

Evaluation of Access to Primary Healthcare

A Case Study of Yogyakarta, Indonesia

Jeny Shrestha
February, 2010

Evaluation of Access to Primary Healthcare

A Case Study of Yogyakarta, Indonesia

by

Jeny Shrestha

Thesis submitted to the International Institute for Geo-information Science and Earth Observation in partial fulfilment of the requirements for the degree of Master of Science in Geo-information Science and Earth Observation, Specialisation: (Urban Planning and Management)

Thesis Assessment Board

Chairman	: Prof. Dr. Ir.M.F.A.M. van Meerseveen
External examiner	: Prof. Dr. O. Verkoren
First Supervisor	: Dr. S. Amer
Second Supervisor	: Dr. J.A. Martinez



**INTERNATIONAL INSTITUTE FOR GEO-INFORMATION SCIENCE AND EARTH OBSERVATION
ENSCHDEDE, THE NETHERLANDS**

Disclaimer

This document describes work undertaken as part of a programme of study at the International Institute for Geo-information Science and Earth Observation. All views and opinions expressed therein remain the sole responsibility of the author, and do not necessarily represent those of the institute.

Abstract

Access to primary healthcare (PHC) has been a major goal of much health legislation and planning processes in order to meet the healthcare need of population. Improvements in access to PHC pave the way for advancement in the quality of people's life. However, efforts to conceptualize and operationalize measures of access have varied. In this study, access is decomposed into five dimensions as: availability, accessibility, affordability, acceptability and adequacy. One of the motivations for this concept is the presence of relatively limited studies in access to healthcare considering non-spatial factors like acceptability and adequacy. The relevance of access in this study is substantive, in investigating for each of these dimensions in how far the distribution in space and people is equitable.

Using primary data collected by household survey, variation in dimensions of access was measured, by developing objective and subjective indicators, in three villages in the Province of Yogyakarta (DIY). Variation of access was evaluated across different health facilities users and socioeconomic classes using descriptive and explorative statistics. Existing situation of access to PHC was compared with the related health policies in DIY. Using official census data of 2005, a comparative analysis with primary data was done to complement the disaggregated data with aggregated one.

The results of this study showed that variation in access exists between villages and across different socioeconomic class. Physical accessibility and affordability in general was not very problematic as the result of effective policy implementation. In general people had no real preference over cultural factors and gender of medical staffs (under acceptability). The analyses demonstrate that waiting time in health facilities (under availability) and inter-personal treatment from medical staffs (under adequacy) were important causes of dissatisfaction with access. These issues require policy attention to further improve access to PHC. While developing health policies, consideration to internationally accepted health standards can be effective in meeting minimum required standard for access to healthcare. Results of analysis in scale effect revealed that aggregated census data tends to average out variations as compared to data obtained at higher spatial resolution. Hence, care should be taken before drawing conclusions.

In general, findings of this study indicate how dimensions in access can be quantified and measured for the evaluation of access to PHC across different population groups. Also the possible effect of scale in results of analyses is demonstrated. The approaches and findings of this study can be useful in addressing problematic issues in access to PHC in the region.

Keywords: Primary healthcare, Access, Dimensions of access, Socio-economic stratification, Scale effect

Acknowledgements

This research is the result of valuable support from many institutions and individuals. Their contributions in different ways have helped in the successful completion of this research.

I am very thankful to God who gives me strength and blessings every day of my life. My family deserves special thanks for their love, support and faith in me besides the inspiration that they have provided. I would like to thank Netherlands Fellowship Programme for the opportunity to pursue MSc study in ITC which has broadened my academic knowledge and professional skills.

I would like to express my sincere gratitude to my supervisors, Dr. S. Amer and Dr. J.A. Martinez for their guidance and critical suggestions from the inception till completion of this thesis. Their valuable suggestions at various stages of this research were crucial for conducting my work in the right direction. Their academic and moral support has been very inspiring throughout this study. I am also thankful to all UPM staffs and teachers for the excellent academic guidance and assistance during the programme. Special thanks to Ir. Mark Brussel for initial inspiration and introducing us to the city of Yogyakarta. His guidance during fieldwork was very helpful.

I am very much thankful to ‘Pustral’, Center for Transportation and Logistics Studies, Gadjah Mada University for providing me necessary data and information, which were of immense value in this study. Special thanks to my thesis advisor, Ir. Arif Wismadi for his suggestions and all administrative support during fieldwork. I must thank Dr. Choirul Anwar, the Chief of Health Department, Yogyakarta for his valuable time in providing me relevant information and documents. My acknowledgement goes to Dimas, Pugo and Tamzil for their hard work in conducting field surveys and also to all participants of the interviews. The hospitality shown by the city of Yogya and especially all staffs of Pustral is highly appreciated.

My thanks go to all my colleagues and fellow Nepalese friends; Arun, Gopi, Diwakar, GRD, Ganesh, Janak and Jay for their help, cooperation and good memories shared together during this course of study. Special thanks to my friend Jiwan Limbu for encouragement throughout. All wonderful time shared with friends and colleagues were valuable for providing an extremely diverse, interactive, fun-filled and an intellectual rendezvous.

Table of contents

1.	Introduction.....	1
1.1.	Background of Study.....	1
1.2.	Research Problem.....	2
1.3.	Research Objectives	3
1.4.	Research Questions.....	3
1.5.	Research Framework	3
1.6.	Structure of Report	4
2.	Review on Access to Primary Healthcare	6
2.1	Introduction.....	6
2.2.1	Definitions and Concepts of Access to Primary Healthcare	6
2.2.2	Dimensions of Access to Healthcare Service	7
2.3	Conceptual Framework for Access to Healthcare	11
2.3.1	Healthcare Utilization and Quality of Care.....	12
2.3.2	Equity in Access to Primary Healthcare.....	13
2.4	Measuring Dimensions of Access to Primary Healthcare	14
2.4.1	Developing Indicators to Quantify and Measure Dimensions of Access.....	14
2.4.2	Subjective and Objective Indicators.....	15
2.4.3	Analyzing and Measuring Indicators.....	16
2.5	Methodological Problems to be Resolved in Evaluating Access	17
2.5.1	Effect of Scale in Analysis.....	18
2.6	Conclusion.....	19
3.	Study Area Description and Healthcare Policies	21
3.1	General Description of Study Area	21
3.1.1	Demographic Condition.....	21
3.1.2	Landuse and Economic Activities.....	23
3.1.3	Administrative Units.....	23
3.2	Health Policies and Planning Systems	24
3.2.1	Decentralization	24
3.2.2	Health Policies and Strategies	25
3.2.3	Health Organization System	27
3.2.4	Planning Process for Healthcare Service.....	28
4.	Research Methodology.....	29
4.1	Research Design.....	29
4.2	Fieldwork Preparation	29
4.2.1	Study Area Selection	31
4.2.2	Sampling Strategy.....	32
4.3	Field Work	32
4.3.1	Primary Data.....	32
4.3.2	Secondary Data.....	35
4.4	Post Fieldwork	35
4.5	Challenges During Fieldwork	35
4.6	Data Analysis	36

4.6.1	Socioeconomic Stratification of Sample Households	36
4.6.2	Measuring Dimensions of Access to PHC	37
4.6.3	Synthesising Indicators	37
4.6.4	Access to PHC in Relation to Existing Health Policies.....	38
4.6.5	Scale Effect in Analyzing Socioeconomic and Access Variation	38
5.	Perceived Access to PHC at Micro and Macro Level	40
5.1	Household Characteristics and Socioeconomic Stratification	40
5.2	Measuring Dimensions of Access to PHC.....	45
5.2.1	Descriptive Statistics for Availability of PHC	45
5.2.2	Descriptive Statistics for Accessibility to PHC	47
5.2.3	Descriptive Statistics for Affordability of PHC.....	47
5.2.4	Descriptive Statistics for Acceptability and Adequacy of PHC	48
5.2.5	Overall Satisfaction Level with Access to PHC	50
5.2.6	Influencing Factors to Overall Satisfaction Level	51
5.3	Synthesis of Indicators to Develop Summary Scores.....	53
5.4	Existing Situation of Access to PHC from Policy Perspective	58
5.5	Scale Effect in Analyzing Socioeconomic Attributes and Access to PHC.....	61
5.5.1	Comparing Individual Variables from Census and Primary data	61
5.5.2	Comparing Variation within Village with Variation at Sub district Level	64
6.	Discussions on Findings	66
6.1	Sub-objective 1: Measuring Access to PHC at Micro Level	66
6.2	Sub-objective 2: Existing State of Access in Relation to Health Policy	68
6.3	Sub-objective 3: Variations in Results Obtained from Census and Primary Data	69
7.	Conclusions and Recommendations	70
7.1	Conclusions.....	70
7.1.1	Main Findings from Sub-objective 1	70
7.1.2	Main Findings from Sub-objective 2.....	71
7.1.3	Main Findings from Sub-objective 3	71
7.2	Recommendations	72
	References.....	73
	Appendix A: Empirical references to indicators used in this study	76
	Appendix B: Description and rationales of indicators used in this study	79
	Appendix C: Content of household survey questionnaire	83
	Appendix D: Content of Interview with Health Facility Personnel.....	88
	Appendix E: Distribution of summary scores of dimensions of access	90

List of figures

<i>Figure 1-1: Conceptual Framework</i>	4
<i>Figure 2-1: The health access framework [Source: Obrist, Iteba et al.(2007)]</i>	11
<i>Figure 2-2: Conceptual framework to evaluate access to PHC</i>	12
<i>Figure 3-1: Population growth trend in DIY (1971 – 2000)</i>	22
<i>Figure 3-2: Population density map of DIY</i>	22
<i>Figure 3-3: Land use of DIY</i>	24
<i>Figure 3-4: Administrative boundary</i>	24
<i>Figure 3-5: Organizational Structure of Health System in Indonesia</i>	27
<i>Figure 4-1: Location of surveyed household in villages</i>	33
<i>Figure 4-2: Data collection and fieldwork observations</i>	34
<i>Figure 5-1: Proportion of socioeconomic cluster per village</i>	43
<i>Figure 5-2: General characteristics of socioeconomic clusters per village</i>	44
<i>Figure 5-3: Spatial distribution of socioeconomic classes</i>	44
<i>Figure 5-4: Percentage of subjective perception on waiting time in PHC</i>	46
<i>Figure 5-5: Percentage of subjective perception on travel distance and travel time to PHC</i>	47
<i>Figure 5-6: Percentage of subjective perception on total cost for PHC</i>	48
<i>Figure 5-7: Percentage of subjective perception on factors related to acceptability and adequacy</i>	50
<i>Figure 5-8: Perceived satisfaction level with access to PHC</i>	51
<i>Figure 5-9: Synthesising indicators to develop summary scores for dimensions of access to PHC</i>	54
<i>Figure 5-10: Summary score chart for dimensions of access to PHC</i>	56
<i>Figure 5-11: Standardized residuals for perceived satisfaction with various factors of access</i>	57
<i>Figure 5-12: Geographic distance to health facilities per village in DIY,</i>	60
<i>Figure 5-13: Population-doctor ratio per sub districts in DIY</i>	60
<i>Figure 5-14: Euclidean distance from households to health facilities</i>	63

List of tables

<i>Table 2-1 : Empirical references to dimensions of access</i>	<i>10</i>
<i>Table 3-1: Population density per regency in DIY from years 2003 – 2006.....</i>	<i>22</i>
<i>Table 3-2: General demographic characteristics of DIY.....</i>	<i>22</i>
<i>Table 3-3: National standards for health service, Indonesia</i>	<i>26</i>
<i>Table 4-1: Research Design.....</i>	<i>31</i>
<i>Table 4-2: Collected data from secondary sources</i>	<i>36</i>
<i>Table 5-1: Statistics of different socioeconomic clusters.....</i>	<i>42</i>
<i>Table 5-2: Descriptive statistics of waiting time in health facilities</i>	<i>46</i>
<i>Table 5-3: Correlation matrices between perception on factors of access and overall satisfaction level with access to PHC.....</i>	<i>53</i>
<i>Table 5-4: Summary score for dimensions of access per socioeconomic class</i>	<i>58</i>
<i>Table 5-5: Common variables in census 2005 and household data</i>	<i>62</i>
<i>Table 5-6: Distance to healthcare facilities from Census and primary data</i>	<i>64</i>
<i>Table 5-7: Socioeconomic and access to PHC variability in terms of CV</i>	<i>65</i>

Acronyms

DIY	Province of Yogyakarta
BPS	‘ <i>Badan Pusat Statistik</i> ’ Statistics of Indonesia
IDR	Indonesian Rupiah
UGM	Gadjah Mada University
PHC	Primary healthcare
HSEC	High socioeconomic class
MSEC	Middle socioeconomic class
LSEC	Lower socioeconomic class
GIS	Geographic information system
WHO	World Health Organization

1. Introduction

This study develops a methodology that contributes in the evaluation of access to primary healthcare in the province of Yogyakarta (DIY), Indonesia. Study emphasizes on appraisal of existing healthcare service, to see if variation exists in different dimensions of access. If the variation is significantly high, then issues of disparity or inequality arise. This research aims to highlight various dimensions influencing access, and in defining inequalities that arise from such variation. Consistency in results obtained from different scale of analysis is also checked for the study area.

1.1. Background of Study

Primary healthcare (PHC) service is an important concern for increasingly growing population primarily in developing countries. Cities in the developing countries are experiencing unprecedented growth for decades. The emergent population is aligned with the increasing demand for healthcare service along with all sorts of other infrastructures and public service provision required to ensure the basic quality of life. As the result, the situation might come when the existing infrastructure and public facility will not be able to provide adequate service to the constantly expanding population. “If population grows faster either through natural growth or movement in areas facilitated with more services than others, it is possible that the per-capita measure of facility availability could be worsened” (Yamauchi, Chowdhury et al. 2007, p.19). If continued, this process might gradually lead towards significant variation further fuelling inequality in service provision.

Adequate level of access to PHC is a major health development issue. Improvements in PHC services pave the way for advancement in the quality of people’s life. Yamauchi, Chowdhury et al. (2007) states that planners have potential role in providing better coordination in the service provision of such facilities. Equal provision of basic public services like primary healthcare has been a matter of interest for researchers, planners and policy makers since decades. “The achievement of equity in the distribution of urban public facilities is a goal of paramount importance to urban planners, who must analyze whether and to what degree their distribution is equitable” (Tsou, Hung et al. 2005, p.424). Inequality in healthcare refers to disparities in access to health facility to large extend.

Access to PHC can be seen from a wide range of angles considering different factors and dimensions. These factors depend largely on the objective of study and the context of study area. Number of literatures (Penchansky and Thomas 1981; Millman 1993; Guagliardo 2004) have defined such factors and dimensions as barriers to access while defining and conceptualizing access to healthcare, which is explained in detail in next chapter. Factors like physical distance, travel time to reach the facility, availability of transportation, service cost, waiting time, language etc are referred as barriers because these factors impede people in certain socioeconomic condition to reach and achieve the healthcare service.

Dimensions in access can be measured by developing indicators, both objective and subjective indicators. Objective indicators are the observable facts and figures like distance, time, cost etc and subjective indicators are normally derived from peoples’ perception and satisfaction level on each factors obtained from ground survey.

Scale of analysis should be considered carefully while analyzing variations in different dimensions of access to PHC, as results of similar analysis may vary based on the selected areal unit. As spatially aggregated data obtained from census are often used by researchers and policy makers to analyze different contextual determinants of health, it is important to understand what factors and criteria were used to aggregate such data. Aggregation of data might result in the loss of information which might be relevant in specific study like healthcare. The limitations of scale problems are discussed later in chapter two based on some empirical studies. This study analyzes and compares the results from disaggregated primary data to the aggregated secondary data related to socioeconomic and access to PHC in the study area.

In this study, influencing factors in access to PHC is measured in the Province of Yogyakarta, Indonesia. Rapid urbanization in Indonesia is compounding the pressures for higher supply of healthcare services, so is the case in the Province of Yogyakarta having four rural regencies and one urban, the city of Yogyakarta. Regencies are further divided into sub-district and village being the smallest administrative boundary. Depending on the physical and socioeconomic condition of people, relevance of various factors is explored to evaluate the access to PHC. Results obtained from aggregated and disaggregated data are compared to see the consistency in different scale of data.

1.2. Research Problem

As the result of rapid population growth and socioeconomic heterogeneity, variation in the provision of PHC services can be assumed to occur. This affects the life of people in lower socioeconomic group more adversely if the variation is significantly high. It is important to identify and address such variations in order to provide adequate service to all people regardless of their socio-economic status. Many studies have been done focusing on physical accessibility to define spatial equity in service provision. However, there are other factors along with accessibility, which determines equity in access to service. As mentioned earlier, there are different dimensions which influence the access to primary healthcare service. However, it is difficult to decide which dimension poses more importance across different socio-economic groups of people. For instance, geographic distance or cost of service might not be a problem for affluent group of people who can afford their own vehicle. Quality of service might be more relevant for them. On contrary, cost and long travel distance might be the prime barrier for poor people to access such service.

This type of analysis can vary greatly depending on the spatial extent or scale of analysis chosen. Variation in result of analysis gained from different scale of data is known as Modifiable Areal Unit Problem (MAUP). According to Schuurman, Bell et al.(2007), researches on inequality context have given significant attention toward the construction of socio-economic inequality indicators; however less attention is paid in addressing the influence of scale. Stafford, Duke-Williams et al. (2008) stated that the estimation of health inequalities in specific areas are determined by the way in which the area boundary is defined. Effect of scale, in observing variation can be analyzed by comparing results of similar analysis conducted for the same study area, which is divided into different smaller boundaries separately. In Stafford, Duke-Williams et al. (2008) a metropolitan city is divided in three neighbourhood boundaries separately for analysis. The area boundaries were selected based on predefined census wards; physical features like rivers and main roads; and according to socioeconomic homogeneity of residents. Although the result shows small difference (around 3%) in this case, due to certain limitations like limited sample, authors clearly state the relevance of scale in related studies.

Therefore, the research problem to be addressed in this study is to develop an appropriate method to measure variations in access to primary healthcare considering different dimensions in access.

Further, how to ensure if the level of variation in primary healthcare obtained from aggregated data comprehends the result obtained from disaggregated one. Comparing the results obtained from large scale aggregated data with disaggregated data shows the consistency and reliability of results from different data sources.

1.3. Research Objectives

The main objective of this study is to evaluate access to primary healthcare, to observe if variation exists in any dimension of access and if it meets the need of population.

The main objective is divided into three sub-objectives:

- a. To develop an appropriate method to measure different dimensions of access to primary healthcare to evaluate overall access.
- b. To study how the planning for primary healthcare is done in context of Yogyakarta and to see if existing situation matches with the planning standard.
- c. To illustrate if information on socio-demographic and access to healthcare obtained from aggregated data (census) correspond to the results obtained from disaggregated data (primary household data).

1.4. Research Questions

For each sub-objective the questions are proposed to answer:

Questions for sub-objective 1

- i. What are the appropriate methods to quantify and measure different dimensions of access?
- ii. Do all dimensions have equal importance across different socioeconomic group of people?
- iii. What is an appropriate areal scale for evaluating variation in access to PHC?

Questions for sub-objective 2

- i. How is the planning for healthcare done based on health policies and national standards?
- ii. Is the existing situation of access to healthcare in accordance to policy standards?

Questions for sub-objective 3

- i. How different scale of analysis affects the result in mapping socioeconomic and service variation in PHC?
- ii. Does the result of analysis based on aggregated data, for larger spatial boundaries, matches the actual situation within those areas?

1.5. Research Framework

The conceptual framework in Figure 1-1 shows the factors in macro level and dimensions in access, considered to measure the existing situation of access to primary healthcare in DIY. The contextual planning system and standards in health policies should be understood well prior evaluation of service provision. Demographic information is relevant in this evaluation, as the need and perception on primary healthcare service varies depending on the physical and socioeconomic condition of area as well as population. Therefore various dimensions of access to primary healthcare are considered in this study. By exploring these issues, dominant problematic factors causing variation in access to

PHC in context of study area can be found. This will highlight the important dimension in access to be improved, in order to achieve better access to PHC to all.

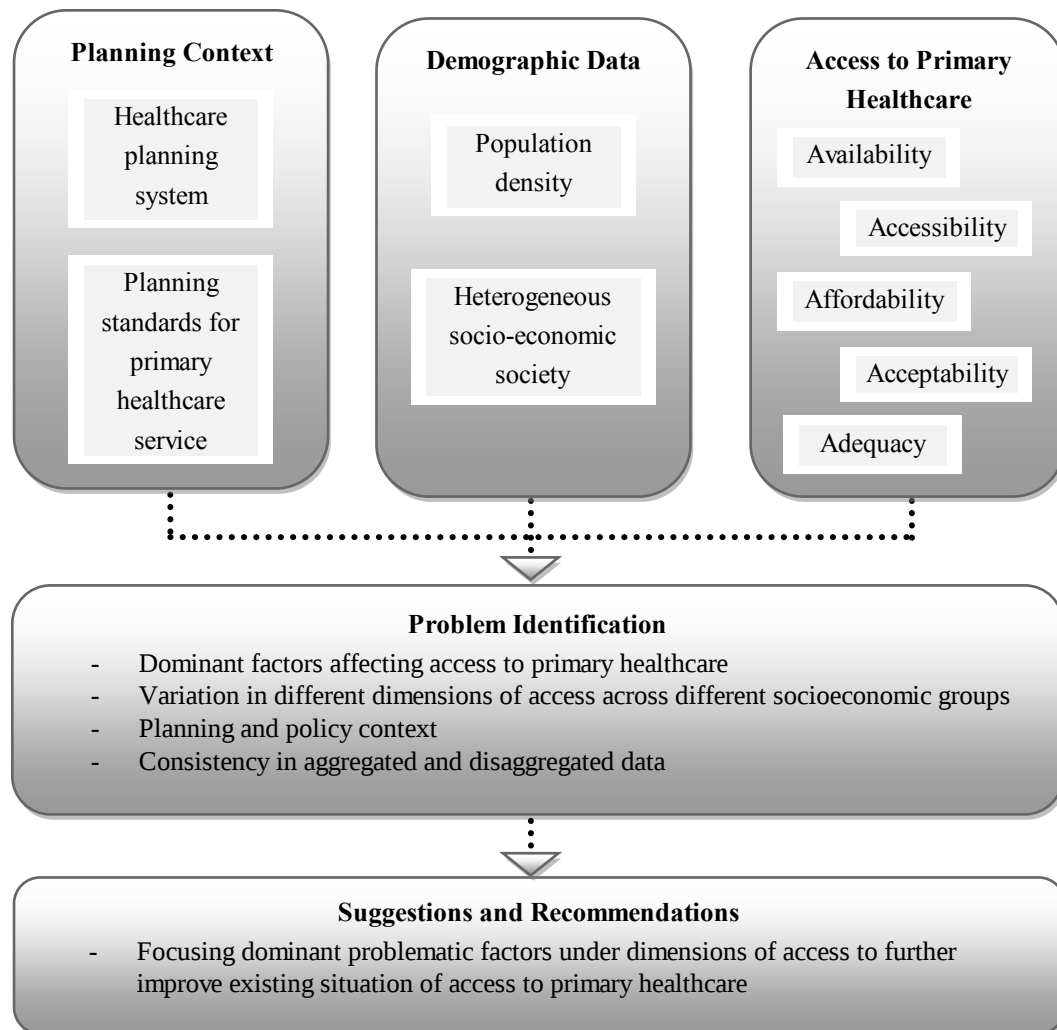


Figure 1-1: Conceptual Framework

1.6. Structure of Report

Chapter 1 - Introduction

This chapter gives an overall idea about the research structure starting with a brief background of study. It comprises the research problem, main objective followed by several sub-objectives, research questions to each sub-objectives and the conceptual framework of the study.

Chapter 2 – Literature Review

This chapter presents a brief review on definitions and concepts of access used in other empirical studies which helped conceptualize access and its measures for this study. Detail definition of different dimensions and conceptual framework in evaluating access to PHC adapted in this study is explained. Variation in dimensions of access is reviewed in relation to the broader issue of equity. Different methodologies used to quantify and measure access along with methodological problems has been discussed.

