. Malaysia Plans, "Specialty and Subspecialty Framework of MOH Hospitals", and Guidelines of the Application of Establishment of Private Hospital/Haemodialysis Centre). The motto of the Family Health Development Division and guidelines published by EPU for application of new facilities were cited as guiding documents in the resource allocative process. "If you look at our Specialty **Blueprint** (i.e. Specialty and Subspecialty Framework of Ministry of Health Hospitals 10th Malaysian Plan (2010-2015)), you will see our guiding principles... ... The guiding principle states how we want to, how we should be providing the specialties access."

(Officer with more than 3 years' experience, Medical Development Division, MOH)

"If you have been listening to what I am trying to tell you, if we are hoping to improve our services, you know our **motto** in Primary Care is 'access to comprehensive, quality services delivered in equitable manner'. These are our four catch phrases. If we are to achieve these, you want to have the quality services, you want to have comprehensive services and you want equity in the distribution of health services."

(Officer with more than 5 years' experience, Family Health Development Division, MOH)

"I think **EPU**, they do have their **guidelines** in. if you can refer to the EPU's website, there are the circulars, guidelines of the projects. Guidelines for us to decide the project site also they have. They have the guidelines for everything... ... They have the guidelines for a clinic... ... for the labs and everything. Not as details as our Medical Brief for the requirement but at least, they do have the guidelines."

(Officer with more than 1 year's experience, Planning Division, MOH)

Other than written principles and guidelines, allocative decisions were disseminated

to the relevant stakeholders within MOH, albeit not consistently across every

administrative level, programme, and type of resource. Some managers did not know how

much allocation were given to other same level managers. All allocative decisions were

not published in the public domain or disseminated to front-line healthcare workers,

patients or the general public.

"We know (how much other hospitals in the same state get). But it's not... only rough (figures) because in the meeting, they put everyone's performance, they compare the performance. Only the thing is, we don't ask (for) details lar. We mind our own business. Right?"

(Hospital director with more than 5 years' experience)

"Yes (we know), because during our meeting it was presented. How much this district's administrative budget has been given, budget being adjusted, meaning there is top-up... ... the presentation is being given to us also to bring back and we can also have a look and review."

(District Health Officer with more than 2 years' experience)

"Of course that they will release (the allocation) based on, you know, the projection. Ok these are the money that is allocated for this state and this state, so **it's open (to all states to see)**. And then, whoever feels like your needs are not met, you give feedback again then they will adjust accordingly la."

(State Head of Service with more than 15 years' experience)

"After getting (the new policy allocation), only the successful people will know... No (you don't know how much other people gets... ... Operating budget **you only know what you are getting** (and not how much other people get).

(National Head of Service with more than 5 years' experience)

The justifications were generally not explicitly stated. In some cases, rationale and justifications were given during follow-up briefings and meetings verbally. When allocations and justifications were not disseminated, doubts on the 'fairness' of the resource allocation might be raised. Final mandated development and operating allocations from EPU and MOF were also without detailed justification of decision.

"(When the final decisions come back from EPU) it is just in the form of project list, it is just a decision (no detailed explanation). Whatever, like I said, discussion on the priority of the project and so on, that is done during the Budget Examination stage. They already have given us the opportunity. The shortlist is done by them based on our justification during the project examination stage."

(Officer with more than 5 years' experience, Development Division, MOH)

"(The allocation amount) Written down as soft copy. But that one, that proportions (of distribution among districts), usually it is not (given) to the district. The district only receives the figure. But how we do it here, it is actually being explained... ... But then, during our meeting, we explained to them why they get more, why they get less."

(Officer with more than 3 years' experience, Family Health Development Unit, SHD)

"When it comes, when the posts which have been approved for one state and one district come, it will be displayed. It's up to us whether we want to know the other district getting or not getting, like that lah... ... No, no (it does not come with the justification of posts distribution It's the same for the 'bodies' (deployment). List were given according to district... ... justification not (given)"

(District Health Office with more than 2 years' experience)

"I don't know how they make the final one (on calculation of operating budget); it is at the **MOF level.** But, I think they (Finance Division) will know because every year Finance (Division) will get that money and they will report to MOF on how much you get, how much the allocation, how much you spend, how much is the balance? Those are important numbers."

(Officer with more than 3 years' experience, Medical Development Division, MOH)

For the regulation of the establishment of private healthcare facilities, the decisions of acceptance or rejection were communicated to the applicants. The successful applications were also published on a website accessible by public and other potential applicants. The justification of rejections was not disclosed to the applicants in detail. The detail of the rationale behind the rejection was available to the applicant upon request.

"We will tell them whether they fulfil the criteria, and then basic criteria in terms of the number of beds. Actually, that's the main thing. That's the principle that we hold on actually."

(Officer with more than 10 years' experience, Private Medical Practice Regulating Section, MOH)

"Normally in the letter we mention it **why actually disapproved**. And the normal and common reason will be that area already have enough... ...No we don't provide the statistic to them... ...But then, if they really want to look into our data, then **we provide**."

(Officer with more than 10 years' experience, Private Medical Practice Regulating Section, MOH)

MOH decision makers acknowledged the importance of transparency of the MOH resource allocative process. It was thought that a transparent process helped to ensure the accountability for decisions made. Explicit procedure to review appeal was set up for the regulation of establishment of private healthcare facilities. This was to ensure the transparency of the revision process. It was further elaborated that a transparent revision process could help to "safeguard the DG". In other words, it was acknowledged that a transparent revision process brought legitimacy to the decisions made. The revision/appeal mechanism is the next condition of A4R to be discussed.