Chapter 3 – Description of Study Area

This chapter provides a general description of the physical, demographic and socioeconomic condition in the Province of Yogyakarta (DIY). An overview on the effect of urbanization and decentralization in Indonesia over provision of public services is discussed briefly. Healthcare planning system, approaches in development of healthcare service and national policy standards for access to healthcare in context of DIY is explained.

Chapter 4 – Methodology

This chapter describes the methodology to be carried out in this study. Detail information on research design, data requirement, source of data and information and framework of analysis is provided. This chapter is divided mainly into four parts; pre-fieldwork, fieldwork, post fieldwork and data analyses. Preparation of questionnaires for household survey, base map, study area selection and sampling strategy is explained in pre-fieldwork phase. Methods applied in carrying out ground survey, interviews and data entry is reported in fieldwork phase. Data preparation, processing and analysis formed the main part of post fieldwork data analyses. Various analytical methods in obtaining answers to the research questions are described in this chapter.

Chapter 5 – Results

This chapter contains the results of analysis of variation in dimensions of access to primary healthcare. This chapter highlighted the dominant factor or dimension affecting the overall perception of individual on access to healthcare services. Findings of the comparative analysis between existing situation and health policies in DIY are presented along with the results obtained consistency analyses between aggregated and disaggregated data.

Chapter 6 – Discussion

The results of analyses, carried out to address all research questions, are discussed comprehensively in this chapter. Critical discussion over strength and limitations of this study is also presented.

Chapter 7 – Conclusions and Recommendations

This chapter provides an overview on the concept, approaches and methods used in order to obtain answers to all research questions of this study. Chapter concludes by highlighting main findings of this research and further recommendations for future improvement of this study.

2. Review on Access to Primary Healthcare

This chapter comprises of review on definitions and concepts of access to different healthcares. It gives detail explanation about different dimensions and conceptual framework in evaluating access to primary healthcare services applied in this research. It also provides an overview on the healthcare utilization as well as the quality of care, commonly used in evaluating health outcomes. Issue of equity in access to healthcare has been discussed which help in clarifying the concept of service variation and inequity in this research. This chapter further explains methodologies used in measuring the dimensions of access by developing subjective and objective indicators. A brief review on GIS based measures of access and methodological problems has been discussed. Issues of different scale effects in analyses are discussed followed by conclusion of the entire chapter.

2.1 Introduction

Primary healthcare has been a major topic for many health studies, research and discussions of medical care since decades. Increasing attention has been focused on this concern by medical educators as well as state legislators in order to improve the supply of primary practitioners. However, definition of the term ‘primary care’ varies. Obtaining consensus on priorities or an agreement on the content itself, has been a cumbersome task (Parker, Walsh et al. 1976). As stated in Bagheri, Benwell et al. (2005) primary healthcare is an important step in providing ‘health for all’, and is widely acknowledged as a universal solution for improving population well-being by World Health Organization and UNICEF. Guagliardo (2004) states that primary care is an essential form of healthcare for maintaining population health as it is relatively inexpensive and easily delivered. Author further explains that it is most effective in preventing disease progression on a large scale if they are adequately provided in space.

Access to primary healthcare is considered as one of the indexes in achieving the goal of ‘health for all’ and it has different definitions depending upon different contexts. Different definition and concept of access to primary healthcare is explained in the next section.

2.2.1 Definitions and Concepts of Access to Primary Healthcare

Access to primary healthcare can be seen from a broad perspective making it difficult to give a precise definition. Efforts to conceptualize and measure access have varied depending on different circumstances and context of study. Being a concern of social welfare, studies on access to healthcare service have been carried out by different professionals like geographers, public health sector, anthropologist etc. Thus the definition varies accordingly depending on the study approach. “The most basic problem in defining ‘access’ is that it is both a noun referring to potential for healthcare use, and a verb referring to the act of using or receiving healthcare” (Guagliardo 2004, p.2). This might create confusions due to overlapping of understanding between physical presence of primary healthcare facility and ability and willingness of people in obtaining the care.

A more specific definition refers to ability to “secure a specified set of healthcare services with certain level of quality, subjected to a specified maximum level of personal inconvenience and cost, while in possession of a specified amount of information” (Oliver and Mossialos 2004, p.656). The term ‘specified’ in this definition, makes it easier for policy maker to define access depending on specific circumstances for different places depending on the availability of resources to finance healthcare. It can be summarized that general definition of access can guide the planner and policy maker towards important factors, such as relevant range and quality of service, inconvenience,

disutility, cost, information dissemination etc, to be considered. If adopted and implemented properly, this can serve as a standard against which existing access can be compared. Therefore this helps policy maker to observe how improvement can be made or to check if they are improving access over different area and population.

As various factors and issues should to be considered while defining access to primary healthcare, some common factors can be grouped into different dimensions. Study of various dimensions and factors affecting access to primary healthcare can further clarify the definition of access.

2.2.2 Dimensions of Access to Healthcare Service

Many authors have mentioned about different factors that impede access to primary healthcare. Due to the complexity of access concept, it is important to look at each factor separately, even though they are interrelated. Factors like availability of medical personnel, convenience to achieve health services, actual use rates, service use in relation to some standards of need and consumer satisfaction level with services has been highlighted by many studies, while exploring the overall access to primary healthcare service. Dimensions of access differ with different geographical, socioeconomic and cultural settings. Healthcare insurance, service cost, physical distance to reach the service, lack of transportation, capacity of facility to serve the need of patients, indirect cost apart from health insurance like travel cost, socio-cultural factors like race, language, gender etc and service quality issues are some issues in access to healthcare service as documented in Millman (1993). Author has grouped these issues into three dimensions; structural, financial and personal. Similarly, Penchansky and Thomas (1981) has grouped those issues, termed as barriers, into five dimensions: 1. availability, 2. accessibility, 3. affordability, 4. accommodation and 5. acceptability; '5 A'. The first two dimensions are spatial in nature. Availability refers to the total number of service from which user can make their choice. Accessibility is related to travel impedance (time or distance) between spatial location of user and services. The last three dimensions are non-spatial, related to cost, service quality and cultural factors. Obrist, Iteba et al.(2007) also adopted above mentioned five dimensions in clarifying the concept of access to healthcare but the term 'accommodation' is replaced by 'adequacy' while explaining if patient's expectation towards quality of service and personal treatment is met by the facility. The structural dimension in Millman (1993), possess the factors mentioned in availability and accessibility, financial dimension covers the affordability and personal dimension includes issues of adequacy and acceptability.

The concept of '5A' is used in this study while evaluating existing situation of access to primary healthcare. Each dimension is explained and divided further into simpler quantifiable and measurable form.

1. **Availability** refers to the extent to which a system provides facilities (which is the structural form) and services (which refers to the process) that meets the needs of people (Campbell, Roland et al. 2000). More than simple doctor-patient ratio, availability further deals with access to specific gender of medical personnel, for example female general practitioner or nurse; access to medical stores, laboratory or other equipments etc. Campbell, Roland et al. (2000) stated that organizational access can be seen as sub-component of availability. This means even if people have adequate physical access to the facility, there might be other factors creating barriers like length of time in getting appointments, waiting time in before getting treatment or sometimes language barrier with the facility professionals.

2. **Accessibility** is most commonly related with the geographic location of patient to the location of facilities. Measures like spatial distance, travel time, mode of transportation used to reach the facility, type to road network etc are considered assessing physical accessibility of people. Large

number of studies like (Talen and Anselin 1998; Black, Ebener et al. 2004; Bagheri, Benwell et al. 2005; Amer 2007; McGrail and Humphreys 2008) has been done on physical accessibility to public facilities and mostly healthcare service. “Accessibility relates to the ability of people to overcome the friction of distance to avail themselves of services at fixed points in space” (Amer 2007, p. 31). Study of physical accessibility mostly incorporates three components: people; activities or service and mode of transport to link them. The framework in Moseley (1979) states that accessibility varies according to the characteristics of each of these components and it is influenced by the relationship between the socioeconomic character of people, users, and spatial dimensions. More elaborative concept on accessibility incorporates one more component, the temporal component along with the three mentioned above. This deals with the moment of time at which the service is available or at which people are able to participate. For example, the opening hour of the primary healthcare facility and working hour of people in this study.

3. **Affordability** by its name itself refers to the financial component. There might be adequate number of health facilities or medical personnel in an area, spatially close to the needy population. But, these facilities might not be affordable to them. In such case, people tend to go to other facility than the one closer to them, which provide subsidized rate or cheaper service. This dimension looks into direct cost like doctor’s fee as well as indirect costs like travel and medical costs that have affect on overall access to healthcare. Other factors like possession and coverage of health insurance, public supports such as subsidized rate provided for certain group of people like low income or elderly population, are also incorporated in this dimension.

4. **Acceptability** deals with the cultural also religious factors of people. Factors like age, gender, education level, race or ethnicity determines the level of acceptability of service provision to large extend. For example, if the service available is socially acceptable by people like gender issue, if people have some religious or cultural preferences towards choosing certain healthcare facility or if the service provider and people use a common language to communicate. This also depends upon the personal perception of people that might vary within a same religion or gender. Beliefs and expectations of different groups of people should be considered while evaluating this dimension.

5. **Adequacy** is seen from two ways in this study: quality of service provided and personal treatment by the service providers. Opinion about the medical treatment whether people trust the medical ability provided by the facility or not, if they are satisfied with the quality of service or personal behaviour of all facility personnel right from the point of entry to facility for example person at reception till the end of medical treatment by doctors and laboratory personnel.

Acceptability and adequacy being subjective matter, it becomes complex to define a specific standard or threshold line. These can be looked from the people’s feeling, preference and perception on related issues.

A list of empirical studies related to access and its dimensions, along with methodological approach, that are reviewed for this study are summarized in Table 2-1.

These five dimensions can also be related to the concept of potential and realized access to healthcare used in Andersen, McCutcheon et al. (1983) and Bagheri, Benwell et al. (2005). The potential access looks at the ability of needy people in gaining healthcare in presence of healthcare facility in space. It is important to understand the difference between “having access” and “gaining access” to healthcare while evaluating the access to the service. Gulliford, Figueroa-Munoz et al. (2002) clarifies the distinction between them, as the former may be the result of the availability of services and the latter one refers to ability of individual to overcome financial, organisational and socio-cultural barriers to utilise healthcare service.

Some researchers tend to relate potential access with characteristics of the population (such as their household income, education level, their attitudes toward medical care etc) and the characteristic of the delivery system (like the type of organization, distribution of medical personnel and types of facilities). Such characters aid in the understanding of meaning of access toward healthcare for different socio-economic group of people. The realized access deals with actual utilization of healthcare services. To simplify, potential access consider the factors, influencing the ability to enter facilities *before* receiving the service and realized access deals with the perception of people towards different aspect, such as quality of service, cost or personal treatment, *after* receiving the service.

In this study, availability, accessibility and affordability along with other socioeconomic characteristics of people are looked from potential access to primary healthcare. Realized access includes issues related to acceptability and adequacy. Once factors and dimensions of access are determined, a general framework can be formulated to observe a stepwise sequence in evaluation of access to primary healthcare.

Author and year	Study Context and Area	Dimensions in Access					Measures	Operationalization / Methodology
		Availability	Accessibility	Affordability	Acceptability	Adequacy / Accommodation		
Penchansky and Thomas (1981)	Concept of access in health policy <i>United States</i>	√	√	√	√	√	S / O	- Factor Analysis - Multiple regression - Correlation coefficient
Andersen et al. (1983)	Access to medical care <i>United States</i>	√	√	√	√	-	S / O	- Descriptive statistics - Correlation coefficient - Multiple regression - Factor Analysis
Fosu, G.B. (1989)	Access to healthcare in urban areas of developing societies <i>Ghana</i>	√	-	√	√	-	S / O	- Descriptive statistics - Pearson correlation - Multiple regression - Standardized regression coefficient
Guagliardo (2004)	Spatial accessibility studies in urban areas <i>United States</i>	√	√	-	-	-	O	-Two-step floating catchment area - Gravity model - Kernel density method
(Black, Ebener et al. (2004)	Physical accessibility to health care <i>Honduras, Central America</i>	√	√	-	-	-	O	- Correlation analysis - Regression analysis
Bagheri et al. (2005)	Spatial accessibility to primary healthcare <i>New Zealand</i>	√	√	-	-	-	O	- Drive time and least cost path analysis model (network analysis) in Arc Info 9.1

Author and year	Study Context and Area	Dimensions in Access					Measures	Operationalization / Methodology
		Availability	Accessibility	Affordability	Acceptability	Adequacy / Accommodation		
Omer (2006)	Spatial equity regarding physical accessibility to urban services (park) <i>Israel</i>	√	√	-	-	-	O	- Proximity - Container measure - Minimum distance - Moving average index - Correlations income, religion and obtained service area
Obrist, Iteba et al. (2007)	Exploring and improving access to healthcare in resource-poor countries	√	√	√	√	√	S / O	- Outcome in terms of health status - Patient satisfaction and equity survey - Multivariate Analysis
Amer (2007)	Spatial equity in urban health services planning <i>Tanzania</i>	√	√	-	-	-	S / O	- Statistical analysis - Pearson correlation coefficient - Two step Cluster Analysis - ANOVA - GIS-based 'what if' - Flowmap
Yamauchi, Chowdhury et al. (2007)	Spatial coordination in public good (education and health facilities) allocation <i>Indonesia</i>	√	√	-	-	-	S / O	- Descriptive statistics; cumulative percentage, distribution - Non parametric regression
McGrail and Humphreys (2008)	Measuring spatial accessibility to primary care in rural areas <i>Australia</i>	√	√	-	-	-	O	- 2SFCA - Network Analysis in ArcView 9.1, closest facility

Table 2-1 : Empirical references to dimensions of access

Summarized overview of the empirical literatures on evaluation of access and its dimensions to public services (majority on healthcare service)

Note:

√ = Included in the literature

- = Not included in the literature

S / O = both subjective and objective

O = Objective

Looking at this table it can be said that limited number of studies has considered non-spatial dimensions like affordability, acceptability and adequacy while conceptualization and operationalization of access to primary healthcare. Measuring spatial components like physical accessibility and availability have been a common approach in evaluating access to healthcares.

2.3 Conceptual Framework for Access to Healthcare

Different authors have developed their own models and framework in assessing access to healthcare depending on the way they define it. Most of the literatures in healthcare give emphasis on the outcome of service in the form of health status and equity on service. However access to healthcare has been an important part in their framework. In the model of Millman (1993), dimensions of access to healthcare is the first step which is followed by service utilization, quality and efficiency of service and finally by the health outcomes. The framework adopted in explaining health access by Obrist, Iteba et al.(2007) is shown in Figure 2-1. This framework shows the combined effect of macro level, i.e. the policies and different healthcare services, and micro level, i.e. livelihood assets of people and need of healthcare, on the dimensions of access. Obrist, Iteba et al.(2007) explained about livelihood assets comprising of five popular capitals: human capital (like education level, skills or local knowledge); social capital (social networks or affiliations); natural capital (natural resources like land, water or livestock); physical capital (physical infrastructure like road and facility complex, mode of transportation, facility equipments etc) and financial capital (income level, subsidies or health insurance). Further it is explained that the availability of these assets is influenced by less controllable factors like economy, political state, technological advancement or natural factors like climate or hazards like flooding, draught or epidemics. These factors are referred as the vulnerability state. Once access is gained, then the framework follows the similar pattern like Millman (1993). This framework comprises both supply (health services) and demand side (health seeking behaviour) and it places access in the broader context of livelihood assets. Interaction between; healthcare services and organizational policy or institutions responsible to govern the services and; livelihood assets that people can use during vulnerability contexts determines the extent to which access is reached along the five dimensions.

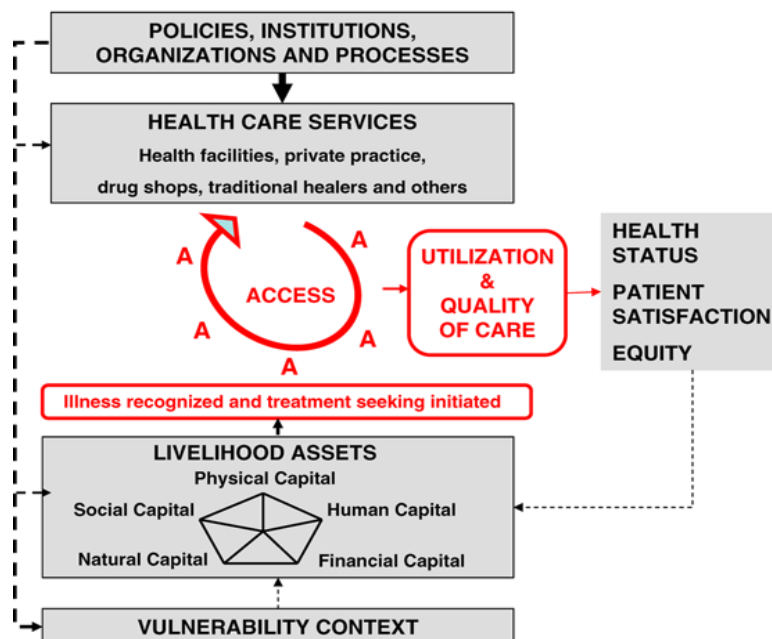


Figure 2-1: The health access framework
[Source: Obrist, Iteba et al.(2007)]

Note: Red highlights the main focus of this literature

With reference to these literatures, a conceptual framework to evaluate five dimensions of access for this study was prepared, which is shown in Figure 2-2. Like in Obrist, Iteba et al.(2007), effects of macro and micro level are observed on the dimensions of access to healthcare services. Factors in

each dimension should be measured to evaluate access. Once access is gained and service utilization is ensured, then people's perception on quality of care and satisfaction over each dimension can be used to analyse most influencing dimensions over access and their relationship with the overall satisfaction level of people.

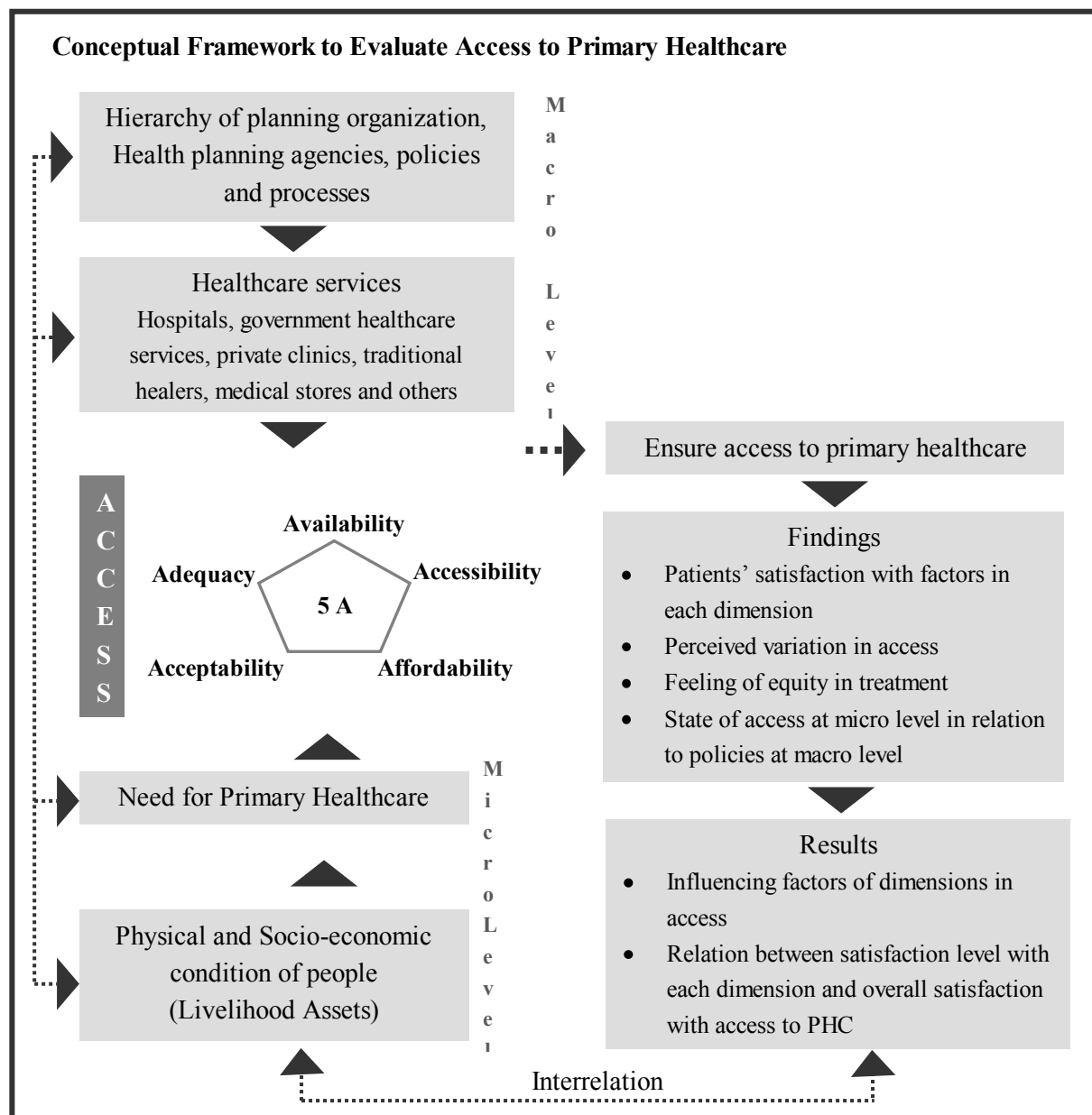


Figure 2-2: Conceptual framework to evaluate access to PHC

Although this study is limited to evaluation of dimensions of access, an overview on the service utilization and quality of care can be relevant to develop a clear concept on total healthcare system. This will allow to compare the perception of individuals on quality and satisfaction over different dimensions with those documented empirically in previous studies.

2.3.1 Healthcare Utilization and Quality of Care

Once need for primary healthcare is realized and access to service is achieved, then the quality of service provided can be checked by evaluating the healthcare utilization rate. This is carried out in

the ‘*Finding*’ section in Figure 2-2. Obrist, Iteba et al. (2007) mentioned that, improved access and healthcare utilization should be combined with good quality of care in order to get positive health outcomes. The outcomes can be observed by measuring health status, patients’ perception towards the level of satisfaction and equity. Quality in healthcare is multidimensional. Quality can be evaluated in respect with some predetermined standards (normative) or can be judged by more subjective way like measuring patient’s satisfaction level. For example, Maxwell (1992) have point out that results obtained from the people opinion on satisfaction can differ from the result obtained by evaluating technical efficiency of facility.

Campbell, Roland et al. (2000) defined quality of care from two principal dimensions; access and effectiveness. Access, as already mentioned, confirms if people are getting adequate primary healthcare at time of need and effectiveness confirms how effective is the care obtained. Quality of care is defined as “the ability to access effective care on an efficient and equitable basis for the optimization of health benefit/well-being for the whole population” (Campbell, Roland et al. 2000, p.1617).

Quality of care has been discussed in more elaborative form in Maxwell (1992). Author has point out some important components while defining the quality of care.

- Effectiveness: ensures if the treatment provided is the best available in a technical sense and evaluates the result of treatment.
- Efficiency: compares if the healthcare output is maximised for a given input or vice versa. For example comparing unit cost among different health facilities providing similar services.
- Relevance: observes if the overall pattern of services is the best possible considering the needs and expectations of population.
- Equity: looks into issues like relative fairness in treatment. It ensures if some people or group of people are being dealt less favourably.

These issues prove to be important while evaluating existing state of primary healthcare in my study. Individuals’ perception on issues like service quality, trust towards the ability of service providers and feeling of equity has been addressed while evaluating their satisfaction level with existing primary healthcare provision.

2.3.2 Equity in Access to Primary Healthcare

Achieving equity in access to primary healthcare has been a central objective to many health care systems. Most governments have declared that citizens should get universal and equal access to good quality of primary healthcare. The issue of equity should be addressed at macro level in the framework shown in Figure 2-2, while developing policies for health care planning.