"So far lar, we don't use this external (influence) (as our justification). Because this external (influence) sometimes we could not officialise it. When it is not official, it is not documented. When it is not documented, in the future we cannot refer back... ... We don't use the non-official (influence) because if we use those non-official (justification), it will come back to (haunt) us also"

(Hospital Director with more than 5 years' experience)

"We believe in sharing responsibility and cannot have one person deciding without consulting the others because then there's not be any equity, there's not going to be any **transparency**, there's not going to be **accountability**"

(National Head of Services with more than 5 years' experience)

"Under our law (i.e. Private Healthcare Facilities and Services Act), it does not explicitly mention (the appeal process) in the procedure. It just mentions about the DG's power to receive (appeal), that's what (is inside the Act). But then, we want to make it **transparent**. So that's the reason why we want to establish this procedure under the law. We just mention that you apply to DG, the DG will consider. But then, we actually make it the process that we can safeguard the DG as well."

(Officer with more than 10 years' experience, Private Medical Practise Regulating Section, MOH)

6.4.3 **Revision (or Appeals)**

Annual mid-term reviews of operating budget and bi-yearly rolling plans (since the 10th Malaysia Plan; mid-cycle review for 9th and earlier Malaysia Plan) of the development budget provided a built-in mechanism for revisions of allocations for recurrent financial expenditure and establishment of new healthcare facilities or projects.

Nevertheless, some respondents opined that additional allocation received after the mid-

term review of the operating budget were sometimes not timely enough to meet the need.

It was because the allocation would only reach the managers a few months later.

"Yes, they do appeal (on the decision of establishment or expansion of hospitals). We reply, we discuss and sometimes, we call them for a meeting... ... if their reasons are very solid, then we will make a new decision. If we feel no, then we don't"

(Officer with more than 5 years' experience, Medical Development Unit, SHD)

"Sometimes they (District Health Offices) cannot get the full (amount of operating budget in the) application. But somehow... usually, we managed (to get the balance amount) because for the mid-term review. We will try to apply (during mid-term review)."

(Officer with more than 3 years' experience, Family Health Development Department, SHD)

"If we ask during mid-term review, we will get it later, by August or September. By that time, the District Health Office is already using money from another resources or programmes. That is one of the issues."

(Officer with more than 3 years' experience, Family Health Development Department, SDH)

Even though most of the appeals were done through this built-in mechanism in the operating budget allocation, *ad hoc* applications were still allowed when the condition did not warrant waiting till the mid-term review. The deployment of staff depends on the availability of staff and was not as structured as allocation of the operating or development budget, which were carried out periodically as explained in previous the paragraph. Both managers and the deployed individuals could appeal the deployment decision.

"When we feel that the amount given is too less from what we expected, and then we ask for the additional. But, I think so far, this last... in 2010 or in 2011... the discrepancies were too wide. So, we asked them for review. So, they reviewed, and we got back what we want."

(Officer with more than 5 years' experience, Family Health Development Unit, SHD)

"Mid-term review is for big things..... But you also can have in between these, urgent need. Let's say now facility, the equipment has burnt. So my facility cannot function..... I cannot wait for the mid-term review. I have to now, begin the request, I need extra fund. And that is what is happening...... So, although mid-term review, fixed review time frame within KKM, KKM is flexible enough for us to approach them when there's urgent need to do. So that is the urgent issue."

(National Head of Service with more than 5 years' experience)

"Yes, (the depolyed staff) can appeal but still depends on the reason given. Usually, those who gave reason which are not so strong, they won't appeal. But, for those who feels that it (appeal) is a necessary, they will appeal. Sometimes they give evidences which are stronger."

(Officer with more than 1 year's experience, Human Resources Unit, SHD)

Revisions of operating and development budget allocations were done not only within

different MOH administrative levels but also between MOH and EPU and MOF. Appeals

were also allowed for individual healthcare workers regarding their deployment.

"Because the budget distributed to other ministries as well are a fix budget. Let say, we have this amount, EPU lah, Economic Planning Unit, we have for about 25 ministries, they (EPU) already fix this... ... So, whatever state feels that this project is more important than the other, we can go back to and try to appeal. They (EPU) said... the most probably they will say, "can, but you have to drop others".

(Officer with more than 15 years' experience, Planning Division, MOH)

"Sometimes appeal from deployed officer he appeals to transfer to other place. We will prepare the form and he will fill in the form and the appeals will be considered by involved (state) deputy directors, whether it is Medical or Public Health Program."

(Officer with more than 1 year's experience, Medical Development Unit, SHD)

"If they are not happy, we have avenue for them to express their unhappiness. Like example, I only give you 6 Medical Officers, although you have another 4 vacant posts. Can you tell us why you are not happy? So, they will table to us. If we agreed with that explanation, and your case is valid, we may consider within few months, we may fulfil another post (by deploying another staff)."

(Officer with more than 5 years' experience, Medical Development Unit, SHD)

Some decision makers noted that the lack of publicity of decisions might lead to less

appeals against the result. Others described instances where publicity of allocation

decisions, combined with the possibility of revision, led to improved allocation decisions.

Some doubt if the appeal mechanism really allowed revision because there were very few

changes on decisions even after the appeal.

"There was once during my early time, I don't know what's the basis that the previous officer used to give. And at that time, I gave like more or less as the previous officer gave. But, when we looked back, there were some District Health Offices that no need to get that amount of money... ... At district level there were people who noted and they asked me why... ... But, it is a good learning process for me."

(Officer with more than 1 year's experience, Family Health Development Division, SHD)

"Because by the time you appeal (for New Policy), you see there's no more money to grant it. You understand? So although there is this hypothetical appeal process, the only appeal we do is for

the next year's New Policy... ... to be honest, I do not know whether there is appealing mechanism... ... Has there been an appeal that has succeeded?"

(National Head of Service with more than 5 years' experience)

For the application of establishment of non-clinic private healthcare faculties, appeals could be made and there was no restriction on how many times a decision could be appealed.