“The concept of equity refers to the degree to which services or amenities are distributed in an equal way over different areas as well as economic, ethnic and political groups, with appropriate consideration given to the needs of special groups such as children and the elderly” (Omer 2006, p.254). Depending on context, policy makers give priority to different groups of people to secure equal access to primary healthcare. For example such groups are commonly defined by income; social status; geographical location; education level; ethnicity; gender; lifestyle etc. According to Andersen, McCutcheon et al.(1983) equity of access is obtained when services are provided on the basis of people’s need. This refers to proportional equity based on needs. Authors state that inequity exists if factors like race, income level or insurance coverage etc are important predictors of access.

Equity can also be seen from social aspect. According to Martinez (2005), to reveal the fact that inequalities within cities really do matter, it is essential to consider an approach from social justice perspective. Smith (1994) considers that justice involves treating people fairly, which in distributive justice means that whatever is being distributed should go to people in the right quantities. Social justice is concerned with the question of who gets what where and how, and more precisely who should get what where and how.

Equity in this study is related with the variation in primary healthcare service received by people across different socioeconomic classes. Further equity can be observed from peoples' perception on quality of service and personal treatment they receive from healthcare facilities. Comparing similar issues between different service providers, for instance government and private clinics, can further clarify the equity concept in this study.

Once concept is clear and dimensions of access are determined, an appropriate method should be used to measure each dimension in order to evaluate the state and (un) equal access to primary healthcare.

2.4 Measuring Dimensions of Access to Primary Healthcare

The need to measure each dimensions of access individually has been recognized in literatures in order to evaluate the overall access to primary healthcare either with respect to certain norms or from user's perspective. As the main objective of this study is to evaluate access to PHC from five dimensions adopted from literatures like Penchansky and Thomas (1981) and Obrist, Iteba et al.(2007), developing an appropriate method to measure each dimension becomes the main methodological problem in this research. To measure each dimension of access, they can further be divided into simpler quantifiable components. Developing quantifiable indicators of each component is a commonly adopted method in measuring access to healthcare. To clarify the concept of indicator, a brief definition, advantages and types of different indicators are explained in the following sections.

2.4.1 Developing Indicators to Quantify and Measure Dimensions of Access

Andersen, McCutcheon et al.(1983) have stated that there have been a number of summaries of the research on the indicators that correlates with evaluation of healthcare service which should be considered in various approaches while measuring access. Developing such indicators allows to measure variation, if exists, in any dimension of access to primary healthcare across different socio-economic groups. And if variation is found to be comparably high, then the indicators further enables to measure inequalities in different aspect of access. As mentioned in Martinez (2005), advantage of using indicators to measure inequalities is that they can communicate in a simple way while detecting and quantifying such variations. Indicators can also be used in monitoring the area of priority for policy intervention. The main functions of indicators can be summarized as to simplify complex phenomenon, quantify them to measure and to communicate the results. Depending on functions and purpose of policy, indicators are classified into three groups in Parnell and Poyser (2001) which is also explained in Martinez (2005).

- Descriptive or baseline indicators: describes the existing situation of some system or process. They are the initial data collected for each variable.
- Normative or target indicators: Once area of need is identified, target indicators help to set the expected target or goal to be achieved. They allow evaluating and comparing the existing condition with certain standard normally defined by policies.
- Performance or outcome indicators: enables to check if the targeted goals have been achieved from policy side and also allows observing users satisfaction level with the obtained result.

This study however is concentrated in developing descriptive indicators that exhibits the present condition of access to PHC across different socioeconomic groups of people, considering different dimensions of access. Development of indicators is focused on the needs, experiences and opinions of people (users) towards the existing access to PHC. This helps in highlighting the problematic issues or area of need to draw policy attention. Based on the concept of five dimensions of access, indicators were developed referring to the questions raised towards each dimension in Obrist, Iteba et al. (2007). To address the research question for sub objective 1, indicators were developed to distinguish different socio economic groups of people to see variation in dimensions of access. Various household characteristics can be summarized as indicators in order to come up with different socioeconomic classes. List of socioeconomic and access indicators developed for this study are presented in Appendix A with references from number of empirical studies in related field. These indicators can be continuous data like income, crowding, employment dependency or age dependency and categorical like education level, housing condition or ownership of assets. Detail description and rationale behind all indicators developed for this study purpose are presented in Appendix B.

The evaluation of access can be seen from two ways: subjective and objective perspective. Therefore subjective and objective indicators can be developed separately to measure them. The following section will explain more about these indicators.

2.4.2 Subjective and Objective Indicators

Being a matter of social concern, policy makers in healthcare planning have been interested in both objective and subjective approach in policy making process. Hence, developing subjective and objective indicators becomes important in this approach. Large number of literatures like Veenhoven (2002), Das (2008), Foo (2000) etc have stated the importance of both subjective and objective indicators while evaluating the quality of life, where healthcare has been an important domain of study. As explained in these literatures, objective approach focus on measuring ‘hard’ facts like income of family, education level, distance travelled to reach healthcare, cost paid for the service etc. The subjective approach on the other hand measures ‘soft’ matters like the people’s opinion or perception on some issue, their satisfaction level with income or the healthcare services. Subjective indicators express individual’s evaluation of objective matters. Subjective indicators are normally measured using Likert scale. Likert scale is a commonly used scale in research surveys and questionnaires related to subjective measures and respondents state their agreement to a level of statement. For example, 5-point Likert scale for satisfaction can range from: very satisfied, satisfied, neutral, dissatisfied and very dissatisfied. However there is no such defined range in Likert scale. For instance Turksever and Atalik (2001) used a 4-point Likert scale in evaluating subjective quality of urban life, while Das (2008), Foo (2000) and Ibrahim and Chung (2003) applied 5-point Likert scale. Both of these approaches hold their own importance in evaluating social problems and developing new policies. As mentioned in Veenhoven (2002), objective indicators provide information about the actual state of social problems and the effects of attempts to solve these problems. Such information is of indisputable nature or can be called objectively true which enables rational social action. Despite of many controversies against subjective indicators, like being irrational that hampers scientific management, Veenhoven (2002) stated that it is important in social policy making process for number of reasons such as:

1. Need of social policy to consider peoples’ psychological satisfaction and their support, as policy is not limited to mere material matters. Therefore, subjective indicators are required to achieve these subjective goals.
2. To evaluate the progress or outcome of policy intervention from subjective measurement.
3. Satisfaction level and preferences of people gained directly from people can better indicate comprehensive quality of services provided.
4. The distinction between ‘needs’ and ‘wants’ of people for certain service can be measured with subjective indicators.

In this study, objective indicators give information about the physical state of access to healthcare like spatial distance to healthcare service, travel time, waiting time, direct and indirect cost to be paid for service etc. Subjective indicator on other hand will provide information on the mental state of people towards all these issues along with their satisfaction level with over all access to healthcare service. Subjective indicators are concerned with individual's evaluations of various aspects of their healthcare-seeking experience like the convenience to get service, cost, service provider behaviour, or overall quality of the care they receive. For example, there might be a case when a person can physically access a healthcare with ease but he might not be happy with the quality of service or personal behaviour of facility personnel. There might be discrimination in medical as well as personal treatment for different socio economic class of people which leads to dissatisfaction among certain group of people. This kind of information related to personal feeling is gained from subjective indicators.

It is important to observe link between results obtained from subjective and objective approaches, as there are some contradictory conclusions about the relationship between these two approaches. For example, Das (2008) exhibits a weak relation between subjective and objective approach in measuring quality of life. However, Foo (2000) and Ibrahim and Chung (2003) recommend to use both indicators in order to complement the limitation of specific indicators.

2.4.3 Analyzing and Measuring Indicators

The conceptualization and the measurement of both indicators have been a major concern in healthcare research. According to Andersen, McCutcheon et al. (1983) multiple regression techniques have been applied to analyze a range of potential and realized access indicators. Objective measures, which normally refers to utilization rates, can be measured in different ways for example, simple proportion of people visiting and not visiting a healthcare facility within a certain period of time or total volume to service consumed. While analyzing subjective measures, some researchers have used satisfaction indicators as a determinant of utilization and others relate it as a consequence of utilization. Roghmann, Hengst et al. (1979) states that satisfaction measures are content oriented and its validity is generally assumed or assessed through correlations with other variables like their willingness to change the service providers if applicable. In such studies, regressions were computed to predict satisfaction from utilization and vice versa. Other statistical methods like descriptive statistics, multi regression, correlation and factor analysis can be applied to analyze the nature and relation among different types of data collected on various aspects of study (Field 2005). Lahelma, Martikainen et al. (2004) used logistic regression analysis to calculate inequality indices for health service. Martinez (2005) stated that factor analysis and multivariate statistical techniques are the most commonly used techniques in social research which are preferable approaches in measuring socio-spatial variations. Twp step cluster analysis or K-mean methods enables to obtain different clusters of socio economic classes using continuous as well as categorical variables as input data

These statistical analyses are relevant for this study for exploring and analyzing collected data on both subjective and objective measures of access. These analyses will enable to obtain relation between different dimensions of access and helps to validate the result obtained to evaluate overall access to healthcare service.

Along with statistical techniques, application of Geographical Information Systems (GIS) has a great importance in analyzing the observations and displaying results. Next section explains about the GIS application in related type of research.

GIS based Measures to Access

Increasing advancement in GIS in health organisations, together with the availability of data, has supported studies related with developing measures of access to healthcare services. Black, Ebener et al. (2004) stated that GIS is suitable in measuring spatial accessibility to healthcare as they enable researchers to input, store, manage, manipulate of both spatial and attribute (textual) data, analyze and visualise spatial information. Literatures like Bagheri, Benwell et al. (2005), Guagliardo (2004) and many more have explained about measuring spatial dimensions of access; availability and accessibility. Measuring straight line distance (Euclidean distance) and creating thiessen polygons are some simple methods in assessing physical access. For more detail analysis, sophisticated network analysis can be done calculating travel time, distance and mode of transport in GIS. Bagheri, Benwell et al. (2005) calculated driving time to primary healthcare (destination point) from patients' house (origin point) to apply least cost path analysis model using network analysis in Arc Info 9.1.

Higgs (2005) reviews number of literatures highlighting the use of GIS-based measures in exploring the relationship between geographic access, utilization, quality of healthcare service and health outcomes. These studies explore the spatial configuration of healthcare delivery system along with service quality measures; role of transport system used to reach the care service for different socio economic class of people and the characteristics of people or the area where they reside, seeking healthcare in measuring access to healthcare service.

GIS software provides spatial analysts that offer excellent tools for spatial data management and visualization. Amer (2007) has used GIS to identify and visualize trend like socially progressive or regressive pattern in the distribution of healthcare facilities. GIS in combination with other software like Flowmap is useful in identifying suitable location of facilities for certain number of facilities to a defined population or territory. This can ensure the optimal distribution of service in space considering the concentration of demand (people). Amer (2007) mentions that more sophisticated GIS-based analytical techniques, for instance GIS-based 'what if' in his study, can be used to evaluate and support improvement of healthcare service in terms of spatial equity and efficiency which can further support strategic planning of urban health services delivery.

As this study focus on spatial and non spatial components of access equally, a simple proximity measures can be applied to examine the influence of spatial dimensions on total access to primary healthcare service. Further observation on how peoples' perception of proximity to primary healthcare facilities can be related to actual proximity to validate the conclusion of this research.

2.5 Methodological Problems to be Resolved in Evaluating Access

Main methodological problems mentioned in the academic literature related to equal access are twofold. According to Oliver and Mossialos (2004) the first problem is to get consensus in the development of specific definition of healthcare which will enable healthcare policy makers to make policy that is more consistent in providing suitably (dis)proportionate access across different groups of people with different level of needs. This refers to providing appropriate unequal access for unequal need. The second problem is to develop an appropriate method to measure access. This requires the formation of standard policy that specify explicitly issues like: 1) the minimum relevant range which can be referred as a benchmark while evaluating the quality of healthcare services, 2) considerable level of convenience for all healthcare users, 3) margin of cost to be paid in obtaining basic healthcare and 4) the minimum amounts of information that people should have to get the advantage of healthcare services.

However, getting total consensus in defining access to healthcare is a cumbersome job, as is it not feasible to consider and fulfil the need of total population. Different individual might have different

perception and priorities about the concept and dimensions of access. More over developing universal standard to evaluate access can be impractical as it is highly determined by the geographical location, political condition to some extend and socioeconomic as well as cultural characteristics of users. Homogeneity of area, defined by above mentioned factors should be considered while developing social policies. Therefore, developing different standards for different homogeneous areas, considering little tradeoffs to minority, might be appropriate for measuring and evaluating dimensions of access in that particular area.

Another important methodological issue in related research in access is the effect of geographical scale of analysis in the results. The affect of scale of analysis over results is discussed in the next section.

2.5.1 Effect of Scale in Analysis

Spatially aggregated data often provided by statistics office are commonly used by researchers to investigate the contextual determinants of health. Most studies use census areas as the geographical units for convenience as detailed population data are available in this unit. Spatial extent or scale at which the analysis is done has an effect on their values and results. According to Stafford, Duke-Williams et al. (2008) results of analysis using aggregated data vary according to the selection of areal unit which is well-known as Modifiable Areal Unit Problem (MAUP). Schuurman, Bell et al.(2007) states that the complexity of scale in research analysis is of critical importance as large number of deprivation indices on health outcomes are being developed for policy implementation. Researchers use different indicators at different spatial scales to find area of service deprivation. This allows to observe the relationship between socio-economic difference and variation in healthcare service. This enables appropriate classification of high-risk populations, or the areas of deprivation to inform policy makers. “MAUP refers to the problem that occurs when inferences, based on spatial analysis, change when the same data are analyzed using either variations in administrative zoning or through different scales” (Schuurman, Bell et al. 2007, p.596). The two main components of MAUP mentioned in literatures are the scale effect and geographic boundary constraint.

Number of studies (Carstairs 1981; Cockings and Martin 2005; Haynes, Daras et al. 2007; Stafford, Duke-Williams et al. 2008) has stated that automated zone design techniques can be an option to counter the affect of MAUP. This helps to control the design of zoning system in order to create robust aggregation of spatial information for the intended analysis to be undertaken. In automated zone design, different zones are created by automated means in which zone boundaries are controlled by statistical design rules. Zone design technique can be used to create zones by maximizing the internal homogeneity of variable like physical or socio economic condition within each zone. A potential application could be the testing of hypotheses of causal links between variables. For example, if it is hypothesised that health condition in socially deprived area is worse than in well off areas, one could aim to create zones which are homogeneous in terms of social deprivation. If the hypothesis is true then strong resultant correlation could be expected between the independent variable, deprivation in this case, and dependent variable, health condition, for the newly created zones. Such zones might be created considering approximately equal population size at different scales (Cockings and Martin 2005) or internal homogeneity in terms of environment or social characters (Carstairs 1981; Haynes, Daras et al. 2007). Such zones are able to demonstrate stronger relationship between variables than census units, and that larger areas produced stronger relationships. Similar techniques were used in the 2001 England and Wales census to produce homogeneous output areas (Martin, Nolan et al. 2001).

Haynes, Daras et al. (2007) grouped 1991 Census enumeration districts (EDs) using similar material deprivation values , like housing type, in the zone design. Homogeneity of variables in each zone can

be measured by the intra-unit correlation (ICC) which can be calculated by dividing the variance component between zones by the total variance. Stepwise multiple regressions can be used to identify significant predictor variables.

From the review of these literatures, inappropriateness of spatially aggregated census data and ward boundary for specific analysis like health condition or service can be assumed. It can be concluded that automatically designed aggregation might reflect the actual situation for accurately than the pre-existing administrative area boundaries. Rogerson (2006) explains about the inconsistency in results of statistical analyses obtained from aggregated and disaggregated data. It is noted that “correlation coefficients tend to increase with the level of geographic aggregation when census data are analyzed. A smaller number of large geographic units tend to give a larger correlation coefficient than does an analysis with a larger number of small geographic units” (Rogerson 2006, p. 165).

Effect of scale is relevant in this study, as it aims to check consistency in results obtained from census and primary data. This will ensure the reliability of aggregated data over disaggregated one for particular studies like socioeconomic variability and access to PHC.

2.6 Conclusion

This chapter reviewed the general definitions and concepts used to describe access to primary healthcare service by various authors in different geographic context. As there is no such universally accepted standard in defining and measuring access, commonly used dimensions of access was explored which further developed into a model in measuring and evaluating overall access to healthcare provision. This contributed in development of the conceptual framework for this study.

Although this study concentrates on the evaluation of different dimensions of access to healthcare, review on different phases and aspects of healthcare outcome such as livelihood focus, healthcare utilization, quality of healthcare and health related equity issues was very useful to develop an overall idea on the primary healthcare system.

Access to healthcare can be measured by two approaches: subjective and objective approach. These can be measured by developing subjective and objective indicators for each dimensions of access respectively. In this research, indicators are the significant tools which simplify the dimensions in such a form that they can be quantified and measured.

Overview on different statistical and GIS applications in related researches are relevant for developing methodology for this study. Relation and dependency of variable in access can be obtained from different statistical analysis. GIS can be effectively used: to explore spatial characteristics of study area, in estimating proximity to healthcare facilities, to explore the spatial variation in access to healthcare and finally to visual interpretation of the results.

The review showed the importance of access to healthcare, regardless to geographic or socioeconomic context, in social policy making process. The output of this study is expected to highlight factors influencing the access to primary healthcare and to display how spatial as well as social variations exist in this regard.

3. Study Area Description and Healthcare Policies

This chapter presents a brief description on the study area and the planning process for healthcare. The description includes the geographic location, surface area, administrative units, and influence of decentralization, socio-demographic condition and other characteristics of the Province of Yogyakarta. Overview on the procedure and indicators used by government planning agency to develop policy standards related to health care service is also explained.

3.1 General Description of Study Area

The province of Yogyakarta is located in the South of Central Java Island. It is the second smallest province out of 33 provinces, after Jakarta in Indonesia with the total area of 3185 km². It is surrounded by the province of Central Java and bounded by the Indian Ocean on south. A distinct character of this province is that it still has its pre-colonial monarchy embedded in the administrative structure. Yogyakarta is the only province that is led by kingdom Kraton Yogyakarta, besides the formal government. Due to this reason it is known as the special region of Yogyakarta, Daerah Istimewa Yogyakarta or DIY in Indonesian. Apart from monarchy there is democratically elected legislative body, Regional People's Representatives Assembly known as Dewan Perwakilan Rakyat Daerah. Javanese is the main ethnicity with 97% of total population. Majority of people in DIY are city are Islamic with 91.8% followed by Christian (7.9%), Hindu (0.2%) and remaining Buddhist (0.1%).

3.1.1 Demographic Condition

Based on the result of National Socio-Economic Survey of Indonesia in 2005, total population in the province was recorded to be 3,281,800 in which 51% was female and 49% of male. Sleman regency has the largest population and Kulon Progo is the least populous. The population density in 2005 was 1030 person per km² with the growth rate of 1.88 percent. Between 1990 and 2000, Sleman regency had a growth rate of 1.45% accounting for the highest rate in the entire province. This phenomenon is supported by high population density in the municipality and compared to the others during that time. Figure 3-1 presents the population growth trend in the province from year 1971 to 2000.

The highest population density at present is in Yogyakarta city that is around 13,000 people per km² with area around 1% of total DIY area. In contrary, the density of Gunung Kidul regency is the lowest with around 470 people per km² with area coverage of 46% of the total DIY area. Figure 3-2 displays the population density per village in DIY according to figures in census 2005 and Table 3-1 shows the population density of DIY per regency. The province has experienced significant growth in terms of population in over 3 decades. Based on the result of National Socio-Economic Survey, the highest percentage of DIY population by age is productive (16 – 60 years old) people. About 14% of the total population are old, above 60 years. This shows that population of DIY tends to have a higher life expectancy.

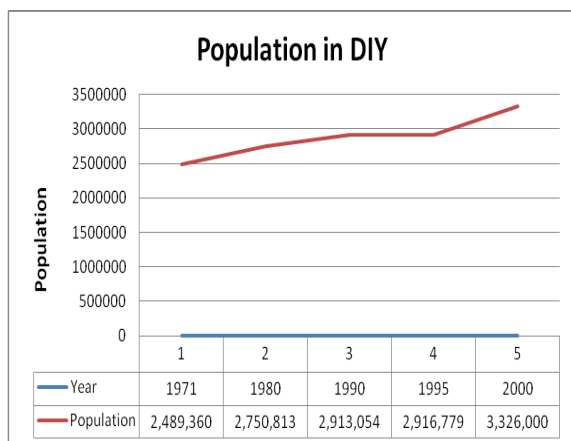


Figure 3-1: Population growth trend in DIY (1971 – 2000)
Source: Statistics Indonesia, 2008

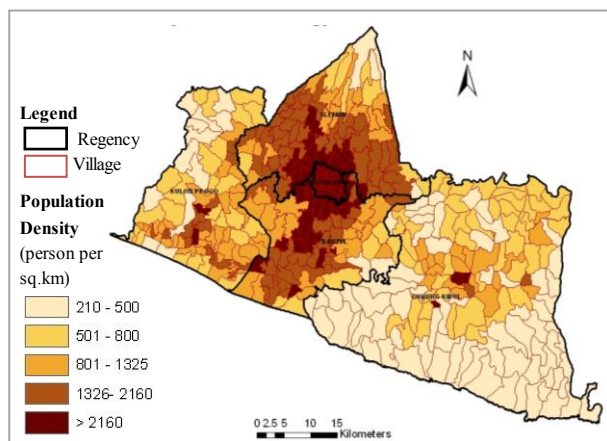


Figure 3-2: Population density map of DIY
Data source: Census, 2005

Regency	Area (km ²)	Population Density			
		2003	2004	2005	2006
Kulon Progo	585	640	640	660	635
Bantul	505	1600	1610	1,625	NA
Gunung Kidul	1,485	460	460	470	460
Sleman	575	1635	1640	1660	1755
Yogyakarta	32	12,025	12,445	12,935	13,600
Total	3,185	1000	1010	1030	787.15 ^a

Table 3-1: Population density per regency in DIY from years 2003 –

Source: Statistics Indonesia

Note: NA = Not available

^a = Not including Bantul regency

General exploration of demographic attributes of the Province of Yogyakarta is done in Arc GIS. Census data obtained from the Statistics office of Indonesia (BPS) for the year 2005 was used as it is the latest date for data availability. Information from census data is available on village level for the whole province. Some general demographic information for five regencies in DIY are listed in Table 3-2.

Regency	Bantul	Gunung Kidul	Kulon Progo	Sleman	Yogyakarta
State	Rural	Rural	Rural	Rural	Urban
Total population	800569	747782	447695	895408	515976
% of population in DIY	23.5	22	13	26	15.5
% of area coverage in DIY	16.5	46	18	18.5	1
Male (%)	48.5	48	49	49.5	51
Female (%)	51.5	52	51	50.5	49
No. of household	214558	178936	110867	236776	102716
No of districts	17	18	12	17	13
No. of villages	75	144	88	86	45

Table 3-2: General demographic characteristics of DIY

Source: Statistics Indonesia, 2005

3.1.2 Landuse and Economic Activities

DIY has been divided into two major land types: rural and urban. All four regencies have been stated as rural. Only city of Yogyakarta is defined as urban city by Indonesian Department of Public works. Population density and economic activities are the main criteria in defining it as urban. Apart from rural and urban land use, some areas are stated as preserved areas that include natural resources like mountain range and water catchment areas. Figure 3-3 shows the main land uses in DIY.

The economic structure in DIY is boosted by public service sectors like educational institutions and tourism. Agriculture, trade, and industry also have some contribution in economic development. Tourism sector has the major contribution to the GDP (Gross Domestic Product); however, agricultural sector employs the most people. Communication and transport sectors are gaining prominence over years which aid to development to large extend. Main economic activities in urban land use are trade and service while less populous rural areas are predominant by agriculture. However steady conversion of agricultural land to build up form can be observed in the periphery of Yogyakarta city, especially in Sleman on South. Shift from agriculture to other economic sectors has lead to tremendous growth in such sectors. This growth is attributed to huge amount of migrant population from areas outside the province. High rate of rural urban migration has resulted in high population density with widespread unemployment and lower living standard. Unemployment is problematic but with the rate fluctuating between 5–8%, which is comparatively lower than in other regions in Indonesia. These phenomenon leads to a heterogeneous society, dominantly in the city and its surrounding areas.