"When we reject the application. The applicant can still go to the minister to appeal. But then our common practise normally (the) minister commonly ask the DG's opinion... ... minister rarely actually contravene the DG's decision... ... Even some centre we reject two to three times. And then they appeal. Second appeal maybe rejected and then third appeal maybe rejected. Fourth appeal maybe considered. But then, have to remember, every time if you submit similar information (or justification), the decision (is) maintained. So, but then they have to come out with another information (or justification) ... "

(Officer with more than 10 years' experience, Private Medical Practice Regulating Section, MOH)

6.4.4 Regulation (or Enforcement)

For the development budget allocation, directives from EPU ensured MOH provided justification for each proposed project or facility. Regular audits done by the National Audit Department examined accountability of expenditure (e.g. was the procurement price reasonable? Were the purchased equipment utilised?), but it did not exactly evaluate the allocative process and decisions. Internal audits were also carried out in some administrative units.

"Important now how to spend the money wisely, right? That is the key factor... ... and National Audit (Department), that also very active doing their job. So, today you ask and then make sure that you utilise it properly. You have a, you know? Genuine workload because the audit now will come and see. What is this for? When did you buy? How much is your workload?"

(Officer with more than 5 years' experience, Medical Development Division, MOH)

Every year we will carry out our **audit internally**. Internally means we, in State Health Department, have one unit, Quality Unit. This Quality Unit will go to other unit to check process. So, like last year we also got warning la. We got warning which is related to project, but not from the implementation aspect, from the aspect... more of procedure. Like filing... were decision made following our... they call it... 'work procedure manual'? We have a team for quality lah."

(Officer wit more than 2 years' experience, Development Unit, SHD)

"Yes, internal audit... Ministry has its **internal audit**, sometimes they came. State (Health Department) also can send their officer if they feel there are things which they need to investigate... ... (We are audited about if) we abide by the rules that we have to pay within two weeks. And then, all the documentation is complete."
(District Health Officer with more than 2 years' experience)

Published documents such as "Specialty and Subspecialty Framework of MOH Hospitals" provided guidance to allocative decisions. There was no explicit guideline for all the engagement, discussion and decision-making. However, some respondents described that the decision makers implicitly carried out different processes according to the scale of the allocation. The implicitness of the process was echoed in other ways. Some respondents claimed that the process had been carried out the same way for many years despite lack of explicit rules for the process.

"If there is a big policy and it is part of an **implicit SOP**. The implicit SOP is understood.....when there is impact in terms of political image, or Ministry of Health image maybe affected, those will need high ups to make the decision. So, that escalation of discussion is well known implicit among all the rest of Ministry of Health. They know what to raise and what they can do on their own."

(Officer with more than 10 years' experience, Family Health Planning Division, MOH)

"If suddenly certain event happens... unpredictable event... let say, a clinic was burnt down... ... If needed, maybe we exchange the (allocation to rebuild) burnt clinic with (budget for establishing) other clinic... ... That (process) is understood by everybody... ... (that's how it happens) at least (for the last) 15 years"

(Officer with more than 15 years' experience, Planning Division, MOH)

"Yes (the process is the same), every time it happens this way because this is our standard process we have to go through before the list is submitted to the EPU. So, that's what we called 'screening' lah... ... I'm not sure about that (if the standard process is written in some circulars or guidelines)"

(Officer with more than 15 years' experience, Planning Division, MOH)

When further probed if there were explicit guidelines, rules or regulation guiding the decision making process of budget allocation, most managers referred to financial processes outlined by administrative directives circulated by MOF or Finance Division/Unit in MOH, guidelines of the healthcare workers transfer process described in the 'work procedure manual', or quality standards adopted from the International Organization of Standardization (ISO).

Individual administrative units usually decided their own 'work procedure manual'

after internal discussions. Adoption of ISO quality standard further encouraged the

managers to carry out the allocative process as prescribed in the 'work procedure manual'.

"We have all the guideline given by (internal) auditor. We are... all the **government circular** and all that, the guide us to go through it... ... all the **treasury circular** we follow."

(Officer with more than 5 years' experience, Finance Unit, SHD)

"We have put the (process of allocation) into our 'work procedure manual'... we sit together for (drafting) the work process. (We look at) this is the procedure we are doing, and what is the circulation there... If it's finance... all those financial (procedure) circulation... ... that's why when all are doing their work later, the know this is the work process."

(Officer with more than 3 year's experience, Medical Development Unit, SHD)

"(The allocative process is determined) Because we have already Quality Management System (such as) MS-ISO... ... I believe (in the allocative process), because we have the Procedure Quality, for procurement"

(District Health Office with more than 2 years' experience)

For the re-deployment of human resources, criteria of eligibility to request for transfer

were set in guidelines. One of the set criteria was how long staff had to serve in a facility

before he/she could request for a transfer.

"MOH did come out with guidelines.... as I talk about just now, for transferring out (from a facility) or to serve at another facility... at the websites... lots of reference. All these guidelines are determined by Ministry, we just follow only"

(Officer with more than 1 year's experience, Human Resources Unit, SHD)

"Ministry did give out written rules how to do (the human resources deployment process). That is determined... there must be Transfer Deployment Meeting. If I am not mistaken, **Public Service** Department also got their circular (guiding human resources deployment process)."

(Officer with more than 5 years' experience, Human Resources Unit, SHD)

It was also acknowledged by some that the allocative decision-making process was not

explicitly guided. Some described the allocative process as administrative prerogative.

Others opined that individual experience and training of the involved managers

determined the allocative process.

"No, there are no (explicit guides on allocative process), it is (determined) administratively Administratively must involve Division Directors, or Deputy Directors, must involve those because they are head of unit, right? So, usually that's the basis that we are taking, but there is no specific circulation... no."

(Officer with more than 2 years' experience, Development Unit, SHD)

"There is no like proper guideline for KKM on how we are going to allocate the money. It is all up to your knowledge and your experience. So for me, this thing depends individually. Like us, probably I have the access because I know what they have spent last year. And then, how the staffing is like in that district. But, probably, in some areas whereby they don't have proper information, I think they just give on their own gut feeling. I think this one is very individual... ... I think when we do MPH (Master of Public Health), we learnt, isn't it? How to do budgeting? And some of my previously experiences were when I was in District, because my MPH last time is a very good example. They taught you in the proper way."

(Officer with more than 5 years' experience, Family Health Development Unit, SHD)

For the regulation of establishment of private healthcare facilities, the process was

established and published in a website.

"But then, of course when you don't know how to read law, so very difficult for people to interpret (what is the application and decision process). So, make (we) it easier under guideline. So, we have the guideline. But then, in the guideline also because we add all the procedure."

(Officer with more than 10 years' experience, Private Medical Practice Section, MOH)

6.4.5 Summary of Evaluation of Allocative/Regulating process

The equity or fairness of the allocative process for MOH resources or regulating process for private healthcare resources has been evaluated in Section 6.4 by benchmarking against the four conditions of A4R and the potential gaps for improvements is summarised in Table 6-9.

MOH Allocative Processes	Gaps
No contradicting principles/criteria identified	Clearer reform
except the dilemma of whether or not to consider	agenda may help
availability of private resources.	
Allocative decisions are disseminated but not its	Disseminate
justification; and not to public or frontline	justifications
healthcare workers.	
Revision mechanism are "built-in" for both	Nil
annual operating and five-yearly development	
budgeting process.	
The process self-regulated by "implicit SOP"	Provide explicit
where different processes are applied according	guidelines
to scales of projects.	
	MOH Allocative Processes No contradicting principles/criteria identified except the dilemma of whether or not to consider availability of private resources. Allocative decisions are disseminated but not its justification; and not to public or frontline healthcare workers. Revision mechanism are "built-in" for both annual operating and five-yearly development budgeting process. The process self-regulated by "implicit SOP" where different processes are applied according to scales of projects.

Table 6-9: Potential Gaps for Improvement in Current Allocative Processes

The study found that the allocative/regulating decisions made at MOH national level were largely based on consensus reached during meetings or discussions among managers of different administrative levels (state and national) and Programmes. This might imply that the allocative decision was to a certain extent based on acceptable rationales. This met the condition of 'relevance'. However, respondents said that the decision was reached in consensus and or were agreed upon were mainly higher-level manager, or those at the 'giving-end'. For example, state officers that described the discussion between them and district officers, and headquarter officers that described their meeting with state-level managers. The lower-level managers at the 'receiving-end' were not always satisfied with

the decisions. To further establish if the condition of 'relevance' was firmly met, observation of decision-making proceedings or analysis of verbatim meeting minutes and detailed decision rationales might help. However, none of these evidences were available.

Not all allocative decisions were disseminated to MOH stakeholders. None of the allocative decisions were disseminated to front-line MOH healthcare workers or the public. Justifications of MOH allocations were almost never provided. Approvals of establishment of private facilities were available in the public domain. Reason for rejection of establishment of new non-clinic healthcare facilities was only available if requested. This is an important condition. Some respondents at the receiving-end lamented when they spoke about the lack of dissemination of rationale. Some expressed feeling powerless or had little power to influence the allocation decision even with the requests they put in for more resources. This supports the argument of A4R framework that transparency is one of the important conditions to ensure allocative process being seen legitimate by people and thus allocative decisions being accepted by stakeholders.

There were built-in appeal mechanisms for the allocation of MOH operating budget, implementation of MOH development projects, deployment of MOH healthcare workers, and approval of establishment of new private non-clinic healthcare facilities. Nevertheless, there were no evidence that these appeal mechanisms themselves were carried out in a way that the conditions of 'relevance' and 'publicity' were met. Hence, it was not impossible that these appeal mechanisms might not effectively addressed any dissatisfaction towards the allocative processes or decisions.

The MOH allocative processes were indirectly guided by work process circulars and audits from the Finance and Human Resources Division. Work processes were also set up following ISO standards. These did not explicitly enforce the condition of ''relevance' and 'publicity' described in the A4R framework. There were some evidence of implicit conformity of the allocative processes. Taken together, this implies a lack of explicit rules of the allocative processes to govern its implementation. Hence, the allocative processes might change depend on the handling officers. When the rules were implicit, there were also no means to ascertain if the process was carried out accordingly. This means that there was no certainty that those processes were being carried out as described by the respondents and those processes were consistently carried in same way over the time.

6.5 Conclusion

This study has documented the allocative process of healthcare resources in detail. The allocative process was confirmed to be geography-based. The operating budget allocation was historical and incremental and could be improved by allocative mechanisms such as formula funding. The potential long-term dictating effect of new facilities/projects distribution to recurrent financial input allocation and human resources deployment in the subsequent years was highlighted.

The heterogeneity of values and principles used in the allocative process supported the use of A4R framework in the evaluation of the allocative process. Evaluation of the process demonstrated that allocative decisions and justifications needed to be disseminated to all stakeholders including front-line health workers, patients and the public. Explicit guidelines or regulations on MOH allocative processes for the development budget could help to mitigate the political influence asserted upon them.

CHAPTER 7:

ACHIEVING GEOGRAPHIC EQUITY ON THE PATH TO UHC

7.1 Chapter Overview

Malaysia has a mixed health system where the general taxation funded public provision system is complemented by the significant presence of a private healthcare provision sector. Despite having a significant proportion of healthcare expenditure financed directly by OOP, the Malaysian health system has been argued to have attained UHC (Ng et al., 2015). It was based on the evidence that Malaysia enjoyed equal and equitable healthcare utilisation regardless of socioeconomic status, after taking into consideration differential healthcare needs (Mohd, 2016; Ng et al., 2015). However, there was worrying evidence showing inequality of healthcare utilisation between geographic areas. Unequal healthcare utilisation between states, as one of the geographic administrative levels, in Malaysia is a cause for concern. This is because Malaysia's public healthcare resources were allocated according to geographic administrative levels, while the private sector was, to a certain extent, regulated according to geographic areas. Nevertheless, unequal is not necessarily inequitable. In fact, a health system may have to be unequal to achieve equity. Hence, this study was set out to access the geographic equity of the Malaysian health system, to confirm if Malaysia had a UHC which was not only equitable for people across different socioeconomic groups but also people residing in different geographic areas. The overarching research objective is to assess the geographic equity of healthcare provision across states in Peninsular Malaysia and to produce recommendations on promoting and sustaining geographic healthcare equity.