3.1.3 Administrative Units

There is a descending level of administrative subunits in the government administration process. There are twenty seven provincial level units which are divided into districts (*kabupaten*), sub-districts (*kecamatan*) and further into villages (*desa* or *kelurahan*). Village is the lowest tier of the administrative hierarchy. The nation is centrally governed from Jakarta since independence, from where national level decisions like line of authority, budget allocation, personnel appointments are done. Regional and local governments enjoy little autonomy. Their role is mostly administrative like implementing policies and regulations. They essentially serve as subordinate administrative units in local level, which support the functional activities of Jakarta based departments.

The DIY has four districts also known as regencies; Sleman, Bantul, Gunung Kidul and Kulon Progo and one city, the city of Yogyakarta which is the capital of the province. City of Yogyakarta is located centrally, surrounded by Bantul and Sleman on the South. Gunung Kidul is the largest regency with surface area of 506.80 km² where as the City of Yogyakarta has the smallest surface area of 32.5 km². The administrative units of DIY are shown in Figure 3-4. Rural regency has a regent and mayor in case of city of Yogyakarta, who holds the authority for the local development of public service sectors like education and healthcare facility. Next administrative unit is the sub district which also has a head person who has certain level of power in development and decision making processes. The sub district heads are directly accountable to the mayor or regents. Similarly there are village heads and village head office in each village, where village development plans or other service related problems are discussed before proposing to the higher administrative levels.

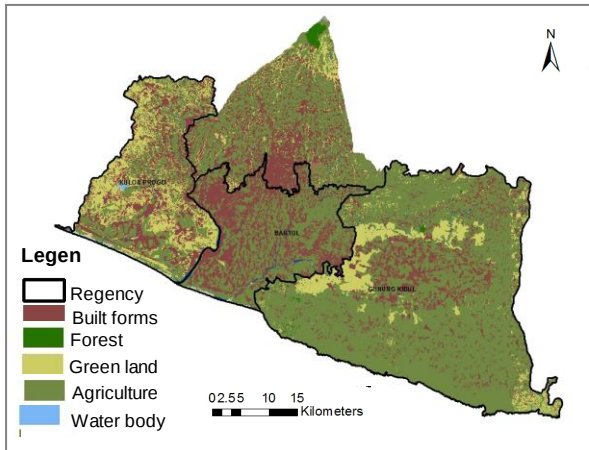


Figure 3-3: Land use of DIY
Data source: Census, 2005

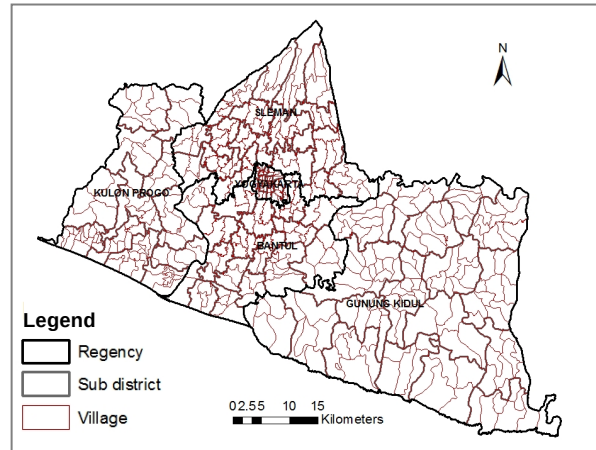


Figure 3-4: Administrative
Data source: Census, 2005

3.2 Health Policies and Planning Systems

Overview on the decentralization in Indonesia is useful for this study as the planning process and policies for healthcare service follows the regulations after decentralization. Significant influence of decentralization can be seen on public service sector including healthcare.

3.2.1 Decentralization

Decentralization is the devolution of political decision making to local governments and communities. The Indonesian Ministry of foreign affairs has defined decentralisation as “a means to hand over political, financial and administrative authority from central to local (regency/city) governments, so that the government can facilitate and guarantee better public services for the people.” Indonesia experienced decentralisation in 1999 with the passage of certain laws on Regional government (Law number 22/1999) and on fiscal balance between the centre and the regions (Number 25/1999). This restructured the administrative framework by providing local government the responsibility for planning and provision of public services. Central government is however responsible to monitor and evaluation such development processes. Decentralization is viewed as a positive development towards stronger association and transparency between people and public service developments. One advantage is that authority at local level is more aware with the ground situation and has greater knowledge about the service related problems. So they can meet the needs of people more efficiently, also being easily accountable by local people. By the distribution of power, better representation of local people is assumed to be achieved ensuring maximum public participation in development processes. It is further believed to enhance effective distribution of public services. Empirical studies on public services in Indonesia, documented in Yamauchi, Chowdhury and Dewina (2007), have demonstrated that physical accessibility to public services like school and hospitals has improved during decentralization period. But, per capita availability of school and local medical healthcare, *puskesmas*, have decreased over time. The authors mentioned that despite of the coordination in spatial allocation of such services, availability is coming up as a problem due to mobility of endogenous people and higher growth rate. These phenomena partially cancel the advantages of the coordinated efforts on public service allocation. There are some drawbacks of decentralization in public service delivery. Yamauchi, Chowdhury and Dewina (2007) states that investments in public service can be biased depending on local income and endowment which complicates the coordination of investment decisions across different socioeconomic communities. However it falls outside the scope of this research.

3.2.2 Health Policies and Strategies

The government of Indonesia has been redeveloping policies to improve the health service throughout the nation. One of the policy visions in the line is the creation of “Healthy Indonesia 2010”. As health is considered as a shared responsibility, the policy forces the Ministry of Health and Social welfare to develop collaborative relationships with other parties involving all strata of community, other related government agencies and private sector. As stated in WHO (2009) the “Healthy Indonesia 2010” is developed with the main goals:

1. To initiate and lead a health orientation of the national development
2. To maintain and enhance individual, family and public health along with improving the environment
3. To maintain and enhance quality, accessible and affordable health services
4. To promote public self-reliance in achieving government health

This study is related more to third and fourth goal. In the mean time, with the introduction of two new Acts on Local Governance (Act No. 22/1999) and on Financial Balance (Act. No 25/1999), the implementation of decentralization policy in Indonesia was emphasized from 2001. This empowered provinces and regencies with autonomy in formulating policies and decision making in health service considering local needs. It is believed that the service can be provided more effectively and urgent problems of the area can be resolved faster. Collaboration between the National Health Development and decentralization policy agreed on four paramount strategies serving as the pillars in formulating a Strategy for National Health Development, which are:

- a) Concept development of health
- b) Professionalism
- c) Community health maintenance assurance (Jamkesmas) and
- d) Decentralization

The third strategy is relevant for the scope of this study as it deals with the ‘affordability’ dimension in evaluating access to primary healthcare. It focuses on community health insurance programs like Jamkesmas. The aim was to guarantee equity in access to health services and the service quality. This program was based on the concept of adequacy, equity, efficiency and effectiveness.

Indonesian government has been trying to increase the healthcare for the poor people. According to the document provided by the health agency in Yogyakarta, in year of 2009 Department of Public Health raises the number of poor people who receive subsidy for health insurance premium from 36 million people (2005) to 60 million people (2009). Health insurance premium was also increased from 2.1 trillion (Indonesian Rupiah) to 3.7 trillion. By this increment, 60 million poor people are expected to receive free healthcare by bringing the insurance card to government hospital and local government clinic, puskesmas. As this policy is explicitly formulated for poor people, it is important to understand how ‘poor’ is identified. For social stratification, numbers of socioeconomic indicators are developed by the Planning Office at regency / municipality level in context of local area and living standards. The indicators includes attributes like income, employment status, physical condition of house, nutrition, possession of consumer goods like telephone, television, motor bike, car etc. According to the planning officer in Yogyakarta, the criteria for deciding different socioeconomic class of people does not focus on mere income, as considering the possible affect of

inflation in future. It is assumed that with certain level of income, one might not be able to maintain a similar kind of living standard in future, the way they are living at present, if the market price rises. These indicators are developed in reference to the census data. The central Bureau of Statistic (BPS) is responsible to provide data needed for similar planning procedure and for implementation. BPS data is used also for the financial allocations to districts and in estimating 'quotas' for poor people. The social data produced by BPS is collected through surveys like National Social economic survey (SUSENAS). Such survey is designed in order to collect social population data which is relatively in wider scope. Collected data includes information on education, health/ nutrition, housing / environment, criminality, social culture actions, consumption, income of households, possession of vehicle type and other consumer goods and household welfare level. A team is set at sub-district level for the survey in identifying poor households. When a household is considered to be poor after evaluating with those indicators, then it will receive a letter known as 'Surat Keterangan Tidak Mampu'. With this letter of poor the household receives free or highly subsidized rate at public services. With the possession of this letter, one becomes eligible to get a health card known as 'Katu Sehat'. The local authorities provide the lists of qualifying individuals and districts are allocated quotas for health cards, based on the estimated percentage of poor people residing in that district. Such cards cover the service cost of both outpatient primary care in puskesmas and free treatment at hospitals (generally at third class public hospitals).

A nominal rate of Rp. 5,000 (about US dollar 0.55) per month per card holder is set as the standard contribution rate. At present there are different types of free health insurance premium like Jamkesda (district level health insurance for poor), Jamkesmas (civil health insurance for the poor), Askeskin (Indonesia health insurance for the poor) etc depending upon their area and employment status. The main function of these insurance is the same as previous health card that is to provide subsidized health service and free in case of primary healthcare.

The national standards for healthcare service related to this study are presented in Table 3-3.

Service Area	Indicators	Service Standards		Quality
		Scope	Services	
Health care facilities	-Distribution of healthcare facilities / coverage of health services	For neighbourhood unit population should be less than 30,000	-1 unit medical post / 3000 people	Location of facility should be in centre of the sub-districts / districts Should be located in clean area far from disease sources , garbage dumping sites and pollutions
		-At least 1 unit of puskesmas / sub district	-1 unit of child and maternal healthcare (maternity hospital / BKIA) / 10,000 to 30,000 people	
		-1 unit of health post (posyandu) / village	-1 unit puskesmas / 120,000 people	
			-1 unit hospital / 240,000 people	

Table 3-3: National standards for health service, Indonesia

Source: Standard guidelines of minimum service level, 2001

The health policies seem to give priority to the spatial distribution and service cost. The report (Moeloe 1999) from the Ministry of Health documented that in spite of adequate number and distribution of health facilities, the health services are still below standards in terms of service quality as it is far from peoples' expectation. Another problem mentioned is regarding the uneven distribution of health service personnel, inadequate educational quality and unbalanced health manpower

composition which results in longer waiting time by patients in healthcare centres and low service performance. Although, there is not any officially documented policy regarding this issue, information related to waiting time in healthcare facilities was obtained from the interview with head of health planning agency and puskesmas personnel during fieldwork. According to them, the indented optimal waiting time is considered to be around 30 minutes. However, these issues need further policy attention.

3.2.3 Health Organization System

After implementation of decentralization, 349 regencies and 91 municipalities (also referred as district/regency/city) became the key administrative units. One level down in administrative hierarchy is the sub district, which has at least one public health centre, puskesmas headed by a medical doctor. It is usually supported by two or three sub-puskesmas, generally headed by nurses. The medical doctors occasionally visits the sub-puskesmas for instance once in a month for monitoring. Most of the puskesmas are equipped with four wheel ambulances for emergency cases also to support mobile health service to provide service to underserved populations in urban as well as remote rural areas. At village, the smallest administrative unit, there should be at least one integrated family health post. These health posts are established by community people with the help of medical assistant from health centres. The aim is to provide preventive healthcare service also to promote healthcare awareness. Midwives, both professional and traditional, are deployed to the villages commonly for maternal and child healthcare.

The hierarchy of organization of health system starts with the Ministry of Health at the national level. It is then followed by health planning agencies known as *dinas kesehatan* at province and further at district levels. Then puskesmas are established at sub district level which is followed by sub puskesmas, midwives and health posts at the lowest administrative unit (village). The flowchart of organizational structure of health system is shown in *Figure 3-5*.

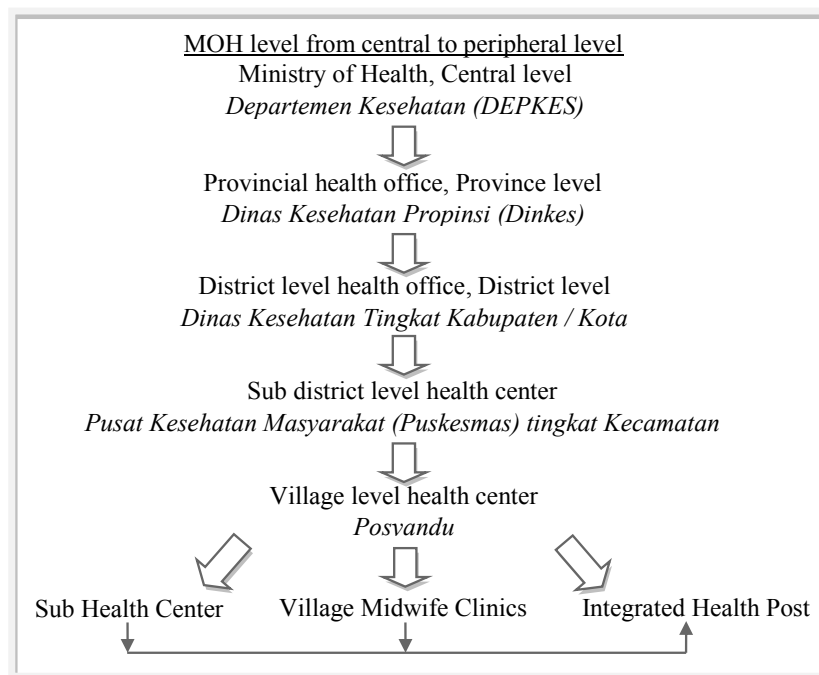


Figure 3-5: Organizational Structure of Health System in

3.2.4 Planning Process for Healthcare Service

Decentralization has provided a platform to support more community participation and involvement of different stakeholders in the development and planning process for public services. Both local communities and government organizations are often involved in the process of decision making for public goods investments and service allocation. This has encouraged the bottom up planning system. When people realize a need of certain healthcare service, villagers coordinated by the village office with a village head approach the health office at sub district level and then to district level with a proposal of investment project for that service. Then the district health office set a team of survey for the evaluation of validity of the need of that project. In presence of many project proposals, the district office selects a good project based on priority analyzed from the survey and thorough analysis. Then it allocates fund to the selected project, received from central government allocated for that region. However this process has some problems like difficulty in coordination and lengthy decision making period. As both local communities and government are involved in the decision making process for different projects, gaining consensus is a very difficult and lengthy process. And even with the government's effort to coordinate investments across communities in their jurisdiction, it cannot be guaranteed that the investments will be well coordinated to gain equal access of the service by all people. Hence attention is given in the coordination for an effective and faster project approval, planning and implementation to meet the demand of people.

Conclusion

This chapter provided general information on demographic condition in DIY such as population density, population growth trend, urban rural land use types and hierarchy of administrative boundaries. Such information was relevant for getting familiarize with the study area and also important in selection of areas for primary data collection. Brief explanation on health policies and planning process helped in understanding the healthcare system at macro level. This was important as one of the objectives in this study was to compare existing situation of access at micro level with the policy standards in the area context.

4. Research Methodology

This chapter contains the methodological approach to address the research questions of this study. Answers to the research questions are obtained by following a method that has five stages. In the first stage, literature and empirical studies of access to healthcare provided a firm base to develop initial concept of methodology. Research design is developed to determine the required data, source of data and methods of obtaining them. The second stage is pre-field work preparation for the fieldwork. General study about the study area along with the overview of available secondary data and information was carried out. In relation with the research question and possible availability of secondary data, questionnaire was prepared for household survey and interview with primary healthcare facilities. The field work of 28 days was carried out during which all relevant primary and secondary data was collected in the third stage. All collected data is processed and checked for its consistency in the fourth stage which is the post field work stage. The final stage is the data analysis. Methods for analysing both subjective and objective attributes are applied to study the existing state and variation in access to primary healthcare in the study area.

4.1 Research Design

The research design of this study is shown in Table 4-1. It presents details on data required, source of data collection, methods to be applied to obtain answers for research questions to achieve each sub-objective. The research design also includes the type of analysis carried out in this study

4.2 Fieldwork Preparation

A base map of study area was prepared with the available spatial data on administrative boundary and geo-referenced Google image. Various indicators were developed to quantify and measure five dimensions of access identified after literature review. Indicators developed under each dimension of access are presented in Appendix B along with description and rationale. List of all relevant information and household questionnaire for primary data collection was prepared accordingly. The questionnaire consisted of two major sections: first was the general information related to household and their socio-economic characteristics, second part focused on factors related to the access to healthcare facilities. This section included type of healthcare facilities respondent visited and their perception on satisfaction with various attributes of access to the facility. The questionnaire comprised questions on both subjective and objective attributes of access. From objective attributes answers for travel time, travel distance, cost, income level etc were obtained. Subjective attributes included personal perception of level of satisfaction with various dimension of access to health care facilities.

The questionnaire was developed in a simple structure which can be understood easily by respondents. Questions related to subjective attributes and ranking options were translated in the local language, Bahasa in order to be filled by the respondent themselves. An interview format was prepared to obtain information from health facilities personnel.

Sub-objectives	Research Questions	Required data	Data source	Methods	Analysis
1	- What are the appropriate methods to quantify and measure different dimensions of access? -Do all dimensions have equal importance across different socioeconomic group of people? - What is an appropriate areal scale for evaluating variation in access to PHC?	Literatures, Empirical studies Census data Socio-demographic characteristics Spatial factors (geographic location and distances) Individuals' perception	BPS – Statistics of DIY Household survey Center for Transportation and Logistic Studies, Gadjah Mada University (Pustrat, UGM)	1. Developing indicators for socioeconomic characteristics of respondent 2. Developing indicators for each dimension of access 3. Measuring perceived level of satisfaction with each dimension and overall access 4. Comparing perception on satisfaction level between different economic classes of respondent. 5. Synthesising indicators to developing summary scores for dimensions	Descriptive statistics; mean, range, standard deviation percentage count Two step cluster analysis GIS; Proximity measure Chi square test Correlation coefficient Coefficient matrix Plotting summary scores in multi-dimensional charts Standardized residuals
2	-How is the planning for healthcare done based on health policies and national standards? -Is the existing situation of access to healthcare in accordance to policy standards?	Health policy and planning standards for healthcare facility in DIY Demography data Number of existing healthcare facilities Spatial factors (geographic	Planning for Health Department (Dinas Kesehatan) Regional Development Agency DIY Province (Kepatihan Yogyakarta) BPS – Statistics of	Studying planning process for healthcare service in DIY Comparing predefined standards with existing situation.	Ratio of population to healthcare facilities and Total number of doctors Distance proximity measure Evaluating individuals' perception over policy measures

		location and distances)	DIY		and their implementation
3	-How different scale of analysis affects the result in mapping socioeconomic and service variation in PHC? -Does the result of analysis based on aggregated data, for larger spatial boundaries, matches the actual situation within those areas?	Census data: Aggregated socio-demography data; information on access to healthcare; spatial data Disaggregated data on similar issues from primary source	BPS – Statistics of DIY Pustral, UGM Household survey	Comparing aggregated census data with disaggregated household data. Evaluating consistency in statistical analysis	Descriptive statistics; percentage count Coefficient of variation Correlation coefficient

Table 4-1: Research Design

4.2.1 Study Area Selection

For the selection of study area, units of administrative boundaries were considered. The province of Yogyakarta consisted of five regencies (districts), 77 sub districts and 438 villages. For this study, village was an appropriate unit of observation since it was the basic unit of consensus-building for bottom up approach in decision makings. The scale of analysis was chosen also in concern to the secondary data to be obtained, as data were available on such administrative boundary. Certain criteria were developed for selecting sample villages for detail study. Population density, socioeconomic heterogeneity and spatial location of villages were considered for selection. Percentage of prosperous household figure presented in census and visual interpretation using Google image was used to determine heterogeneity in socio economic condition. All regencies in DIY followed similar health policies formulated at the province level, regardless to different socio-demographic structure in rural and urban regency. For instance, according to one of the health policies, there should be at least one puskesmas in each sub district. However it did not mentioned about the geographic area or population size of such sub districts. As area and population of sub districts in rural and urban regency has vast difference, a comparative analysis of access to PHC between rural and urban area was intended in this study. City of Yogyakarta being the only urban regency, it was selected purposively. Two villages Tegalpanggung and Kricak were selected from city of Yogyakarta. Tegalpanggung had the highest population density in the whole province and located in the centre of city of Yogyakarta, hence was selected. Kricak was located at extreme northern boundary of the city with comparatively higher population density than other villages located in boundaries. Reasons to consider geographic location was to observe variation in access to PHC, if any, in highly crowded city core and growing city fringe. Another spatial characteristic of these villages was the river and major road network defining the physical boundaries. Dense informal settlement was found along the river bank in west boundary of both villages. In contrast to this, more formal basically commercial activities were found along main road lines. Such characteristics were assumed to provide the possibility of exploring heterogeneous group within each village. Villages

were selected also considering the geographic area coverage and percentage of population covered by those villages in relation to the respective sub districts they belonged to. Selected villages had the largest area and population size among other villages within that sub district, hence was considered to be representative for that sub district. This criterion was checked as the third sub objective of this study was related to analysis of scale effect. Hence for comparative analysis between aggregated data for sub districts and disaggregated data at village level, most representative village were chosen.

Sleman was selected as rural regency as it had highest population density among four rural regencies in DIY. Village Tridadi was chosen from Sleman considering higher population density and heterogeneous mixture of formal and informal settlement observed from Google image. Administrative support provided to carry out survey and interview in related health organizations in this village also played some role in the selection. After selection of villages, sampling strategy was designed to carry out household survey. The main objective in this strategy was to collect data which was representative of the population in village as far as possible.

4.2.2 Sampling Strategy

Depending on time constraint and limited financial resource, total sample size for this study was determined to be around 300 households from three selected villages. This was about 3 percent of total number of households residing in all three villages. Therefore proportional number of household from each village was calculated considering the same percentage. Random sampling was applied for the selection of households within those villages.

After the purposive selection of villages and determination of sample size, random sampling was applied for the selection of household for survey. Digitization in ArcGIS was done to define the cluster of built forms within each village. The digitized pockets excluded the major road and vacant lands as far as possible. The built form in two villages in city of Yogyakarta was more dense and clustered together. Therefore, grid of 100 meters by 100 meters was laid over the digitized pockets and then calculated numbers of random points were created over grid boxes in ArcGIS. These points were pre determined for each village, i.e. 3 percent of total household in the village. Digitization and random points were also laid for the third village. However, grid was not applied due to the sparsely located smaller pockets of built forms. Number of sample points within each digitized pocket was decided according to the area covered by those pockets. Location and random points of sample units for household questionnaire is shown in Figure 4-1.

4.3 Field Work

The required data for the study was collected from two main data sources; primary and secondary sources during fieldwork.

4.3.1 Primary Data

Household survey was carried out in the selected villages along with three surveyors in their local language. Objective data and individual perception about different aspect of the primary healthcare facilities was collected through structured questionnaire from 28th September 2009 to 9th October 2009. Prior to the real household survey, the questionnaire was well explained to the surveyors and required translation of certain portion in questionnaire was done. A pilot survey was carried out in one study village to confirm the surveyors understanding of the questionnaire, also to check the time length required to complete one questionnaire. The criterion for household survey was that the respondent must be the head of family or the spouse of the head of family. This criterion was set so that the respondent should be able to give the detail information about the whole household members,

for example overall income level. It was assumed that the head of family or spouse can reflect the perception or feeling of all other household members.