This chapter concludes the study by first summarizing the conceptual framework and methodology in Section 7.2 and 7.3. It is followed by a discussion of the main findings of the study in Section 7.4. Then, the policy implications and recommendations yield from the study are offered in Section 7.5. The contributions of knowledge are highlighted

in Section 7.6. Lastly, Section 7.7 reflects on the limitation of this study and provides suggestions for future research.

7.2 Framework of Evaluating and Improving Geographic Equity

The study reviewed current literature and established a conceptual framework to evaluate the fairness in the geographic distribution of healthcare resources and healthcare resource allocative processes (Chapter 2 and 3). Existing literature suggests that population healthcare needs of geographic areas was influenced by various direct and indirect geographic factors (Section 2.5). Also, healthcare resources were mainly organised and distributed based on geographic administrative areas in Malaysia (Section 3.2.3). Drawing upon Tanahashi's conceptual framework for healthcare coverage (Section 2.4), the availability of healthcare resources is the prerequisite of provision of healthcare. Therein, the concept of geographic equity was proposed, i.e. that healthcare resources should be made available to the population of each geographic area according to health needs of aggregated population health needs.

Further linking the concept of geographic equity back to the concept of UHC, which was stipulated as "all people receiving quality health services that meet their needs without being exposed to financial hardship in paying for the services" (Section 1.2), concepts of horizontal geographic equity (in provision of healthcare) and vertical geographic equity (in finance of healthcare) were proposed in this study (Section 2.6). This study argues that, within Malaysia's mixed public-private health system, overall healthcare resources should be distributed proportionately to state population healthcare needs (horizontal equity in provision) and MOH healthcare resources should be concentrated among less wealthy states (vertical equity in finance).

Assessment of horizontal geographic equity in provision and vertical geographic equity in financing were done by KI and DI respectively (Section 5.2). KI and DI were

estimated based on the plotting of LC of health needs and CCs of health needs and resources. The concept of using KI and DI to measure the groups' horizontal and vertical geographic inequities were based on methods applied in an earlier study measuring healthcare equity across socioeconomic gradients (Adam Wagstaff et al., 1989). One major difference of this study compared to recent studies (Lu et al., 2007; Somkotra, 2011) that is worth mentioning, is that the analysis of this study was based on groups rather than individuals. When estimating KI, geographic population groups were ranked according to the per capita healthcare needs of the group. It was not ranking individuals according to individual healthcare needs. Similarly, when estimating DI, instead of individuals ranked by their household incomes, geographic population groups were ranked according to the average household income.

To quantitatively assess the geographic equity defined, the study had constructed a state population healthcare needs index. The construction of the index depended on appropriateness (was it a valid proxy for population healthcare needs) and availability of data (the data should be one consistently and regularly collected for the duration of study). The index was constructed based on average utilisation rate of 18 age- and sex-specific groups (for hospital and primary care), demography of state population (number of population of 18 age- and sex-specific groups), and adjusted by premature mortality (under-65-year-old standardised mortality rate; as proxy of morbidity).

The baseline population health needs was the function of population number, sex and age because people of different sex in general have different healthcare needs at different ages. Although the healthcare needs of each person are different, almost each person would require healthcare in life. Hence, in general, the larger the population of a state, the higher the aggregated healthcare needs. This was demonstrated in the crude aggregated population healthcare needs reported in Tables 4-5 to 4-8 (Section 4.3).

Premature mortality adjustment was to reflect the differential healthcare needs over and above demography across geographic areas. The adjusted aggregated population healthcare needs reported (Table 4-5 to 4-8) further demonstrated that this differential health needs factor over and above demography was significant enough to change the ranking of state aggregated healthcare needs rank.

Healthcare resources indicators were identified to allow comparisons across MOH, public Non-MOH and private providers in primary and hospital care. Expenditure on health clinics and hospitals (as abstracted from MNHA) was identified as a proxy for recurrent financial expenditure for primary and hospital care respectively. Acute hospital beds number was identified as a proxy for hospital care facilities; number of doctors in clinics was identified to be the only appropriate proxy for primary care facilities. Number of doctors for primary care and hospital care were identified as appropriate proxy as human resources. However, to the best knowledge of this study, the number of doctors with breakdown for hospital and primary care were not collected systematically in Malaysia. The study could not recommend any other appropriate proxy as replacement. Hence, only acute hospital beds and recurrent financial expenditure for primary and hospital care were analysed in this study.

Literature showed that the resource allocative process was complex and varied among health systems. There were no universal criteria or principle of equitable healthcare. Hence although the answers of how a health system is equitable can be suggested and agreed upon, it cannot be prescribed. There was also no single uniform allocative process across healthcare systems. It was therefore important to explore and understand the allocative process if practical recommendations were to be made to improve the equity of the resulting resources distribution pattern. A theoretical framework of equitable resource allocative process, accountability for reasonableness (A4R) framework, was adopted as the analysis framework in this study to yield direct policy recommendation. Four conditions of the A4R framework, i.e. relevance, publicity, revision and regulation, were used as a benchmark of fairness of the resource allocative process. If the allocative process is fair according to the A4R framework, the criteria or principles adopted during the allocative process is legitimised as fair or equitable.

7.3 Findings of Geographic Equity in Peninsular Malaysia

In a mixed public-private health system like Malaysia, where the private sector is mainly funded by OOP, there are concerns of over-concentration of private sector providers in urban areas. This is because urban populations are usually more affluent and private clinics are more likely to set up in areas where the population can afford to pay OOP. This led to the concern that populations in more urbanised or economically richer states might enjoy more healthcare resources than they needed. This was in turn a larger concern for primary care service than hospital service because while 26% of hospital care was carried out in the private sector, up to 60% of primary care service was provided by private clinics in 2015 (Table 3-3). The findings from this study assuaged such fears for provision of primary care in Malaysia. The study showed that distribution of primary care recurrent financial expenditure was in line with both principles of horizontal and vertical geographic equity in 1997 and 2012 (Tables 5-7, 5-8 & 5-15).