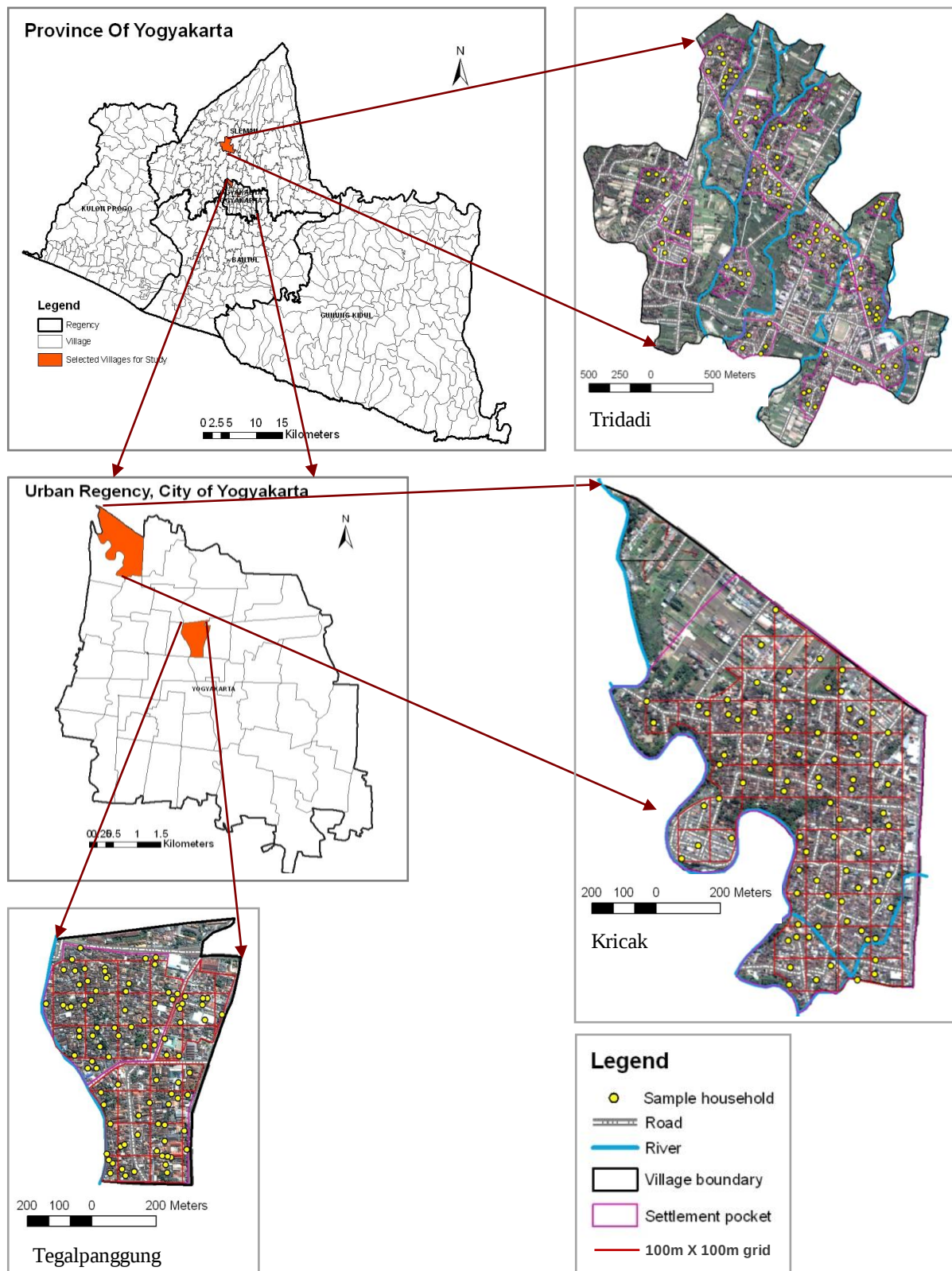


Figure 4-1: Location of surveyed household in

Note: Image obtained from Google Earth-Pro, acquired in 2007

Ten questionnaires were filled in pilot survey. The time required to complete one questionnaire was about 20 to 30 minutes. Certain changes were done after the pilot survey in order to further clarify the questions. Surveyors were given training in reading map over laid with satellite image, in order to find the spotted house on image for survey. In case of unavailability or unwillingness of respondent in the spotted house or if the spot is on land use type other than residential, the survey was carried out in the nearest house from the spot. Second part of the primary data collection was interview with personnel at two health planning agency, Dinas Kesehatan at City of Yogyakarta and Sleman regency and with medical staffs at 5 public healthcares, Puskesmas, in three sub districts containing the sample villages. For this purpose, an official request letter was issued from the University of Gadjah Mada and a permission letter from the municipality was obtained. Then mentioned health planning agencies and puskesmas were visited along with a local translator in the appointed date. Purpose behind the interviews at health planning agencies was to gain understanding about the health planning process and related policy structure in study area. And purpose of interviews at puskesmas was to understand type of health services being provided and to query about common problematic factors, if any, in access to healthcare reported by patients. Some photographs from fieldwork are displayed in Figure 4-2 .



(a) Household survey with the help of local surveyors



(b) Socioeconomic heterogeneity with in village (Kricak)



(c) Data collection from health planning agency and public healthcare facility, puskesmas

Figure 4-2: Data collection and fieldwork observations

4.3.2 Secondary Data

Census data for the whole province of Yogyakarta for year 2005 was obtained from the Center for Transportation and Logistics Studies, Gadjah Mada University. This data was provided by the Statistics office of the province. Spatial data like administrative boundary of study area for the whole province along with road network data was also obtained from the same organization. Census contained number of socio-demographic information at village level for the whole province.

Knowledge on the planning system for health facilities was gained from the visit to regency planning office and health agency. Few supporting documents on numbers of different healthcare facilities and medical doctors were also acquired. Table 4-2 displays the list of secondary data collected during field visit.

4.4 Post Fieldwork

Data collected from primary source, questionnaire and interviews, is processed, checked for consistency and entered in digital form. After entering, every 10th household data was cross checked with the filled questionnaire, to ensure the accuracy in entering. As most of the collected documents were in local language, *Bahasa*, required translation was done. As the census data contains a huge number of attributes related to socio demographic information, infrastructures, agriculture and other public services, only limited attributes relevant to this study were selected and translated in English for further use.

4.5 Challenges During Fieldwork

Some difficulties and constraints were faced before and during the data collection.

- Lack of sufficient data and information on socioeconomic condition and health facilities hindered the selection of villages and finalization of questionnaire before field visit.
- Due to absence of high resolution satellite image, preparation of base map for sampling for household survey took time. Processing high resolution image from Google pro and geo-referencing and preparing mosaic from small pieces of images was time consuming.
- Spatial location of healthcare facilities was not obtained as per expectation. Location of five puskesmas, in three sub districts containing selected villages, and hospitals being visited by respondents were spotted in Google image with the help of secondary document collected from health planning agencies and with the help of local spatial knowledge. Personal visit was made to the spotted health facilities for conformation.
- Language barrier was another difficulty during fieldwork. As a consequence, survey had to be done with the help of local surveyors and translators.
- Documents obtained from planning and health agency was in their local language. Translation required extra time and effort.
- Sample size had to be limited due to time and financial resource constraint.
- Due to the Muslim festival 'Idul Fitri' fieldwork had to be stopped for a week. During the festival period all related organizations were closed for interviews. Also due to unavailability of local surveyors even household survey could not be carried out.

Type of Data	Description	Data condition	Source
Spatial data	Administrative boundary; Province, regency, sub-district and village	GIS data (vector)	Pustral, UGM
	Road network	GIS data (vector)	Pustral, UGM
	River	GIS data (vector)	Pustral, UGM
Demography data	Population data, geographic socioeconomic data	Excel Document (hard copy)	Pustral, UGM BPS- Statistics of DIY
Health Facilities	Number of health facilities per village (public hospitals, puskesmas)	Excel Document (hard copy)	Regional development agency DIY (Kepatihan Yogyakarta)
	Number of medical doctors per village	Excel Document (hard copy)	Health Agency (Dinas Kesehatan) Puskesmas
	Standards in health policy and information on regional health insurance	Document (hard copy)	Health Agency (Dinas Kesehatan)

Table 4-2: Collected data from secondary sources

4.6 Data Analysis

4.6.1 Socioeconomic Stratification of Sample Households

Analysis of socioeconomic strata of respondent was relevant, as the major part of this study was based on the subjective perception of respondent on dimensions of access to PHC, which was assumed to be influenced by their socioeconomic characteristics. Also socioeconomic attributes such as possession of letter of poor and government health card, explained in section 3.2.2, were important as being directly related to the dimension affordability. Number of socioeconomic attributes collected from household survey was combined together in order to categorize each sample households into different socioeconomic groups. Description and rationale for each socioeconomic indicators used is presented in (Appendix B).

In this study different attributes of household characteristics were given equal consideration in evaluating their socioeconomic status rather than limiting to a single variable like income. Amer (2007) explained that using single variable like income or education to distinguish social strata oversimplifies the result and cannot reflect the actual reality. The author also highlights the negative possibility of using scoring method in which variables are assigned certain weights based on some assumption, which are later combined to come up with one value as the final result. This approach has some drawbacks, as the process of assigning weights is preconceived and subjective approach. Therefore to avoid such possibilities, Amer (2007) used a multivariate and exploratory stratification approach, Two-Step Cluster analysis. This analysis is adapted in this study for similar purpose.

Two-Step Cluster analysis is an exploratory tool designed to reveal natural groupings within a data set. The algorithm used in this process offers number of beneficial features like 1. ability to create clusters using both categorical and continuous variables, which is suitable for the data set in this study; 2. it enables automatic selection of the number of clusters based on similarities and dissimilarities within and between clusters. It also allows user to specify the number of clusters if

needed and 3. it can efficiently analyze large data set. Clusters can be characterized based on the descriptive statistics provided for each input variable. After classification, GIS is applied to visualize the spatial distribution of households from different socioeconomic classes within each sample villages, to see socioeconomic heterogeneity at village level.

4.6.2 Measuring Dimensions of Access to PHC

Descriptive statistics was used to measure both objective and subjective indicators developed under dimensions of access to PHC. The first three dimensions of access to PHC; *availability, accessibility and affordability*, was measured from objective as well as subjective approach by developing indicators. The remaining two dimensions; acceptability and adequacy, being subjective in nature only subjective indicators were developed to measure perception of respondent on related issues. During household survey, questions were asked about objective and/or subjective aspect on each dimension of access to PHC. The subjective perception over each indicator and overall satisfaction level with access to PHC was measured using 5 point Likert scale that ranged from very satisfied to very unsatisfied. Statistics like mean, standard deviation and minimum – maximum range was used to compare variation in objective indicators such as travel distance, time and waiting time in health facilities between different villages, health facility users and socioeconomic classes. For travel distance, Euclidean distance was measured in GIS between sample household points and visited public health facilities as reported by respondents. Descriptive statistics, i.e. cumulative percentage of respondents is calculated to compare the subjective satisfaction level with each indicator and over all access to PHC.

For categorical data, cross tabulation table was used as it is a basic technique for examining the relationship between nominal or ordinal variables. It also offers a test of independence and measures of association between such variables using Cramer's V statistics. If the frequency of subjective opinion in Likert was less than 5 in cross tabulation, then 5 point Likert scale was aggregated into 3. This was done by considering 'satisfied' and 'very satisfied' as one value indicating positive opinion and 'dissatisfied' and 'very dissatisfied' was replaced with one value indicating negative opinion. Neutral opinion was left unchanged.

Correlation matrix was computed between levels of satisfaction with various indicators and overall access to see the significance and strength of correlations. Factors which had highly significant strong correlation can be considered as better predictors of overall satisfaction level with access to PHC.

4.6.3 Synthesising Indicators

Summary scores were developed for all dimensions of access by synthesis of underlying indicators, as it is hard to deliver a meaningful message from indicators alone when looked from a broader perspective of policy making. Developing a summary score by synthesising indicators by considering their relative importance into a single value has been a common practice which enables easier interpretation for policy maker. "It is the analysis of indicators against the wider context and policy objectives that provides the added value of converting information into intelligence" (Wong 2006, p.81). This will provide a more explicit evaluation of the state of access to PHC following the concept developed for access in this study.

Considering equal importance of all dimensions in access, equal weights were applied to each indicator while developing a summary score. Also as there was no reference of subject matter expert's opinion on prioritization of different indicators, equal weights were applied. The concept followed while developing indicators based on their relevance referring to literature Obrist, Iteba et al. (2007) can fairly justify the use of equal weights for this study.

Box plot was used to see the nature and range of summary score distribution. Following Wong (2006) average value of summary scores for each village, health facilities and socioeconomic classes were plotted in multi dimensional radar chart for visual interpretation. As the result of equal weighting, information on dominant problematic factors might get lost while developing summary scores. Hence referring to Amer (2007), standardized residual was used to see variation in occurrence of satisfaction level with each indicators under dimensions. Residuals give the difference between observed frequency of cases with satisfaction and the expected frequency, specifying the deviation from the expected average number. It helps to observe how proportion of respondents from different cases (villages or using different health facilities) differed based on their satisfaction with each indicator.

4.6.4 Access to PHC in Relation to Existing Health Policies

One of the objectives of this study was to compare the existing situation of healthcare service in terms of access, with health policies and planning standards in study area. This enabled to compare the existing situation of access at micro level from people's perception with planning norms at macro level. As discussed earlier in section 3.2, after decentralization, provinces and regencies were empowered with autonomy in formulating policies for public facilities including health. Hence health policies and standards formulated at provincial level were referred for descriptive analysis.

Information on spatial distance to health facilities and number of doctors working for public health facilities, obtained from census data was used to prepare choropleth maps to display spatial variation in geographic distances from villages to nearest public health facilities in DIY. Also maps were prepared to display relative variation in population doctor ratio referring to the Indonesia's average population doctor ratio obtained from Dash (2000).

Descriptive statistics, i.e. cumulative percentage, was used to compare the existing state of factors related to access to healthcare, which are also mentioned in health policies of DIY.

4.6.5 Scale Effect in Analyzing Socioeconomic and Access Variation

To achieve answers to the research questions related to the effect of scale in analysis, a comparative study was done between primary and secondary data source. The purpose was to explore the consistency of the results obtained from aggregated and disaggregated data. Referring to different techniques to minimize scale effect (refer section 2.5.1) from empirical studies (Carstairs 1981; Hyera 2003; Stafford, Duke-Williams et al. 2008), this study was concentrated on socioeconomic homogeneity of three selected villages to observe variation in socioeconomic characteristics and access to healthcare within each village. Common variables related to socioeconomic and access to PHC was selected between primary data and census for comparison.

Descriptive statistics like percentage count, mean, minimum-maximum range of the common variables was used to see how well census figures at village level represented the actual condition within villages obtained from primary data collection.

Variation observed at village level was compared with the variation at sub district level using similar variables from census data. Referring to Turksever and Atalik (2001), variability in socioeconomic attributes and access to PHC was explored in terms of coefficient of variation (CV) at sub district and village level. Coefficient of variation was computed by dividing the standard deviation of each attributes by its mean and it indicated absolute variation within sample villages. This will further aid in analysing variation obtained from different sources of data. In all applicable cases, CV was computed using aggregated village data from census to observe variation at sub districts level and disaggregated household data for variation within each sample village.

Referring to empirical studies on scale effect, it was assumed that correlation coefficients tend to increase with higher level of geographic aggregation. “A smaller number of large geographic units tend to give a larger correlation coefficient than does an analysis with a larger number of small geographic units” (Rogerson 2006, p.165). Hence to ensure consistency of aggregated and disaggregated data in statistical analysis, correlation coefficient was checked between similar variables of access from different source of data.

5. Perceived Access to PHC at Micro and Macro Level

This chapter presents the results of analysis in four main sections. First section includes the general characteristics of the sampled households, emphasizing socioeconomic attributes. Measurements and analysis of indicators on each dimension of access to PHC is presented in the second section. The results of the analysis of perceived satisfaction level with each dimension including variability in their multiple indices are presented in this section. Third section evaluates the existing state of access comparing with health policies and standards in DIY. The last section contains the comparative analysis of common variables between census and household data to show the consistency of using aggregated data in this type of study.

5.1 Household Characteristics and Socioeconomic Stratification

Household characteristic

General characteristics of 273 sampled households were explored to get an idea of the collected data prior to running other analyses. Majority of respondents were female and about 75% of households were composed of 3 to 6 members. As the survey was carried out in day time between 9 am to 6 pm and most of the households have male as working members. As the province of Yogyakarta is renowned for educational institutes, literacy rate was found higher than the national literacy rate which was 71% in 2008 according to Statistics of Indonesia (BPS), also larger than the ratio for the province itself (65% of literacy). Person above 15 years old who have attained formal education and are able to read and write is defined as being literate by BPS. About 79 % of sample households were found to attain education from senior high school up to university level education. The household monthly income was classified into 5 ranges starting from 700,000 Indonesian Rupiah (IDR). Absolute income poverty line for province of Yogyakarta was defined as 194,830 IDR per capita for year 2008 by BPS, which is equivalent to around 21 US dollar per month. This was less than 1 dollar per day per capita if referred to Millennium Development Goal poverty indicator. Using such standard poverty line could not reflect the actual state of reality, as it differs from country to country. Hence, poverty thresholds or indicators should be chosen as per the context of study area. Range of income was designed assuming average household size of four members considering the income poverty line by BPS. About 38% of households stated to be in the range below 700,000 IDR out of which 65% of households have more than 4 members. The percentage of households below income poverty line in the province was 18% in 2008 as stated by BPS. Around 67% of households reported to have the letter of poor from the local government. Majority of the interviewed houses (52%) were semi permanent with half non brick or wall and non plastered floor. This shows a significant difference with the figure stated by BPS for 2008, which was 13% of semi permanent houses in the province. Definition of each category of construction type was referred from the census questionnaire from the BPS (presented in Appendix B). Regarding basic infrastructures like water source and sanitation, majority of households with 58% used well water and around 77% had private toilets with septic tanks. These figures are similar with the percentage presented by BPS for the whole province of Yogyakarta.

From these figures, it can be said that the study area have larger proportion of poor households as compared with the statistics for the province provided by BPS. However, it is in better state in terms of literacy rate when compared with the provincial as well as national literacy rate.

Socioeconomic stratification

A number of socioeconomic indicators were used as input variables in the Two Step Cluster Analysis to assign each household a socioeconomic class. Prior to performing cluster analysis, independence of variables was explored by checking relation between them to ensure if there is any strong association between variables. Number of iterations was done entering and removing different socioeconomic variable to come to a reasonable result of classification. Finally, cluster analysis was performed using thirteen independent variables. As the analysis produced only two automatically formed clusters, a specific number of clusters was entered to get three classes of socioeconomic strata for this study. Three clusters were identified that distinguish well off and poor households with middle socioeconomic class in between. The result is summarized in Table 5-1.

The first cluster was composed of 43% of total sampled households. This cluster had the lowest percentage of university level education attainment and all households with no formal education fell in this cluster. There was a distinct difference in the proportion of monthly income range and possession of letter of poor in this cluster. About 89% of households in this cluster had monthly income in the lowest range of 700,000 IDR with about 80% of households possessing the letter of poor. This cluster had the highest percent of households which does not have house ownership and with temporary housing structure among three clusters. The ratio of bedrooms to total household members was the lowest however the difference is insignificant with cluster 3. Average value of age dependency (ratio of member from age 16 - 60 to total household members) was lowest among three clusters. Similar was the case with the mean value of ratio of employed members to total household members. The mean value for the number of assets like bicycle, motorbike, telephone and refrigerator owned by households in this cluster was also lowest although the difference is less between the third cluster. From this statistics, cluster one was considered to belong to lower socioeconomic cluster (LSEC) among three.

Cluster two was composed of 35.5% of total sample households with largest percentage (42.3%) having university education attainment. Monthly income range was distinctively higher and comparatively lower portion of households with the letter of poor. The result of house ownership status was contradicting from other indicators, as cluster three had the highest percentage of households with house ownership. However, significantly large portions of houses were with permanent structure with better physical condition and larger bedroom ratio. It can be assumed that living condition can be better in such house than in poor structured with ownership. It was also supported by the result of highest portions of houses with private toilet and none of houses without toilet. The average values for the ratio of working age members and employment ratio to the total household members were higher than other two clusters. Also the mean values of all household assets were large with all households having car in this cluster. This cluster presents the better living condition and higher socioeconomic characteristics, therefore considered as higher socioeconomic class (HSEC).

Most of the statistical results of the last cluster were in between cluster one and two which was composed of 21.6% of total sample households. This cluster had similarities in results with other two clusters in case of different indicators. For instance, none of the household without education and with lowest range of income was in this cluster, which is similar to cluster two. Also the combined percentage of higher education attainment is close. On other hand, the value for permanent structure of houses, type of toilet, working age ratio, employment ratio, bedroom ratio and asset possessions were similar to that of cluster one. Therefore, this cluster was considered to be in better socioeconomic condition than the first cluster and worse than the second, so it was considered as middle socioeconomic class (MSEC).

		Cluster characteristics (Frequency %)				
		Overall frequency %	1(LSEC)	2(HSEC)	3(MSEC)	
Indicators			N=117 (42.9%)	N = 97 (35.5%)	N = 59 (21.6%)	
Categorical variables	Education level					
	No education	0.5	1	0	0	
	Below senior high school	19.5	35	5	12	
	Senior high school	41	42	34	43	
	University	31	22	42	37	
	Others	8	0	19	8	
	Range of monthly income					
	Less than 700,000	38	89	0	0	
	700,000 – 1,400,000	39	10	42	88	
	1,400,000 – 2,800,000	19	1	47	12	
	2,800,000 – 5,600,000	4	0	11	0	
	Above 5,600,000	0	0	0	0	
	Possession of letter of poor					
	Yes	68	80	54	64	
	No	32	20	46	36	
	House status					
	Owned	78	61	85	100	
	Not owned	22	39	15	0	
	Type of house construction					
	Permanent	39	13	86	14	
	Semi permanent	53	69	14	81	
	Temporary	8	18	0	5	
	Toilet type					
	Public	18	27	2	27	
	Private	77	66	98	65	
	No toilet	5	7	0	8	
Indicators		Overall mean	Cluster mean			
			(Higher value indicates better socioeconomic condition)			
Continuous variables	Household characteristics					
	Age dependency (16 - 60 years / total members)	0.59	0.54	0.66	0.57	
	Employment ratio	0.37	0.28	0.52	0.31	
	Housing Condition					
	Bedroom ratio	0.54	0.47	0.66	0.49	
	Asset possession		Cluster mean and % with asset possession			
			(Higher value indicates better socioeconomic condition)			
	Number of bicycles	1.01	0.79 (57%)	1.32 (67%)	0.95 (65%)	
	Number of motorbikes	1.24	0.68 (56%)	2.08 (93%)	0.97 (73%)	
	Number of cars	0.07	0 (0%)	0.2 (19%)	0 (0%)	
	Number of telephone	1.38	0.94 (50%)	2.1 (90%)	0.95 (56%)	
	Number of television	1.15	0.91 (80%)	1.52 (99%)	1 (93%)	
Number of refrigerator	0.55	0.21 (21%)	0.99 (76%)	0.47 (48%)		

Table 5-1: Statistics of different socioeconomic clusters

[Note: LSEC = lower socioeconomic class; MSEC = middle socioeconomic class; HSEC= higher socioeconomic class; N = number of households]

In this way, each household was classified into three different socioeconomic strata which were used for the subsequent analyses that follow. The proportion of each socioeconomic class for the sample

villages is shown in *Figure 5-1*. The portion of LSEC household was found to be greater (almost 48%) in village Tegalpanggung. This village had the highest population density in DIY and is located in the core of Yogyakarta city. Employment opportunity could be one reason for the poor household to concentrate in the city core, which avoids the travelling cost for work. Also the west boundary of Tegalpanggung is defined by Chode River, along which informal settlement resides. Kricak had the highest portion (40%) of HSEC households. However, difference in proportion between HSEC and LSEC was not much (only 3.5%). Tridadi also had highest portion of LSEC households (44%) followed by HSEC households (37%). Kricak and Tridadi are steadily growing villages in terms of population and economic activities, as located in the periphery of Yogyakarta city. As observed during field survey, the majority of physical living condition (housing condition) was found better in Kricak and Tridadi with less temporary houses with bigger living area. During survey it was noted that better off households preferred to live in urban periphery that offers bigger space, as the core being highly dense. Also they normally owned a private vehicle, generally motor bike, so transportation was not a big problem to reside at considerable distance from city core.

Figure 5-2 shows some of the general characteristics of different socioeconomic clusters and Figure 5-3 displays the spatial distribution of different socioeconomic classes in three villages.