Regulation of private clinic establishment was not subject to geographic equity consideration (Sections 3.5.2 & 6.3.1.4). Hence, was it because MOH purposely established more Health Clinics in areas where there were no private clinics, hence establishing horizontal equitable primary care resource distribution? Interestingly, interviews from this study found no such evidence (Section 6.3.2.2). The respondents claimed that the establishment of government clinics did not consider the existence of private clinics in the area because Health Clinics were thought to be providing more

comprehensive services than private clinics, and there were also the urban poor that need Government services in urban areas. Nevertheless, the combined effect of public and private primary care services provided needed health services according to needs across states (i.e. horizontal geographic equity in provision).

On the other hand, it was also found from the interviews that MOH decision makers would still establish Health Clinics in rural areas despite such moves being less costeffective. This is perhaps the reason that MOH primary care resources were found to be concentrated among the less wealthy states which were usually less urbanised (i.e. vertical geographic equity in financing) in both 1997 and 2012 (Tables 5-13 to 5-15). This is in contrast to the previous study which could not establish evidence that more of MOH public health operating budget were allocated to states with lower household income in 1998 (Wee & Jomo, 2009). In their study, Wee and Jomo (2009) measured distribution of resources across states by using crude resources to population ratio. Also, the public health operating budget used by them includes not only primary care clinic expenditures, but also non-clinic-based healthcare activities such as health promotion and outbreak controls. This study estimated state population health needs with demographic and geographic factors over and above demography. Hence, the difference of conclusions may be due to more meticulous health needs estimation or the narrower scope of primary care expenditure used in this study.

For hospital care, it was found during the exploratory inquiry that most of the MOH decision makers took into consideration the existence of private hospitals when they were considering the establishment of MOH hospitals (Section 6.3.2.4). At the same time, it was explicitly expressed in the MOH guideline for private hospital zoning that the existence of other public and private hospitals within the 30km vicinity would be taken into consideration for the establishment of a new private hospital (Section 6.3.2.1). It was,

hence, not surprising that the distribution of hospital beds and hospital care recurrent financial expenditure were in line with principles of horizontal geographic equity in both 1997 and 2012 (Tables 5-3 to 5-6 & 5-15). This finding is particularly significant given more private hospitals were found in wealthier states. For example, the ranking of the four states with the most private hospitals beds (MOH, 2012) were identical to the ranking of the four richest states in 2011, which were Kuala Lumpur, Selangor, Penang and Johore from first to fourth place (Table 5-9). Among these four states, Kuala Lumpur and Penang only ranked fifth and seventh in the number of population (Table 4-6). In other words, the geographic equity principle, such as taking into consideration the established private hospitals, applied by the MOH decision makers in distributing MOH Hospital beds seemed to be able to ensure horizontal equitable in hospital care provision despite concentration of private hospitals in wealthy states.

However, it was found that it was not possible for resources at specialist and subspecialist level to be distributed equally across states (6.3.2.1) across MOH hospitals due to the scarcity of subspecialty services. Due to this lack of resources, MOH decision makers took the approach of distributing hospital specialty and subspecialty services according to four different regions in Peninsular Malaysia. The states with the most resident subspecialty services in their respective regions were Penang (northern region), Kuala Lumpur and Selangor (central region), Johor (southern region) and Kelantan (eastern region) in 2011 (MOH, 2011b, p. 32). As mentioned in the last paragraph, with the exception of Kelantan, the other four states were the most affluent among the 12 states in Peninsular Malaysia. Perhaps, this was the reason that the distribution of MOH hospital resources was not obviously consistent with the vertical geographic equity principle proposed in this study. Nevertheless, the distribution of MOH hospital beds had improved from being distributed proportionately to healthcare needs among states in Peninsular Malaysia regardless of mean household income in 1997 to being concentrated in states

with lower mean household income in 2012 (Tables 5-9, 5-10 & 5-15). At the same time, the distribution of MOH hospital recurrent financial expenditure showed similar improvement although it was not statistically significant (Tables 5-11, 5-12 & 5-15). Wee and Jomo (2009) reported similar findings, that is, states with lower household income were not allocated with more MOH hospital care operating budget in 1998.

Malaysia's MOH allocative/regulating process of MOH/private healthcare resources in this study was described from the perspective of MOH decision makers (Section 8.3). There are two observations of the allocative process worth highlighting here for its potential practical impact on the allocative practice. First, it was found that allocations of MOH healthcare facilities, human resources and recurrent financial expenditure were tied to the MOH operating and development budgeting process and geographic administrative structures. The MOH decision maker should hence understand that an allocative decision of the development budget, which is often a facility establishment, would have a longterm impact in restricting the distribution of resources such as human resources and recurrent financial expenditure in the future. Second, it was found that allocation of the operating budget was historical and incremental. MOH decision makers should hence acknowledge that it would not be easy to divert healthcare resources from an area which receives more funds to an area that receives less funds due to the historical and incremental budgeting practise. In other words, MOH decision makers need to be ready to act against convention of allocating resources to where healthcare resources usually are when they find that there are more healthcare needs in areas where resources are less.

The study found that, as in other health systems, diverse groups of factors were considered during the allocative decision-making process. Two of the major guiding factors for allocation that was identified were population health needs and existing healthcare resources. This was not different from other healthcare systems (Asante & Zwi, 2009; Husain, Kadir, & Fatmi, 2007; Lydia Kapiriri et al., 2007). At the same time, MOH decision makers used a variety of values and principles, (such as norm, sustainability, consistency, cost-effectiveness, equity and fair) to guide their allocative process and decisions. These were not unique to other countries (Guindo et al., 2012). The heterogeneity of principles and factors described support for Daniel and Sabin's argument that it is easier to agree on fair processes than on criteria or principles of equitable decision-making in the allocative process (N. Daniels & Sabin, 1997). Thus, it supports the appropriateness of benchmarking the allocative process studied against the A4R framework.