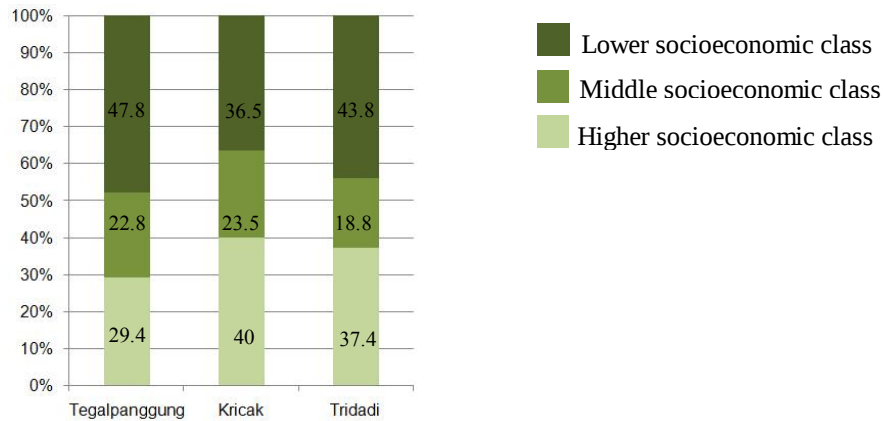
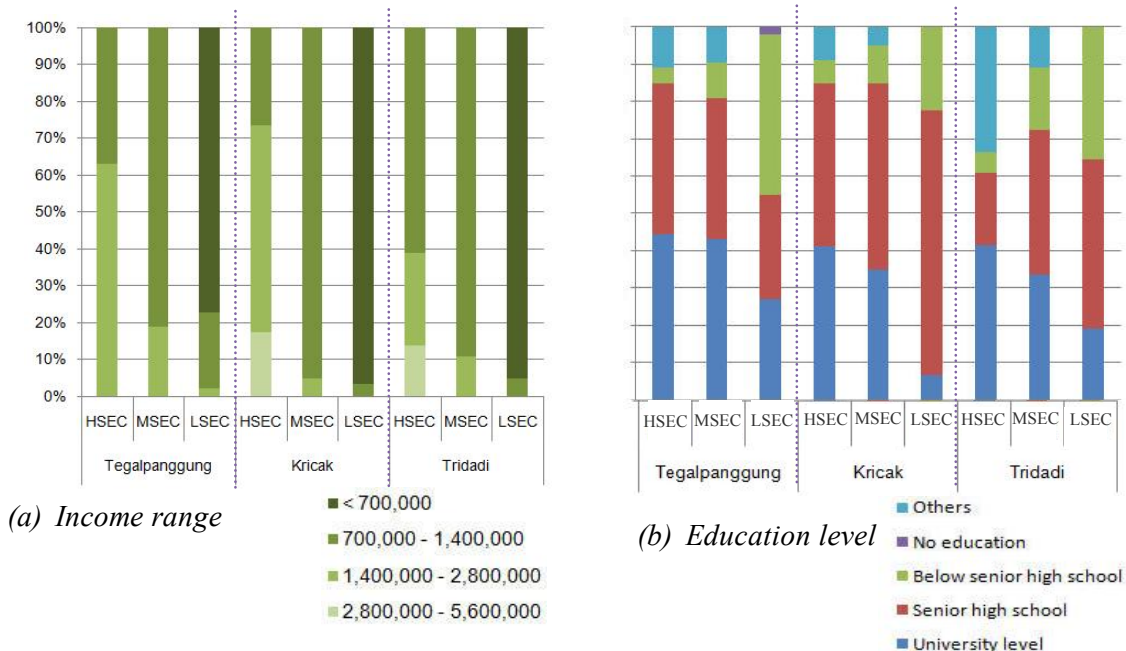


Figure 5-1: Proportion of socioeconomic cluster per village



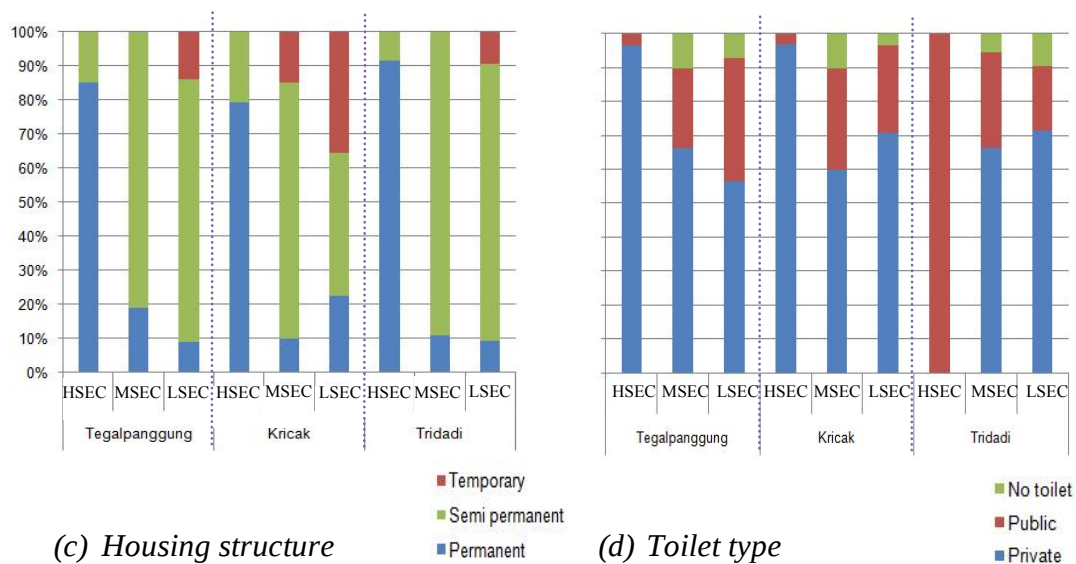


Figure 5-2: General characteristics of socioeconomic clusters per village



Figure 5-3: Spatial distribution of socioeconomic classes

5.2 Measuring Dimensions of Access to PHC

Depending on the nature of indicators developed, each dimension of access to PHC was measured and compared using descriptive statistics. This allowed to observe variation in state of access from different dimensions between households from different villages, visiting public and private health facilities and belonging to different socioeconomic classes.

5.2.1 Descriptive Statistics for Availability of PHC

For availability, questions like type of health facilities; need to get an appointment before visiting PHC facility; waiting time to get check up by doctors and provision of medical supply were asked. Around 75% of respondents reported to visit public healthcare facilities which were available at every sub districts. About 18% of total respondents mentioned about the need to get an appointment before visiting private clinics. None of the respondents stated about difficulty in getting appointment as it could be easily done by telephone. In general availability of medicine did not seem to be a problematic factor, as 97.5% of respondent mentioned that it was supplied by the public health facilities itself or, if not, by a pharmacy near to the facilities. Among all these issues, respondents expressed discontent only with the waiting time before getting check up especially in public health clinics, puskesmas. This problem was remarkable as large percentage of respondent with 42% of total were dissatisfied with long waiting time in health facilities. Hence, waiting time seemed to be an important factor to be considered in availability in this study. As length of waiting time differed depending on type of health facilities, for instance public or private healthcare facility, attributes related to availability was studied separately for different facilities being used by respondents.

Type of primary healthcare facilities in use

Government healthcare centre, *Puskesmas*, was found to be the most common healthcare facility in study area for primary healthcare. About 65% of total respondents from all three villages mentioned puskesmas as the first PHC facility they visited. Total percentage of households visiting puskesmas for PHC was about 53%, 79% and 60.5% for Kricak, Tegalpanggung and Tridadi respectively.

Private clinic was found to be the next common facility with 18% of total households visiting it; mostly those belonged to higher socioeconomic class. Remaining 17% visited hospitals or sub-puskesmas. The proportion of households visiting private clinics was greater in Kricak with about 22.5% followed by Tridadi with 20.5% and 10% in Tegalpanggung. This can be related to the result of socioeconomic classification. As the portion of better off households was higher in Kricak, so is the case with the visit to private clinic. Similarly, majority of households in Tegalpanggung belonged to lower socioeconomic class so the proportion of visit to private clinics is least among three villages. The proportion in Tridadi was in between Kricak and Tegalpanggung. However the difference is very less with Kricak in both cases.

To check if socioeconomic status influenced the selection of PHC facility, relation between socioeconomic class and type of facility visited was checked. Significant medium association was found between these variables with Cramer's statistic .45 ($p < .001$). It was assumed that the socioeconomic status influenced the selection of particular health facility to some extent. Hence the perception on different dimensions of access based on type of facility being visited might change accordingly.

Waiting time in PHC facility

Waiting time in PHC facility before getting check up by doctors showed a great range of difference starting from 5 minutes to 3 hours. The range differed depending on the healthcare facility visited which is shown in Table 5-2. Difference of around 50 minutes was found in the average waiting time at puskesmas and private clinic. It was noted that the mean value for public facilities like hospitals, puskesmas and sub puskesmas, was greater than the maximum waiting time for private clinics. The overall mean values of waiting time for Kricak, Tegalpanggung and Tridadi are 50, 60 and 45 minutes respectively, which did not show much variation. Further subjective perception on the waiting time was asked using a 5 point Likert scale starting from very short to very long. Figure 5-4 shows the percentage of overall and respondents' in village and per facility type that were categorized in each level of Likert scale based on their response. Respondent's perception about waiting time in health facilities was not very different when compared between villages. But large difference was observed in case of private and public healthcare facilities. Subjective perception was assumed to vary with personal as well as socioeconomic characteristics of respondents. For instance, about 10% of respondents visiting a private clinic stated 'long' for the waiting time of 20-30 minutes. On other hand, about 25% of respondents visiting puskesmas stated 'normal' for the waiting time from 45-90 minutes.

Facility visited for PHC	% of households	Waiting time in minutes		
		Minimum	Maximum	Mean
Hospital	8.4	15	120	44
Puskesmas	65.2	10	180	65
Sub –puskesmas	8.7	10	90	38
Private Clinic	17.7	5	30	15
Overall waiting time in minutes before doctor's check up without considering different facility visited for PHC	100	5	180	52

Table 5-2: Descriptive statistics of waiting time in health facilities

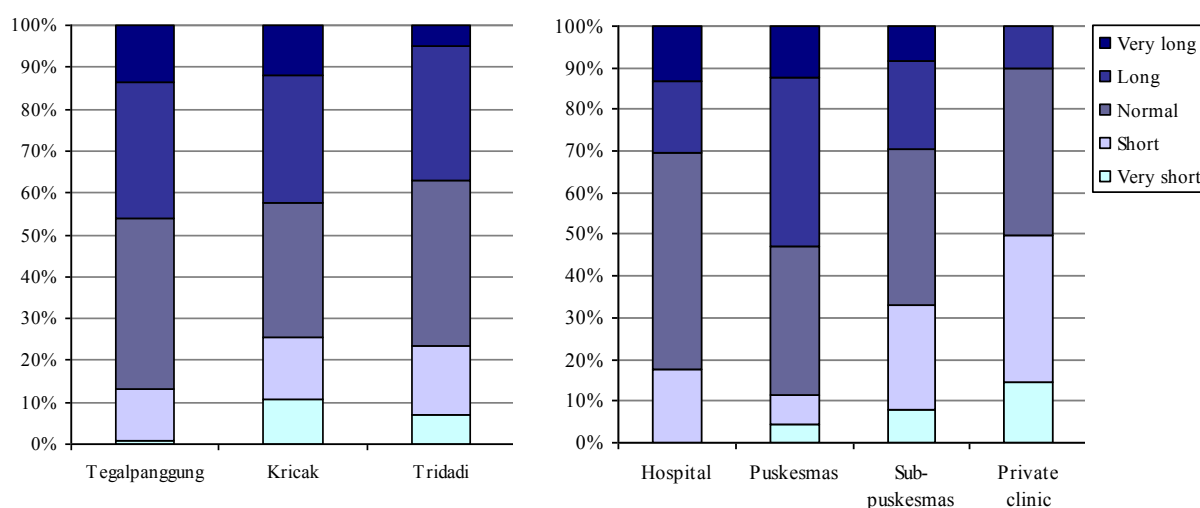


Figure 5-4: Percentage of subjective perception on waiting time in

5.2.2 Descriptive Statistics for Accessibility to PHC

Physical accessibility was measured in terms of travel impedance. Objective and subjective questions were asked regarding travel distance, travel time and mode of transport to reach the PHC facility. For accuracy, geographic distance from household point to the reported public health facilities was measured in GIS instead of using reported travel distance by respondents. Overall mean for measured travel distance was about 1450 meters and travel time was about 10 minutes. Majority of respondents around 70% stated the travel distance to be near and very near when asked in a 5point Likert scale. Similar responses were found about travel time to reach the PHC facility. Only about 3% of total respondent stated far for travel distance. Remaining answers were stated as normal. Figure 5-5 shows the perception of respondents regarding travel distance and travel time for each sample village.

Regarding the mode of transportation, large portion of respondents (50.5%) used motorbike to visit the healthcare centre and about 39.5% used bicycle or walk. As the physical distance was not a problem, only a small portion (7%) of respondents used public transportation and remaining 3%, those from well off class, travelled by car. Depending on respondent's opinion, it can be said that in general physical accessibility did not seem to be a major problematic factor in access to PHC in the study area.

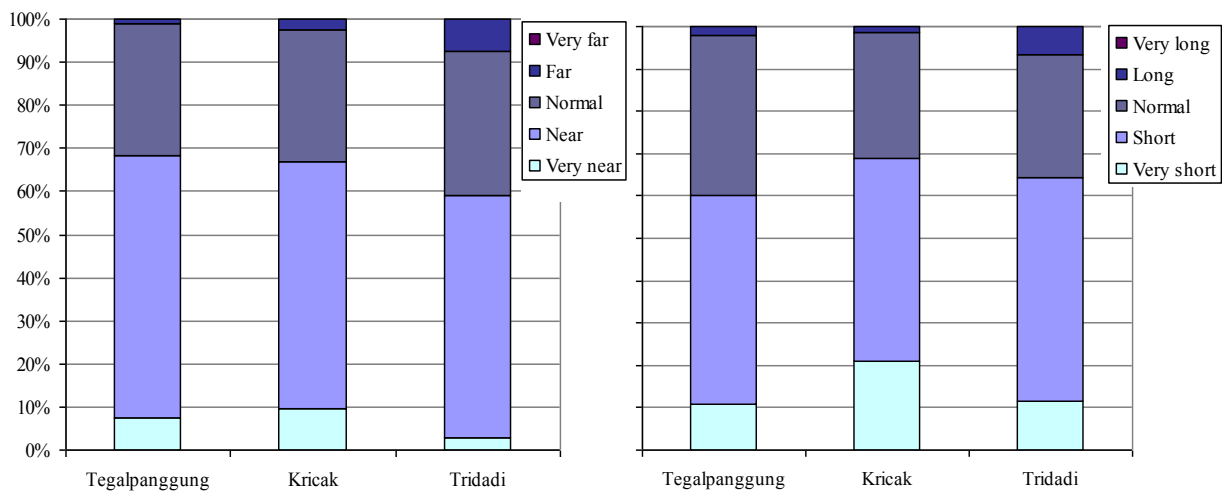


Figure 5-5: Percentage of subjective perception on travel distance and travel time to PHC

5.2.3 Descriptive Statistics for Affordability of PHC

Affordability was measured including direct and indirect expense of healthcare service by asking costs and opinion about various healthcare costs. Possession of health card issued by local government, 'Katu Sehat' was asked as it was a relevant aspect in affordability that influences respondents' subjective perception. About 55% of households stated to have the card, among which 54.5% are from lower socioeconomic class. Majority of households (50%) which did not have health card belonged to the higher socioeconomic class. Primary healthcare service cost was found to be nominal in all puskesmas even without the card. However, it differed and was higher for private clinics. As private clinic was visited mostly by well of class, majority of total respondents stated service cost to be inexpensive. When asked about travel cost, 93% of respondent stated it to be normal or inexpensive. Similarly, 80% said medicine cost to be normal or inexpensive as in most cases medicine cost was covered by the health card. After asking about individual costs, opinion on the total PHC cost was asked. Only 13 % of total respondents expressed it as expensive. This could be due to medicine cost in cases when respondents did not have health card or if medicine was not

provided free of cost by health facilities. 34% of total respondents said that total cost to be normal and remaining 53% said it was inexpensive. The percentage of perceived attributes on total cost of PHC per village and healthcare facility type is presented Figure 5-6. Although in general, people have positive to neutral opinion about healthcare cost, in some cases up to 20% of respondents expressed dissatisfaction towards it. It may not be a major issue but deserves attention.

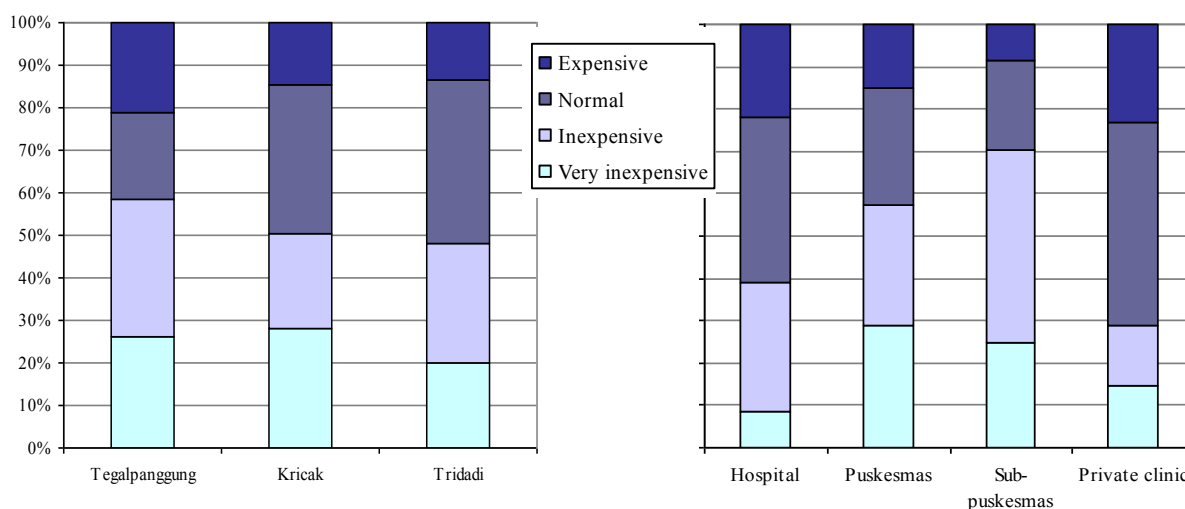


Figure 5-6: Percentage of subjective perception on total cost for PHC

5.2.4 Descriptive Statistics for Acceptability and Adequacy of PHC

Acceptability and adequacy were measured from respondents' perception on issues related to cultural or religious preference in selecting particular healthcare facility. Factors like preference towards gender of medical personnel, physical appearance of facility, service opening hour, trust in medical ability and opinion about inter-personal treatment from facility personnel were investigated. When respondents were asked if choice given, will they have any religious preference in choosing particular healthcare facility, only 12.5% of total respondents said yes. Further a question was asked about the gender preference of doctors in PHC facility. At the first instance, majority of respondents answered that gender of doctor was not an issue for healthcare. Question was then elaborated giving an option, if there were equal number of male and female doctors in health facilities would they have any preference to be treated by particular gender of doctor. Then 42.5% of respondent mentioned if applicable they would prefer female doctors for female patients and only 9% said male doctors to male patients. However, even after the given option, 48.5% of respondents still stated that gender of doctors did not matter for both male and female patients. Figure 5-7 (b) displays the percentage of two opinions on gender preference when applicable, by considering preference of male or female doctors to respective patients as 'yes' and no gender preference for both as 'no'. This result showed that religious factor was not a prominent issue while selecting a healthcare facility though people had certain preference towards the gender of doctors especially for female if given an option. However, these issues did not seem to significantly influence peoples' acceptability of healthcare facility while evaluating overall access to the facility at present context. Higher literacy rate could be a reason for better state of acceptability as highly significant association was found between the level of literacy and score of acceptability index (Cramer's $V = .513$, $p < .001$). Also the province was homogeneous in terms of religion as 90% of population was Islamic. Such issues related to acceptability are relevant in areas which are more heterogeneous in terms of religion, ethnicity or race.

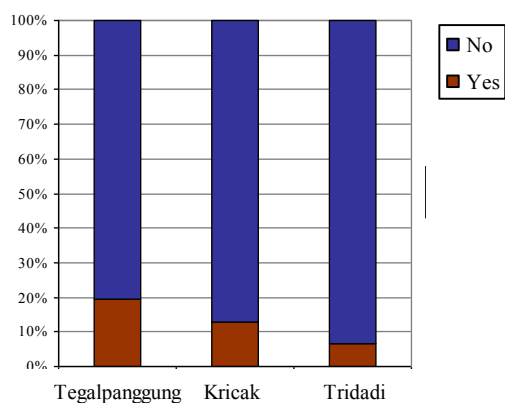
While measuring adequacy, respondents did not complain about physical appearance or cleanliness of the PHC facility, both public and private, as 99.3% of total respondent were satisfied with the

cleanliness of healthcare facility they visited. Opening hour of facilities also did not seem to be a major issue, as 87% of respondent stated that the opening hour suits their working schedule.

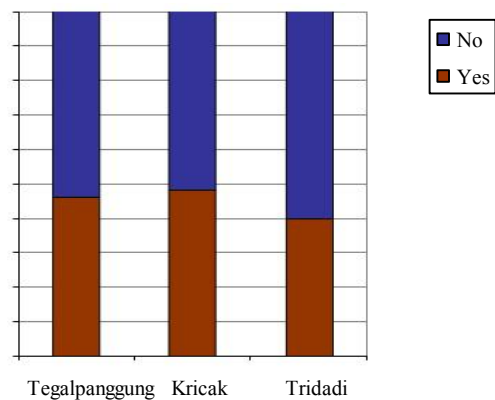
When asked about the trust in medical ability of healthcare facility visited, 93% of respondent had positive to neutral opinion and only 7% said it was bad. All respondents who were unsatisfied visited puskesmas for healthcare. Majority (89.5%) of those who visit private clinic stated the medical ability to be good and remaining expressed neutral perception. Chi square test was done to see if any relation exists between the opinion in medical ability and the facility visited. Significant medium association was found between these variables with Cramer's statistic of .41 ($p < .001$). Although the association was not very strong, it can be said that perception on medical ability, to some extent, was based on the type of facilities people visited.

A question was asked about the feeling of inter-personal treatment by medical personnel. About 40% of respondents expressed dissatisfaction and answered it to be bad, out of which 80% were visiting puskesmas. 35% of respondents stated that the personal behaviour was normal and 25% said it was good. Chi square test between facility type and opinion of personal treatment showed highly significant medium association between these variables similar to the previous case of trust in medical ability and type of facility (Cramer's $V = .3$, $p < .001$). Perceived opinions on different factors related to acceptability and adequacy are shown in Figure 5-7.

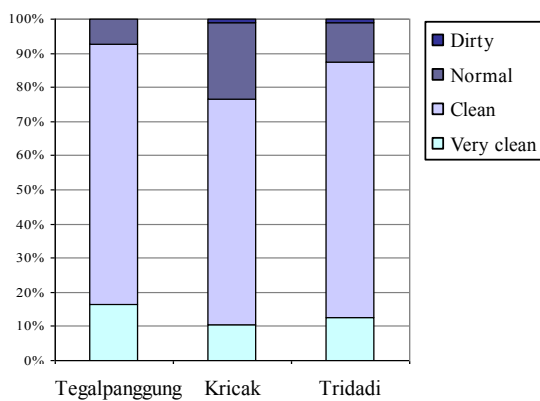
From interviews with households and puskesmas staffs, it was known that there are four different hierarchy of service provision by public health facilities; VIP, 1st class, 2nd class and 3rd class depending upon quality of service and service cost that patients are willing to pay. Priority for service was given starting from VIP to 3rd class. Patients with health card seeking for free PHC received the 3rd class service. When asked about difference in such services, respondents did not complain about quality of service but mentioned about unfriendly behaviour of medical staffs.