As was often reported to be influential in other health systems (Asante & Zwi, 2009; Bate et al., 2007; Husain et al., 2007; Lydia Kapiriri et al., 2007), political influence was also visible in the allocative process in Malaysia. In the Malaysian electoral system, all parliamentarians and state lawmakers are elected by electorates from their respective geographic constituencies. Hence, influence from a few elected representatives might contribute to geographic inequity if the interest of electorates from a few specific constituencies are prioritised. Again, putting this together with the possible long-term dependency of human resources and recurrent financial expenditure allocation on healthcare facilities or projects allocation, MOH should make more concerted effort in ensuring the development budget distribution are allocated in accordance to the principle of geographic equity.

The respondents also acknowledged that allocative principles or criteria used were not always compatible (e.g. equity concern may overrule the cost-effectiveness principle when establishing facilities in rural area) (Section 6.3.2.2 & Table 6.7). There were even a few direct opposing allocative rationales described (e.g. to consider or not to consider private sector resources when allocating MOH resources). However, the allocative/regulating decision was mostly made by mutual agreement or consensus after deliberation during meetings or discussions (Section 6.4.1). Throughout the discussion and before reaching the consensus, the decision criteria and how they are considered are elucidated among the decision makers. Taken together, this was to a certain extent is in agreement with the relevance condition where "decisions should be made on the basis of reasons that 'fair-minded' stakeholders can agree, are relevant under the circumstances".

However, allocative decisions were not well disseminated. Some MOH stakeholders were not informed and the public had no access to such information. In addition, rationales of decisions were almost never provided. The public, patients, and nonmanagerial healthcare workers were not involved in the allocative process and not informed about the allocative decisions. Many respondents emphasised the importance of transparency in the allocative process. Some doubted if the allocation decisions were justified, as the reasons were not given. In other words, these officers concurred that meeting the 'publicity' condition would bring legitimacy to the allocative decisions. This can also be a particular point to be strengthened to mitigate inequity by political influence. For instance, if the allocative decisions and rationale were open to stakeholders inside and outside of MOH, including the general public, to scrutinise, political influence by certain elected representatives may be countered by other representatives. This can be a case in point where a transparent allocative process gives legitimacy to allocative decisions because the consideration of the population of interest from all geographic areas would be seen. The study revealed that there were explicit guidelines prescribing the principal considerations and regulating process of the establishment of private hospitals and haemodialysis centres/units. Perhaps, similar guidelines could be drawn up for the allocative process of MOH facilities and projects. This could be another way to reduce political pressure influencing the allocation of the development budget.

It was found that the appeal mechanism was largely in place for all allocative/regulating processes. MOH resource allocative mechanism fared well in the revision condition. Prescribing explicit allocative processes and principles to be considered could enhance the condition of regulation.

It's worth nothing that, the quantitative analysis measured the geographic equity in year 1996/1997 and 2011/2012 while the qualitative analysis interviewed the respondents between December 2014 and February 2016. As described earlier on, the budgeting system adopted by the government were "modified budget system" (1990-2010) and "outcome-based budgeting" (2011-2018). Probes by the researchers could not established different healthcare allocative resources process during these two budget system periods. Malaysia government has since adopting "zero-based budgeting" system with new government in 2018. There is yet any literature documenting evidence on how the allocative processes could be affected under this new budgeting system.

All in all, this thesis demonstrated that Malaysia's public-private mix had achieved horizontal geographic equity and had been improving in geographic healthcare equity. This is another strong evidence to support that Malaysian had been enjoying UHC. The allocative process can be further strengthened structurally to ensure we stay on the course of UHC.

7.4 **Policy Implications**

This section indicates three policy implications of this study.

7.4.1 Implication on How Geographic Equity Should be Measured in Malaysia

This study has developed a conceptual framework for assessing geographic healthcare equity in Malaysia. The framework proposed in this study allows measurement of distribution of overall and MOH healthcare resources separately according to health needs and wealth of geographic areas. This could be a framework which MOH could adopt in deciding where their healthcare resources should be allocated.

7.4.2 Implication on What Data Malaysia Agencies Should Routinely Collect to Allow Regular Geographic Healthcare Equity Assessment

Through the construction of population healthcare needs index in this study, the availability of data systematically collected by relevant agencies was highlighted.

This study demonstrated that it is possible to construct geographic population healthcare needs based on mortality data routinely collected by DOSM. Mortality data is available at district level and can be used for district level analysis.

This study also demonstrated that data collected by NHMS is valuable in providing information on population health status. Healthcare utilisation data from NHMS has been collected at a higher frequency in recent years. Furthermore, NHMS started to collect data on self-reported health status in 2011. This could be an alternative indicator that can be used in the construction of a population health needs indicator.

This study is the first to propose using data of expenditure on clinics and hospitals estimated by MNHA as proxy for recurrent financial input. MNHA provided precious comprehensive healthcare finance data for both the public and private sector since 1997. However, estimation of MNHA data is stratified at state level only. If MNHA data collection is expanded to be stratified at district level, more granular analysis can be replicated at district level.

Number of doctors was identified as an appropriate proxy for not only human resources for primary and hospital care but also proxy for facilities for primary care. However, there were no routine breakdowns of number of doctors in primary and hospital care collected. Hence, it was essential for MOH to create this database to allow assessment of geographic equity of human resource distribution.

In short, the continuous effort of DOSM collecting mortality data should be supported by the health sector. MOH should continue to collect MNHA and NHMS routinely, considering expanding MNHA scope to allow estimation of expenditure at district level, and refining the collection of human resources data to keep track of human resources specifically available for primary and hospital care.

7.4.3 Implication on How MOH Healthcare Resources Should be Distributed to Achieve Horizontal and Vertical Geographic Equity in Peninsular Malaysia

Assessment on horizontal geographic equity showed that the availability of overall healthcare resources was consistently proportionate to healthcare needs. This implies that a mixed public-private provision in Malaysia could equitably provide health services according to needs. Although MOH resources were never concentrated in richer states, they were not always concentrated in poorer states. This should be a reminder to MOH to direct more resources to less wealthy states.

From the qualitative inquiry into the allocative process, it was found that allocation of MOH facilities or project would likely dictate the subsequent recurrent financial expenditure. This observation was also supported by findings of vertical geographic equity for acute hospital beds and hospital care recurrent financial expenditure. Hence, MOH should focus on allocating more development projects to states which are less wealthy. It would then be less difficult for recurrent financial expenditure to be directed to less wealthy states once more facilities and projects are established there. Furthermore, rather than continue to rely on historical and incremental operating budget allocation, MOH can adopt the formula funding mechanism used by other countries to distribute its healthcare resources. This study has demonstrated a method of estimating geographic population health needs with data routinely and systematically collected by government agencies. MOH can use population the health needs index proposed in this study as a guide for their formula funding mechanism.

7.4.4 Implication on How MOH Allocative/Regulating Process Can Be Improved

Qualitative inquiry in this study yielded several plausible policy suggestions for improving MOH healthcare resource allocative/regulating processes. The findings pointed out that allocative decisions and the rationale behind the decisions were not well disseminated and could cause dissatisfaction among MOH managers. Higher-level managers should understand that transparent decision-making process would bring legitimacy to their decisions.

Another major finding is the lack of explicit guidelines or mechanism enforcing a consistent MOH resource allocative process. MOH should more explicitly prescribe its allocative process at all levels and this could be particularly helpful in reducing political influence in the allocation of the development budget.

7.5 **Contributions to Knowledge**

This study provided a few conceptual and methodological contributions to healthcare equity.

7.5.1 Contributions to the Conceptualisation of Geographic Healthcare Equity for Health System similar to Malaysia

Recent literature has focused much on assessing healthcare equity on the individual level. Many of the literature measure if individuals utilise healthcare according to individual needs. The geographic equity framework conceptualised in this study examines the availability of healthcare resources according to aggregated population groups in geographic areas. This approach emphasised the availability of healthcare resources as the prerequisite of eventual utilisation, and the fact that healthcare service provision is geography-bound. This approach is more practical and meaningful from the perspective of health system managers when healthcare resources are organised and distributed based on administrative geographic areas.

This study supports the use of horizontal equity (equal treatment for equal needs) for provision of healthcare. However, drawing from the concept of vertical equity in financing of healthcare, where richer people should pay more than the poor for healthcare services, geographic vertical equity was conceptualised and measured in this study. This framework can be applied to other health systems with similar mixed public-private provision systems where the public sector is highly subsided and the private sector is mainly financed by private insurance or out-of-pocket payment.

7.5.2 Contributions to the Method of Assessing Geographic Healthcare Resources Equity in Mixed Public-Private Health System

This study is the first to propose a "Difference Index" as an indirect measurement of vertical equity in healthcare financing across geographic areas. This index allows a single estimation of vertical healthcare equity which considers the availability of resources, population healthcare needs, and wealth of the state. To the study's best knowledge, this is a novel approach, which allows analysis to be carried out on data aggregated in geographic area groups.

The Kakwani Index is a well-established index used in measuring horizontal healthcare equity. To the best of knowledge, this study was the first to implement it on

the analysis of horizontal equity in healthcare provision across geographic population groups.

The novel usage of these two indices would provide an alternative to scholars who are interested in measuring healthcare equity by geographic population groups.

7.6 Limitations of Study and Suggestions for Further Research

This study itself is not without some limitations. Not all of the three principle resources indicators (i.e. indicators of human resources, facilities and operating budget) were obtained for primary care and hospital care. Number of doctors were the identified indicators for human resources distribution for both hospital care and primary care, and proxy for facilities of primary care services (see earlier discussion in Section 4.4). Number of doctors at state level was available but it was not detailed enough to allow further classification into those working in private or public service. Hence, only financial expenditure for primary care and hospital care and acute hospital beds (as indicator of hospital care facilities) were analysed.

It can be argued that healthcare needs of primary care and hospital care are not mutually exclusive. When a patient's primary care service needs is unmet, the condition may deteriorate and end up needing hospital care. Similarly, it can be argued that the availability of primary and secondary healthcare services is not mutually exclusive because when patients are treated early at the primary care level, subsequent hospital care may not be needed. A more complex modelling of population healthcare needs which takes this account into consideration may be explored in future studies.

The quantitative analysis of geographic healthcare equity in this study was limited to states in Peninsular Malaysia due to the administrative structure difference. Similar analysis can be replicated for Divisions (the administrative level in between State and

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District) within Sabah and Sarawak. Likewise, the assessment of geographic equity can also be carried out at districts level if there is appropriate proxy for geographic healthcare needs and healthcare resources. However, MNHA could not provide granular expenditure estimation for hospital and primary care clinics at district level. Hospital beds analysis is justified to be analysed at state level because each state has at least one tertiary referral hospital. Hence, hospital bed analysis at lower administrative level such as districts may need to be proceed with more caution.

The availability of healthcare resources is the pre-requisite of eventual healthcare utilisation, which can be determined and examined from the provider side. However, it does not guarantee ultimate utilisation. Utilisation of healthcare across geographic groups in Malaysia should also be examined from the demand side, once equitable provision is ascertained, to ensure no other barriers exist and deter people from getting required and available healthcare.

The qualitative inquiry of this study focused on MOH decision makers in two states in Peninsular Malaysia. A similar study could be expanded to obtain views from stakeholders outside MOH, patients, the public and MOH decision makers in East Malaysia. Ultimately, the impact of resource distribution is so all people have needed healthcare.

This study has explored the guiding principles and factors that was considered by MOH decision makers in their decision making process. Further surveys can be carried out to identify what are the principles and factors that are agreed upon by most people. This could be helpful for MOH to further draw up explicit allocative process and criteria.

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