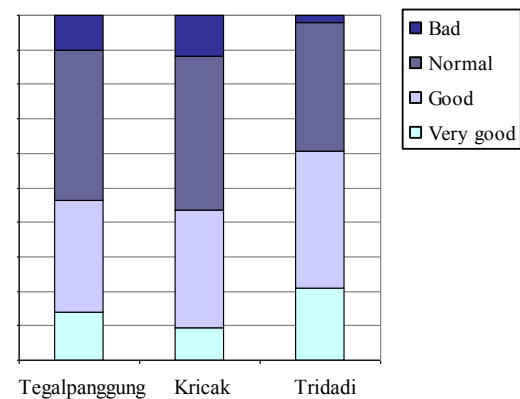
(a) Religious importance



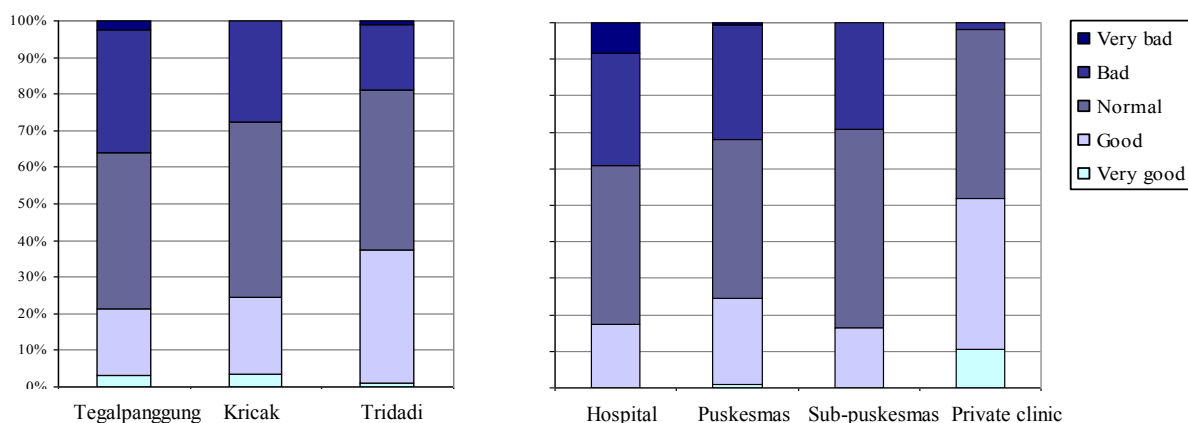
(b) Gender preference for doctors



(c) Physical appearance of PHC facility



(d) Trust on medical ability



(e) Inter-personal treatment by medical personnel

Figure 5-7: Percentage of subjective perception on factors related to acceptability and adequacy

5.2.5 Overall Satisfaction Level with Access to PHC

After asking about the subjective opinion on each dimensions of access, overall satisfaction level with access to PHC was also asked in 5 point Likert scale, considering all the factors in dimensions. Majority of respondent with 48% of total expressed dissatisfaction or very dissatisfaction. 34% said satisfied or very satisfied and remaining 18% expressed neutral opinion about the access to PHC facility. The satisfaction level was then checked for different socioeconomic classes. Large portion of households (45%) expressing satisfaction towards access were from higher socioeconomic class and majority of households (51%) expressing dissatisfaction belonged to lower socioeconomic class. When level of satisfaction was checked for different types of health facilities, remarkable difference was found between public and private facilities. Around 60% of respondents visiting puskesmas reported to be unsatisfied whereas this figure was less than 5% for private clinics. These results can be interpreted with significant medium association between socioeconomic status and type of facility being visited found by Chi square test in section 5.2.1. Figure 5-8 presents different level of satisfaction within villages, socioeconomic cluster and per healthcare facilities. Significant strong association was found between the type of facility (private and public) and the level of satisfaction to access to PHC (Cramer's $V = .51, p < .001$).

Further to ensure the level of satisfaction, respondents were asked if their income is doubled do they still want to visit the same PHC facility. 38% of respondent said they will visit the same facility and 62% said they want to change the facility. Chi square test was computed to see if there is any association between the satisfaction level and willingness to change the health facility. Result showed highly significant medium association between these attributes (Cramer's $V = .42, p < .001$). This indicates that respondent's willingness to change the health facility was related to their satisfaction level with access to healthcare facility and these attributes were related to each other.

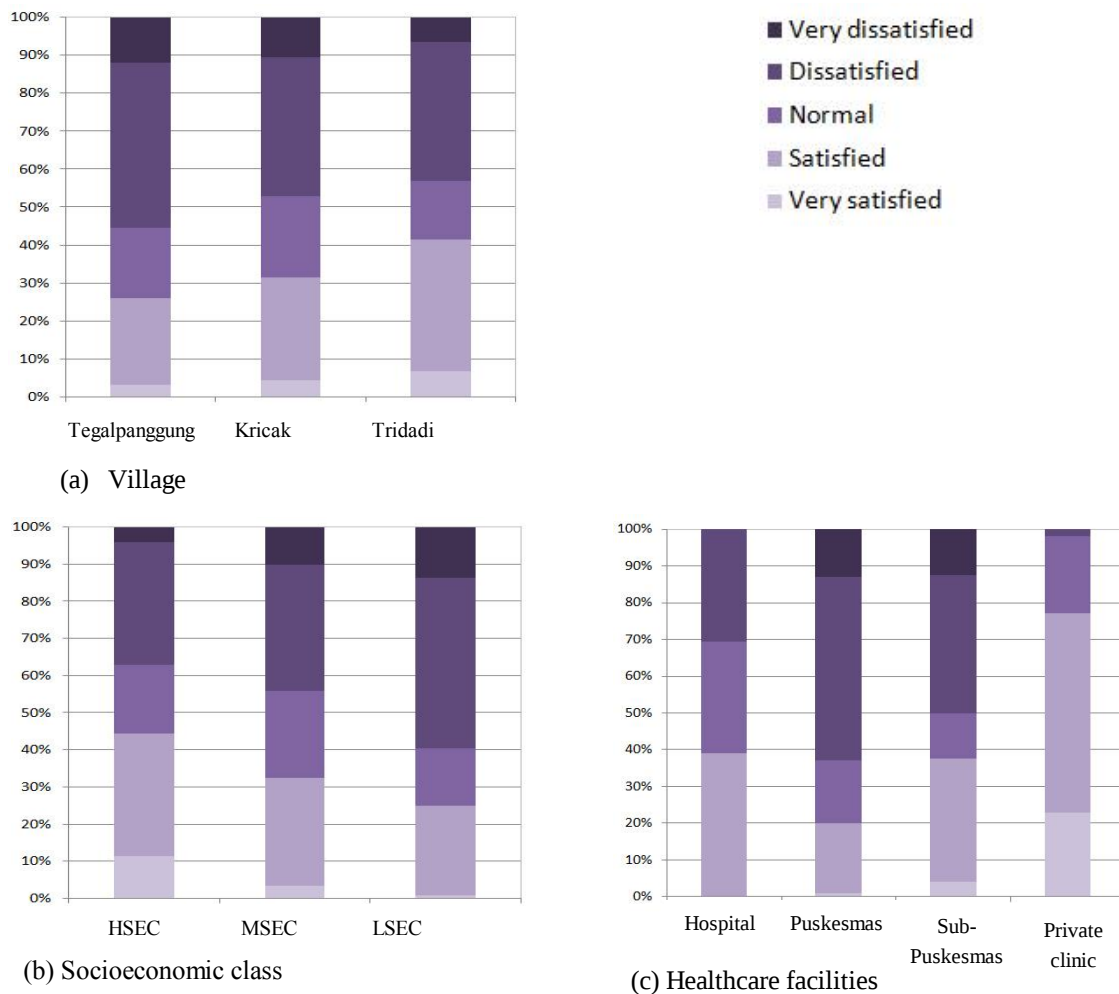


Figure 5-8: Perceived satisfaction level with access to PHC

5.2.6 Influencing Factors to Overall Satisfaction Level

One of the research questions of this study was to find dominant factors that influence the evaluation of perceived access to PHC. Answer to this question can be used to focus and prioritize such dominant factors for further improvement of access. It was assumed that perception on those factors had some relation with respondents' overall satisfaction level with access to PHC. During household survey, overall satisfaction was asked after asking respondent's perception on each factor related to dimensions of access. From earlier analysis in this section, majority of respondents expressed dissatisfaction with waiting time in health facilities and inter-personal behavior by medical personnel. All other factors related to dimensions of access to healthcare were found to be less problematic as perceived by respondents. Hence, to see the relationship between factors related to each dimension of access and the satisfaction level Spearman's correlation was computed between the subjective opinion on different factors and overall satisfaction level. Aggregated 3 point Likert (satisfied; normal; unsatisfied) was used, as it showed significant and stronger correlation between variables than the 5 point Likert. Table 5-3 (a) shows the correlation matrix between factors under dimensions of access and the satisfaction level when all samples were taken. Only few factors were found to have statistically significant correlation between each other and with the final satisfaction level. Subjective opinion on availability (waiting time in healthcare facility) and adequacy (inter-personal treatment) showed comparatively strong positive correlation ($r = .546$ and $r = .600$ respectively at $p < .001$) with the satisfaction level. Perception on medical ability of medical personnel also showed a significant

relation with the overall satisfaction level, however with low correlation coefficient ($r = .232$, $p < .001$).

Similar correlation was repeated for households visiting to different healthcare facilities to see if other factors have any relation with the satisfaction level depending on the choice of facility type. For public facility like puskesmas, almost similar result was found as earlier, which is shown in Table 5-3 (b). Satisfaction level of respondents was found to be influenced only by waiting time and inter-personal treatment. There was no strong correlation between other factors except for travel distance and travel time. Hence, waiting time and personal treatment was found to be dominant factors in determining peoples' satisfaction with access to PHC in case of public health facilities.

Correlation computed for private clinics displayed different results than previous ones. Correlation matrix for private clinics is shown in Table 5-3 (c). In case of private clinics, respondent's overall satisfaction level showed significant positive correlation with their perception on other factors like travel distance, cost and medical ability. Like in previous cases, satisfaction with waiting time and personal treatment also had significant positive relation with the overall satisfaction.

Also, there was significant relation between factors like waiting time, medical ability and personal treatment which was missing in case of puskesmas. As private clinics did not have provision of free healthcare service unlike other public facilities, affordability was an important factor that influences peoples' satisfaction level to some extent. However, the correlation was not very strong, as majority of households visiting private clinics belonged to higher socioeconomic class who expressed the service cost to be normal.

SO	LOS	WT	TD	TT	TC	CI	GP	PT	PA	MA
LOS	1									
WT	.546**	1								
TD	-.090	-.014	1							
TT	-.030	.048	.610**	1						
TC	-.018	.002	.136*	.078	1					
CI	.106	.113	.093	.033	-.037	1				
GP	.008	.071	.043	.026	.050	.130*	1			
PT	.600**	.225**	-.126*	-.068	-.032	.113	.021	1		
PA	.067	.050	.171**	.117	.052	.050	.076	.015	1	
MA	.232**	.067	-.080	-.038	-.173**	-.011	-.103	.251**	-.002	1

** . Correlation is significant at the 0.01 level (2-tailed)

* . Correlation is significant at the 0.05 level (2-tailed)

SO = subjective opinion, LOS = level of satisfaction with overall access to PHC, WT = waiting time in PHC facility, TD = travel distance to PHC facility, TT = travel time to reach PHC facility, TC = total cost of PHC, CI = cultural importance in choosing PHC facility, GP = gender preference of doctors, PT = personal treatment in PHC facility, PA = physical appearance of PHC facility, MA = trust on medical ability of PHC facility

(a) Correlation matrix for total sample households

SO	LOS	WT	TD	TT	TC	CI	GP	PT	PA	MA
LOS	1									
WT	.501**	1								
TD	-.116	-.006	1							
TT	-.008	.111	.587**	1						
TC	.025	.058	.054	.016	1					
CI	.086	.128	.079	.046	-.092	1				
GP	-.062	.045	.068	-.022	.071	.156*	1			
PT	.552**	.092	-.090	-.014	.047	.103	.042	1		
PA	.119	.113	.159*	.210**	.061	-.028	.133	.071	1	
MA	.046	-.071	-.038	-.040	-.100	-.014	-.168*	.165*	-.032	1

** . Correlation is significant at the 0.01 level (2-tailed)

* . Correlation is significant at the 0.05 level (2-tailed)

(b) Correlation matrix for samples visiting puskesmas

SO	LOS	WT	TD	TT	TC	CI	GP	PT	PA	MA
LOS	1									
WT	.695**	1								
TD	.411**	.260	1							
TT	.019	-.126	.338*	1						
TC	.309*	.292*	.180	.080	1					
CI	.269	.215	-.007	-.157	.026	1				
GP	.241	.164	.154	-.012	.009	.258	1			
PT	.432**	.367*	.040	-.092	-.050	.387**	.110	1		
PA	.110	.248	.135	-.091	.059	.312*	-.013	.098	1	
MA	.529**	.462**	.368**	.044	-.018	.380**	.236	.290*	.201	1

** . Correlation is significant at the 0.01 level (2-tailed)

* . Correlation is significant at the 0.05 level (2-tailed)

(c) Correlation matrix for sample visiting private clinics

Table 5-3: Correlation matrices between perception on factors of access and overall satisfaction level with access to PHC

5.3 Synthesis of Indicators to Develop Summary Scores

Perceived satisfaction level of respondents across indicators was used to develop summary scores for all dimensions. A total of 15 indicators measured in 5 point Likert scale were used in this process which is shown in Figure 5-9. As acceptability and adequacy lacks objective indicators, subjective perception about different factors related to access was used. While developing such summary scores for all dimensions, equal weights were applied to each indicator. Distributions of summary scores for each dimension are demonstrated by using box plot in Figure E-1 in Appendix E.

For easier interpretation, indicator values were standardized with ratio scale properties (standard score, $i = \text{raw score } i / \text{maximum raw score}$). Though earlier analysis in section 5.2, showed

significant variation in the perception of respondents between indicators under same dimension, equal weights were used for all indicators, based on the equal importance of all five dimensions in the concept of access to healthcare. For instance, out of three indicators under availability, only waiting time in health facilities was found to be the problematic issue in context of study area. However, ease of getting an appointment to visit health facilities and provision of medicine supply cannot be less prioritized while evaluating the state of availability related to overall access to healthcare. All these factors might hold equal importance in evaluation of access at wider perspective of policy making.

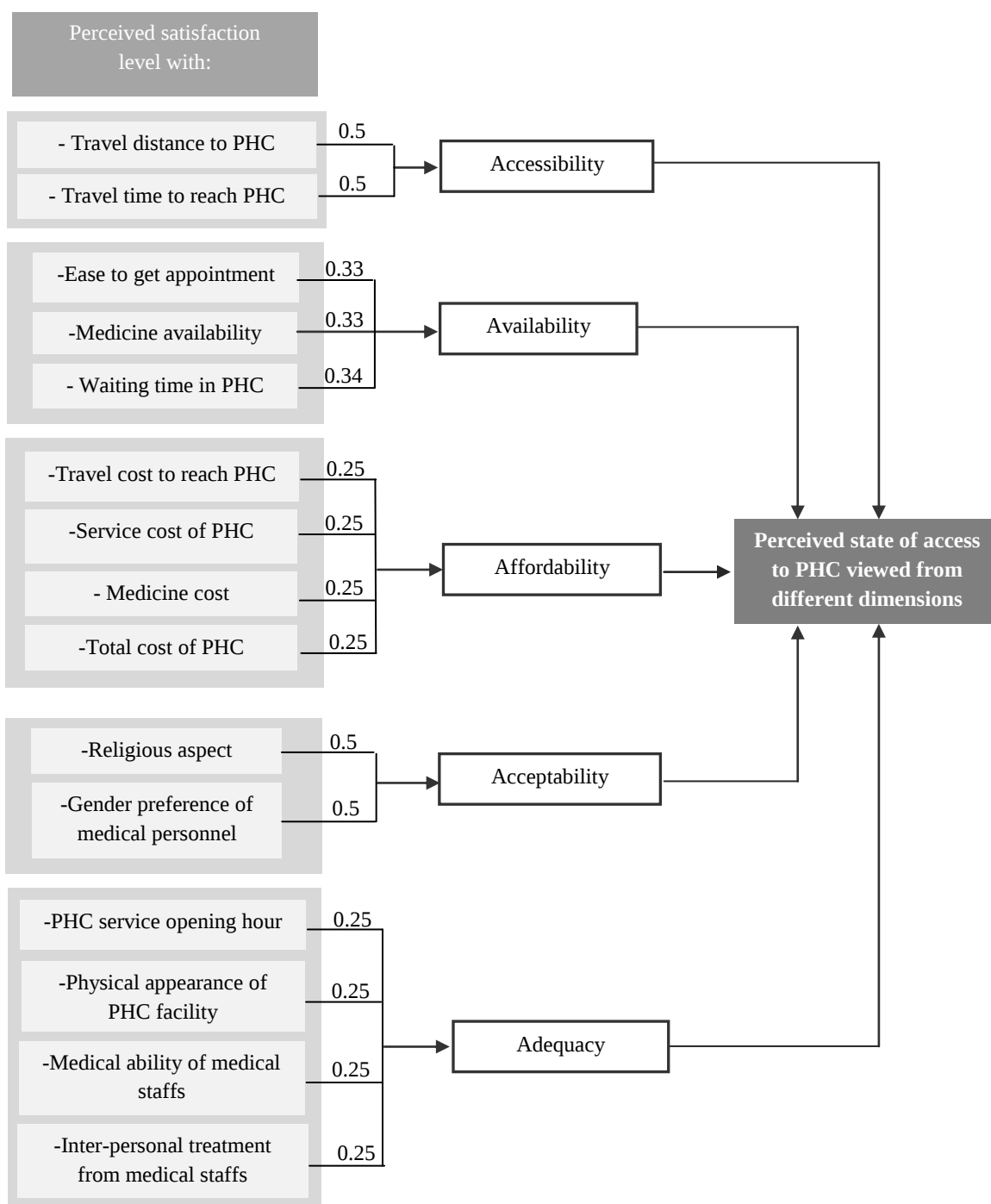


Figure 5-9: Synthesising indicators to develop summary scores for dimensions of access to PHC

Average summary score was calculated by dividing the sum of total scores with the number of cases for each villages, health facilities and socioeconomic classes. This score was used as the representative value for respective cases. Average summary scores of dimensions for villages and healthcare facilities are plotted in a radar chart shown in Figure 5-10. These scores are listed in Table E-1 in Appendix E.

Accessibility scores are highest for villages Tegalpanggung and Kricak as compared to other dimensions within villages. As Tridadi belongs to rural regency, geographic distance was comparatively larger than other two villages. Also considerable number of respondents from Tridadi reported to visit health facility in City of Yogyakarta rather than near facilities within their sub district. Affordability and acceptability also scored higher values as compared to availability and adequacy in all three villages. These scores somehow refers to the result obtained in section 5.2 where only waiting time in health facilities and inter-personal treatment from medical personnel were found to be a concern of respondents' dissatisfaction. There was small difference in scores of each dimension between villages, which indicates similarity in state of access in villages. However satisfaction level of respondents on different dimensions of access within each village showed remarkable variation, for instance difference in accessibility score with availability and adequacy.

Remarkable variation can be seen in the scores when different types of health facilities used by respondents were compared. Figure 5-10 (b) gives a clear interpretation of how perceived satisfaction level of respondents varied based on the type of health facilities they visited. The score of availability and adequacy are significantly higher for private clinics as compared to other public facilities. As the satisfaction level with inter-personal treatment and the quality of service of private clinics was significantly higher than that of other public facilities. And these scores are lowest for puskesmas. But in case of affordability, there is swap in the scores. It is very low for private clinics when compared between scores of other dimensions within same facility. Also the score is lowest when compared with affordability scores of other facilities, whereas it is much higher for puskesmas and sub puskesmas. The reason behind can be related with the findings of section 5.2. As public health facilities provides free primary healthcare and medicine to patients with health card and majority of patients visiting puskesmas, for example, have the health card. Hence, respondents visiting public health facilities expressed higher satisfaction towards affordability. Although majority of respondents visiting private clinics were from higher socioeconomic class, they reported the cost of service and medicine to be relatively expensive. As the service is free or in nominal cost, majority of population visits puskesmas. This results in a long waiting queue for check up in the facility unlike in private clinics. Sub puskesmas has the highest score for accessibility and that of hospital is lowest. These figures well fit the actual context as sub puskesmas are the supporting health facilities allocated per sub districts. There are normally two to three sub puskesmas per sub districts, whereas hospitals are the biggest health facilities in terms of service capacity and provision and are allocated per regencies. So the difference in geographic distance to these facilities was large. Acceptability had relatively higher scores with small variation in both cases of villages and facilities. As respondents expressed that religious factors and gender issues were not relevant matters of concern in choosing health facilities and they were satisfied with the existing situation in terms of acceptability.

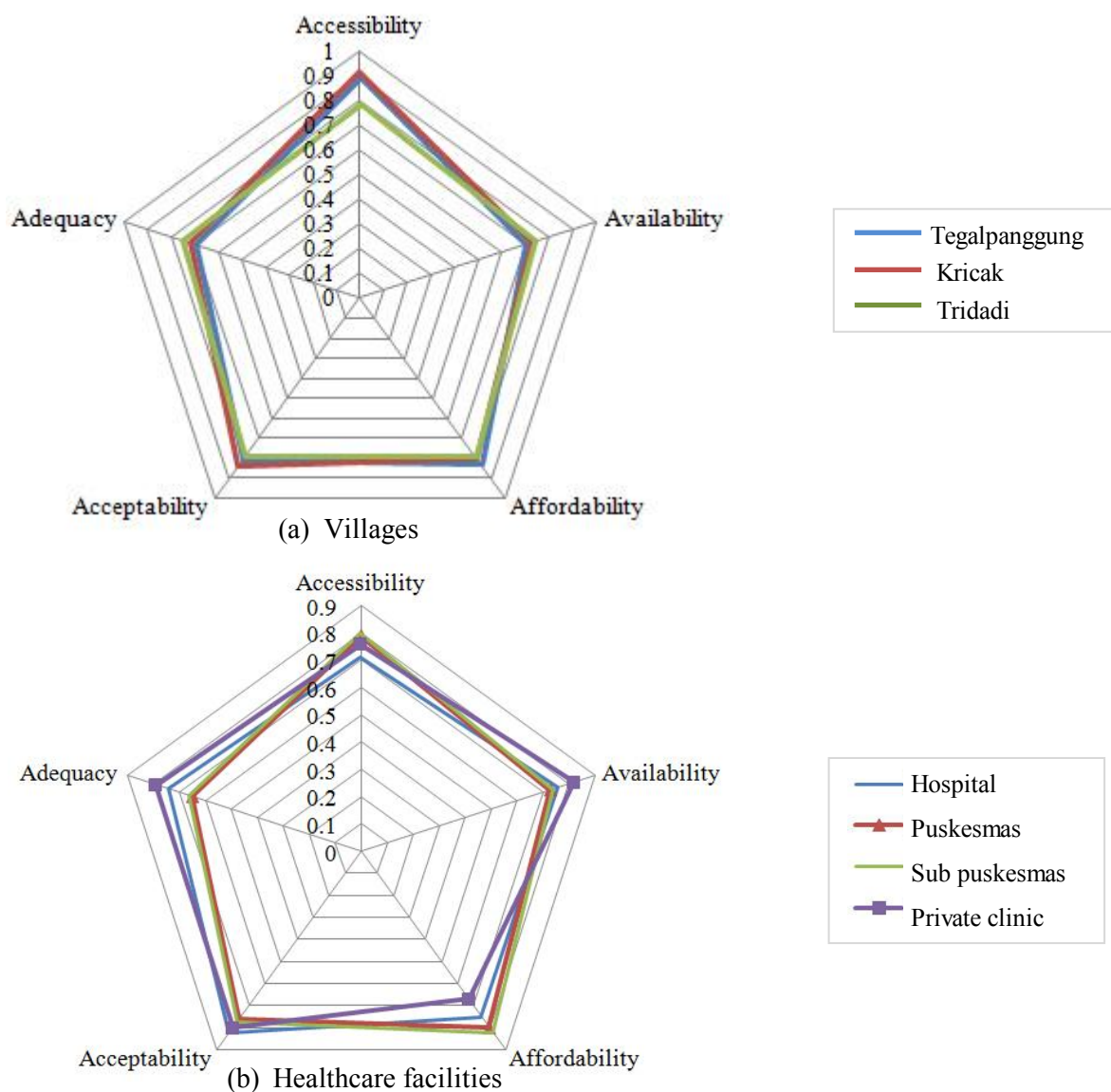


Figure 5-10: Summary score chart for dimensions of access to PHC
For: (a) sample villages and (b) different healthcare facilities

Figure 5-11 shows the standardized residuals of percentage of respondents' perceived satisfaction with each indicator of access. Positive residuals imply that frequency of satisfied respondent is higher than expected average and negative residual means the reverse in all cases.

Frequency of respondents, satisfied with both indicators of accessibility was lower from village Tridadi as compares to other two, showed in Figure 5-11 (a). In availability, frequency of satisfaction with waiting time in facility was distinctly low in Tegalpanggung, whereas it was higher for Kricak. Satisfaction with indicators of affordability was higher in Tegalpanggung. Tridadi had low satisfaction with travel cost which can be seen in relation with lower satisfaction with travel distance and time. Difference was less for indicators of acceptability, as respondents' perception was more homogeneous in these factors. Variation between villages was observed in case of adequacy.

Comparatively Tridadi was in better satisfaction level with medical ability and inter-personal treatment of medical personnel. And, inter-personal treatment was a notable problem with respondents in Tegalpanggung.

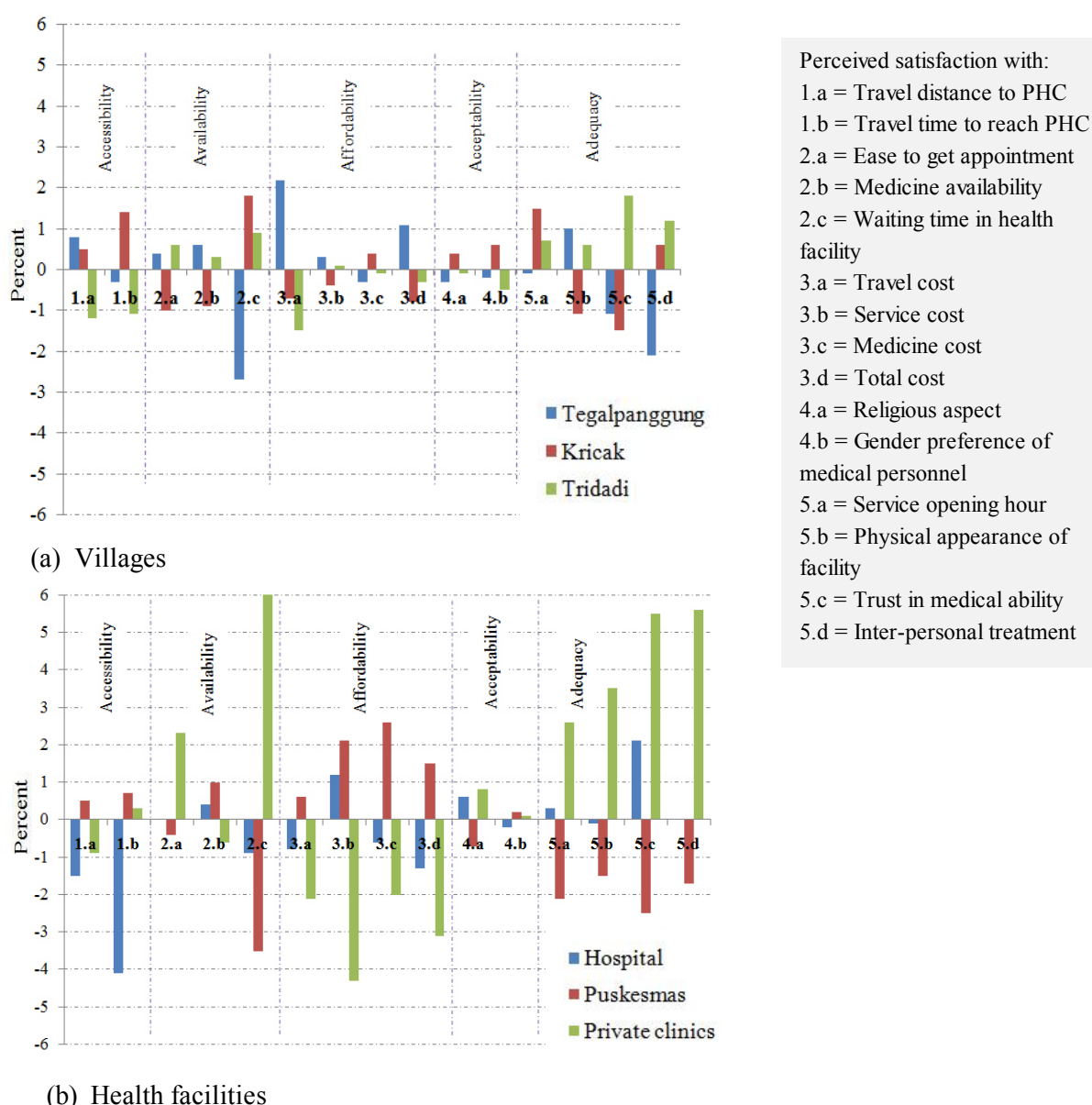


Figure 5-11: Standardized residuals for perceived satisfaction with various factors of

More distinct variation was observed in case of different health facilities displayed in Figure 5-11 (b). It was clear that when compared, large portion of respondents expressing problem with physical distance were the one visiting hospitals. Significant difference was seen in case of waiting time in facility; healthcare service cost; total cost; trust in medical ability and personal behaviour between puskesmas and private clinics. Among these indicators, only healthcare cost was the matter of less satisfaction to respondents visiting private clinics when compared with the cost of puskesmas. Satisfaction with waiting time, and indicators under adequacy was much higher in case of private clinics and was low for puskesmas.

Average summary scores were used to see variation in dimensions of access across different socioeconomic classes to observe homogeneity within villages in terms of access to PHC. Table 5-4 presents the average summary scores of dimensions for each socioeconomic class per village. There was no distinct variation in individual dimension scores between socioeconomic classes in all three villages. However, some variation was found between scores of different dimensions within each socioeconomic class in Tegalpanggung and Kricak. All socioeconomic classes in these two villages

had higher score for accessibility and lower for adequacy. Scores for affordability and acceptability were comparatively high than availability and adequacy with small variation. Higher socioeconomic classes in all villages had slightly higher scores for adequacy and availability than middle and lower socioeconomic classes, whereas it had lower scores in affordability. This can be related with the type of facility visited by different socioeconomic class, as large percentage of respondents visiting private clinics falls in higher socioeconomic class as discussed in section 5.2.1. Tridadi was most homogeneous in terms of variation in dimensions of access to PHC within and also between all socioeconomic classes. As very small variation was obtained between scores of different socioeconomic classes, radar chart could not display clear interpretation, hence it was not used.

	Accessibility	Availability	Affordability	Acceptability	Adequacy
Tegalpanggung					
HSEC	0.81	0.73	0.74	0.77	0.71
MSEC	0.82	0.70	0.79	0.76	0.68
LSEC	0.79	0.71	0.78	0.76	0.66
Kricak					
HSEC	0.81	0.77	0.70	0.78	0.70
MSEC	0.82	0.71	0.78	0.76	0.69
LSEC	0.8	0.73	0.81	0.75	0.67
Tridadi					
HSEC	0.72	0.76	0.74	0.76	0.75
MSEC	0.73	0.70	0.76	0.77	0.72
LSEC	0.73	0.71	0.75	0.76	0.70

Table 5-4: Summary score for dimensions of access per socioeconomic class

Note: High values indicate high level of access; 1 = maximum value

[HSEC = Higher socioeconomic class; MSEC = Middle socioeconomic class;

LSEC = Lower socioeconomic class]

The reason for this homogeneity was due to the fact that majority of households (74%) from all villages visited public health facilities like hospitals and puskesmas for primary healthcare. People opt for public facilities, primarily puskesmas, because of short geographic distance; ease in medicine availability and satisfactory quality of service in terms of medical ability and cleanliness, in addition to nominal service cost. Hence there was similarity in perception over factors related to access from respondents regardless of their socioeconomic status. As the number of respondents from high socioeconomic class visiting private clinics was low (18%) as compared to the number visiting puskesmas from same socioeconomic class, their perception was over shaded by the large number of respondents visiting public facilities while taking average score. Variation observed for different health facilities in *Figure 5-10 (b)* can also explain the variation between socioeconomic classes to some extent. As around 80% of respondents visiting private clinics are from higher socioeconomic class and only 19% from middle socioeconomic class, the summary scores of private clinics also reflects the status of access for higher socioeconomic class. In this manner, it can be said that some variation do exists between different socioeconomic classes.

5.4 Existing Situation of Access to PHC from Policy Perspective

To address the research questions of second sub objective, access to health care was analyzed as per the official norms mentioned in existing health policy in the province of Yogyakarta (DIY). The health policy in DIY primarily focuses on physical accessibility, availability of public health facilities and affordability for healthcare service. Information on geographic distances to public health facilities and total number of doctors per village, obtained from census 2005 was used for analyses. Source of all health policies and standards used in this study was Statistics of Indonesia obtained from

the Gadjah Mada University (Pustral UGM). As per the norm, there should be at least one puskesmas headed by a medical doctor at every sub district level supported by 2 to 3 sub puskesmas headed by medical nurses. This is related with accessibility as well as availability. It addresses the issue of geographic distance to healthcare considering administrative boundary and availability by considering puskesmas to population ratio per sub district. This norm was well met at existing situation, as all 78 sub districts in DIY contained at least one puskesmas and supporting sub puskesmas. Considering geographical distance, 70.5% of total population in the province (271 villages out of 438) was within 2 kilometres and 88% population (327 villages) within 4 kilometres, assuming 4 km per hour as normal walking distance. All 45 villages in the city of Yogyakarta were within the distance of 2 km from nearest puskesmas in respective sub districts covering 15.5% of total population in the province. In terms of distance to hospital, 44.5% of total population (138 villages), including all in city of Yogyakarta, in the province was within 4 km distance from hospital. Variation in geographic distance to puskesmas and hospitals between villages in DIY is shown in Figure 5-12 (a) and (b) respectively. This can be related with the finding of previous analysis for accessibility in section 5.2.2, where majority of respondents in sample villages reported physical accessibility as less problematic issues in access to healthcare. Regency Gunung Kidul had the highest area and lowest population density among all five in the province. Also most of villages, except those located in central area in this regency had primarily agricultural landuse. As settlement was concentrated in the central part of the regency, health facilities were also located accordingly. Hence, looking at Figure 5-12 (b), large number of villages in regency Gunung Kidul showed higher travel distance to hospital except for villages located in central part of the regency. Villages at larger geographic distance from hospitals can be related with lower population density in Figure 3-2 and vice versa.

According to the health policy in DIY, ratio of puskesmas to population was 1: 120,000 and that for hospital was 1:240,000. The ratio of puskesmas to population in all sub districts was distinctly smaller than the standard threshold as none of the sub district had population this large. Largest population of sub district in DIY was 117,130 in Sleman regency. Hospital to population ratio per regency was also found smaller than the standard, except for regency Gunung Kidul which was around 1: 250,000. Further to elaborate the analysis of availability, population to doctor ratio was checked per sub districts using the number of doctors working at public health facilities and population data per village in census. Analysis was done at sub district level as it was the smallest administrative unit for the allocation of puskesmas according to health policy. Dash (2000) stated that average doctor population ratio in Indonesia was around 1:7,000 according to the World development report. Hence due to lack of specific standard threshold for doctor population ratio, this ratio was taken as the benchmark for the analysis in DIY. Variation in ratio between sub-districts is shown in Figure 5-13 (a). Out of 78 sub districts 43 had the ratio below 1: 7,000 which includes all sub districts within city of Yogyakarta. 14 sub districts had the ratio 1:7,000 to 1:14,000 and other 14 sub districts had the ratio larger than 1: 14,000. Majority of sub districts with higher ratio was in regency Gunung Kidul and Kulon Progo. All three sub districts containing sample villages had the ratio below 1:7,000. Figure 5-13 (b) shows the relative variation in population to doctor ratio within the province of Yogyakarta using standard deviation. Average ratio in the province was found to be 1:9900, with standard deviation of 12600, which was larger than the average ratio in Indonesia. Huge variation was observed in the population doctor ratio starting from 1: 425 in regency Sleman going up to 1: 55,000 in Gunung Kidul. Comparatively city of Yogyakarta and regency Sleman were in better situation in terms of availability of medical doctors. This result was contradicting with the higher dissatisfaction of respondents with long waiting time in public health facilities reported during household survey. There was a huge difference in population doctor ratio when compared with the average ratio of neighbouring country like Singapore.

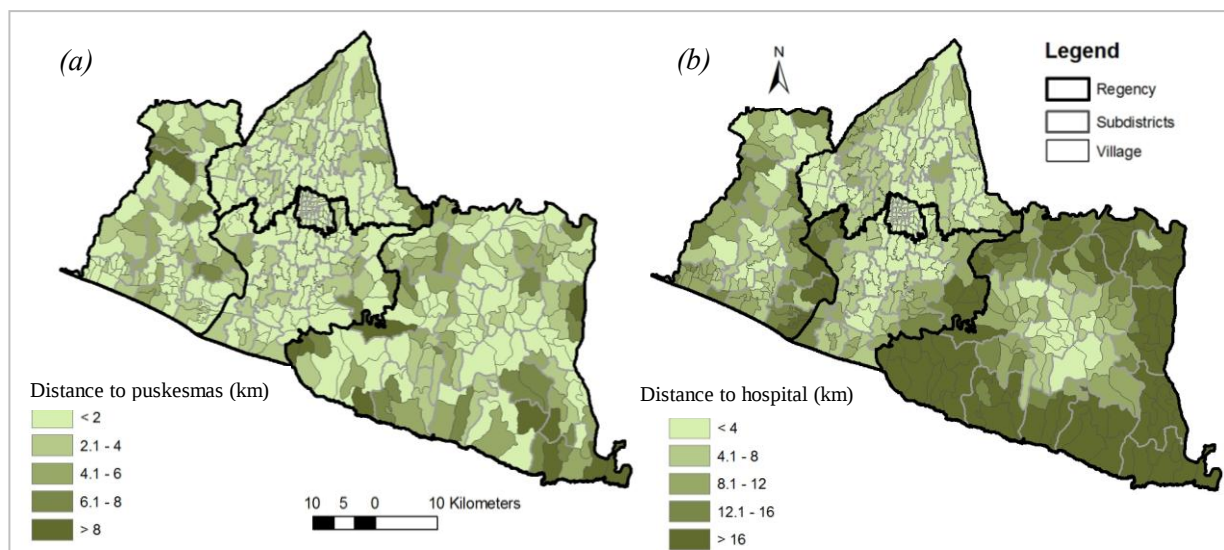


Figure 5-12: Geographic distance to health facilities per village in DIY,
Data source: Census 2005

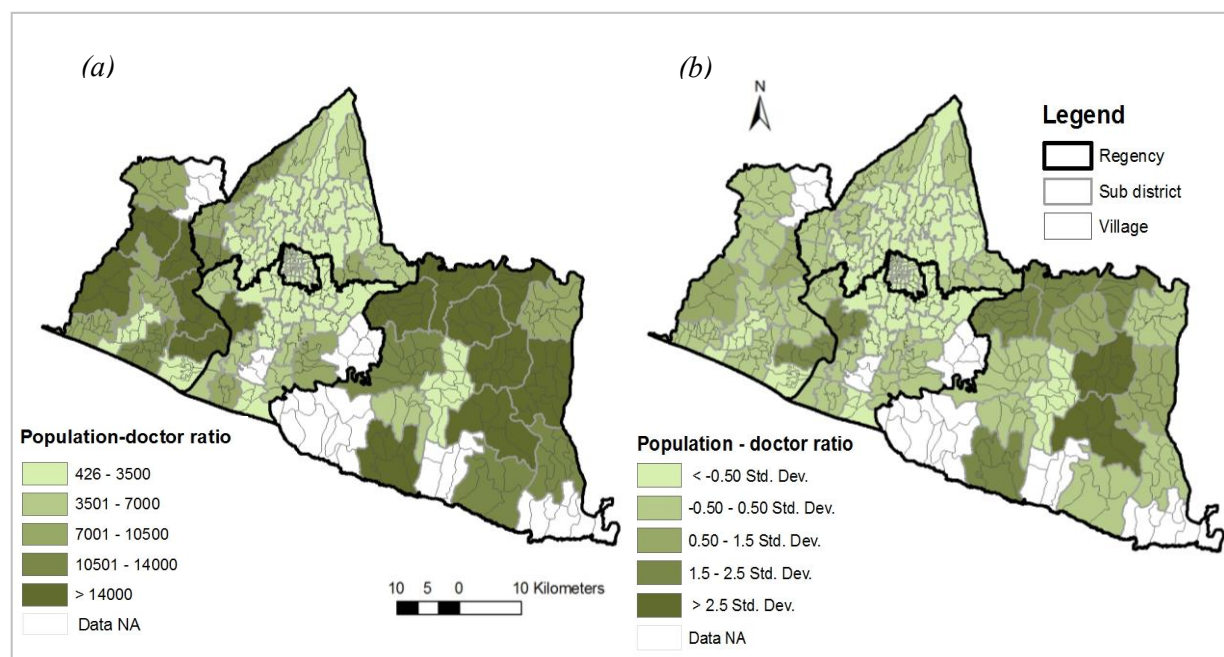


Figure 5-13: Population-doctor ratio per sub districts in DIY
Data source: Census 2005

Dash (2000) stated that population to doctor ratio in Singapore was 1:900. Further comparing it with developed countries like Japan (1:600) and United State (1:400), the average population-doctor ratio in Indonesia was found to be very large. Also when referred to the estimated ratio of physicians to population by human resources for health, World Health Organization (WHO), the existing ratio was found to be very large. WHO stated that although there is no fix standard of ratio of population to medical service personnel, countries with less than 25 medical staffs including physicians and nurses per 10,000 populations cannot achieve adequate service coverage for primary healthcare. ESCAP (2009) stated the estimated ratio of 1 physician to 1000 population in context of Asia in WHO statistical information system 2008. When compared with this figure, only 4 sub districts; 2 in Sleman and 2 in City of Yogyakarta, were found to have meet the ratio estimated. This could be related to the respondents' complaints about long waiting time in health facilities.

One of the major health policies in the province of Yogyakarta focuses in the provision of nominal primary healthcare service in almost all public health facilities. As explained earlier in section 3.2.2, better service quality, accessibility and affordability are the part of 'Healthy Indonesia 2010' which is one of the policy visions in line. The policy concerned to affordability was primarily focused to facilitate poor population by providing government health insurance card, commonly known as a health card. This policy can be considered to be well implemented as more than 55% of sample households in Tegalpanggung and Tridadi were getting free primary healthcare service including medicine provision with the possession of health card. This figure was around 45% for Kricak. Among total sample, 80% of households having a letter of poor reported to have a health card, which was a criteria for getting the health card according to the norm. Even without health card, service cost for primary healthcare in all public health facilities was found to be nominal as 87% of total respondents were satisfied with the total cost of healthcare. Although issue of service quality appeared in health policy, there was not any standard threshold to evaluate the existing quality of health service. Hence it was done based on respondents' perception from household survey. Quality of service basically means peoples' trust on the medical ability of health facilities. When asked, only 7% of respondents expressed dissatisfaction with the medical ability in terms of quality of service. As medical service is given by or under supervision of professional medical doctors at puskesmas, people expressed their trust over the service quality. Other issues related to the service quality like cleanliness of facilities, availability of equipment and laboratory service for primary healthcare were also found to be considerably in satisfactory level.

5.5 Scale Effect in Analyzing Socioeconomic Attributes and Access to PHC

Common variables between census and primary data were selected considering their availability and relation to socioeconomic characteristics and access to healthcare for comparative analyses between aggregated and disaggregated data. These variables are explained in Table 5-5.

5.5.1 Comparing Individual Variables from Census and Primary data

As a preliminary analysis, information on individual variables from census 2005 was compared with that from primary household data. Significant difference was found in the information about socioeconomic characteristics like possession of letter of poor and health card. These variables were important as they reflect socioeconomic status of people and also from affordability aspect of access to primary healthcare. Census presented very low percentage (less than 2%) of households with the letter of poor in all three villages. This figure significantly differed from the finding of primary data, which showed around 55% of households with the letter of poor in Kricak and more than 70% in Tegalpanggung and Tridadi. Similarly, according to census, public piped water supply was the dominant source of water in Kricak and Tridadi. But from field survey, it was found that around 60% households in both villages were using well water, mostly shared community well. Regarding type of toilet in all villages, census information was a good representation, as more than 70% of households have private toilet which was mentioned as the dominant toilet type in census. Observation over the percentage of households possessing health card for primary healthcare also showed large difference of 72% in Tegalpanggung and 45% in Tridadi, as census present low figures for this attribute. But in case of Kricak, census presented higher portion of 89.5% households with the health card, which was found to be 67.5% from household data. In contrary, census showed low portion of households with telephone connection, 14.5% in Kricak and less than 5% in other two villages. Collected primary data showed more than 55% of households with telephone connection in all three villages.

Aggregated data on access to healthcare was available for accessibility in terms of geographic distance and perception on ease to reach healthcare facilities. Hence those attributes were selected for

comparative analysis. Variation was found in physical accessibility to healthcare when check at different level of administrative unit. Measured distance between sample households and healthcare facilities (hospital and puskesmas) being visited by respective households was used to compare with census figure. Distance to hospital obtained from primary source was found to be greater in Tegalpanggung and Tridadi. Difference was much higher for Tegalpanggung. In case of Kricak, census showed a smaller distance than the average value of primary data. Distance to puskesmas from villages also showed some variation.

Attributes related to socioeconomic status	Description according to Census
Letter of poor	Percentage of households within village possessing the letter of poor (<i>see section 3.2.2 for description</i>)
Toilet type	Dominant toilet type in village (shared public toilet; private toilet and no toilet) being used by majority of household in the village
Water source	Dominant source of water supply in village. (River water, ground water – hand pump, well and public piped water supply)
Telephone connection	Percentage of households within village with telephone connection
Attributes related to access to healthcare	
Distance to hospital	Average physical distance from village centre to nearest hospitals
Opinion about distance to hospital	Subjective opinion about ease to reach the nearest hospital based on physical distance in four scale; very easy, easy, difficult and very difficult
Distance to puskesmas	Average physical distance from village centre to nearest puskesmas usually located in same sub-district
Opinion about distance to puskesmas	Subjective opinion about ease to reach the nearest puskesmas based on physical distance in four scale; very easy, easy, difficult and very difficult
Possession of health card	Percentage of households possessing government health card

Table 5-5: Common variables in census 2005 and household data

Table 5-6 presents the descriptive statistics of physical distances to these healthcare facilities obtained from primary data. Although there was not large difference in the average value of measured distance and census, except in case of distance to hospital from Tegalpanggung, large variation in minimum and maximum range of distance was observed in most of the cases. Around 40% of households in Tegalpanggung and Tridadi did not visit hospital for primary care. Remarkable variation in census figure and primary data was found in Tegalpanggung. Distance to hospital from this village was 500 meters in census, whereas none of the sample household was within this distance. The minimum distance from primary source was 1000 m and 15% of sample households are travelling 3000 to 4000 meters to visit a hospital. Also in Tridadi, only 24% of sample was within the distance mentioned in census (4000 m) and about 31% was between a distances of 6000 to 11000 meters. Similarly, the distance to puskesmas in census was not found to be a good representative for Tegalpanggung and Kricak, as large percentage of sample was travelling greater distance than as mentioned in census. This analysis showed the inconsistency in the results obtained from primary data source, compared to the aggregated census figures. On the other hand, census figure was found to be a good representative of distance to hospital in case of Kricak and distance to puskesmas for Tridadi as more than 60% of sample fell within the distance as mentioned. Figure 5-14 shows the measured Euclidean distance from each sample households to the visited hospitals and puskesmas as reported. This displays the variation in travel distance to health facilities within each village, prominently for hospitals from rural village Tridadi.

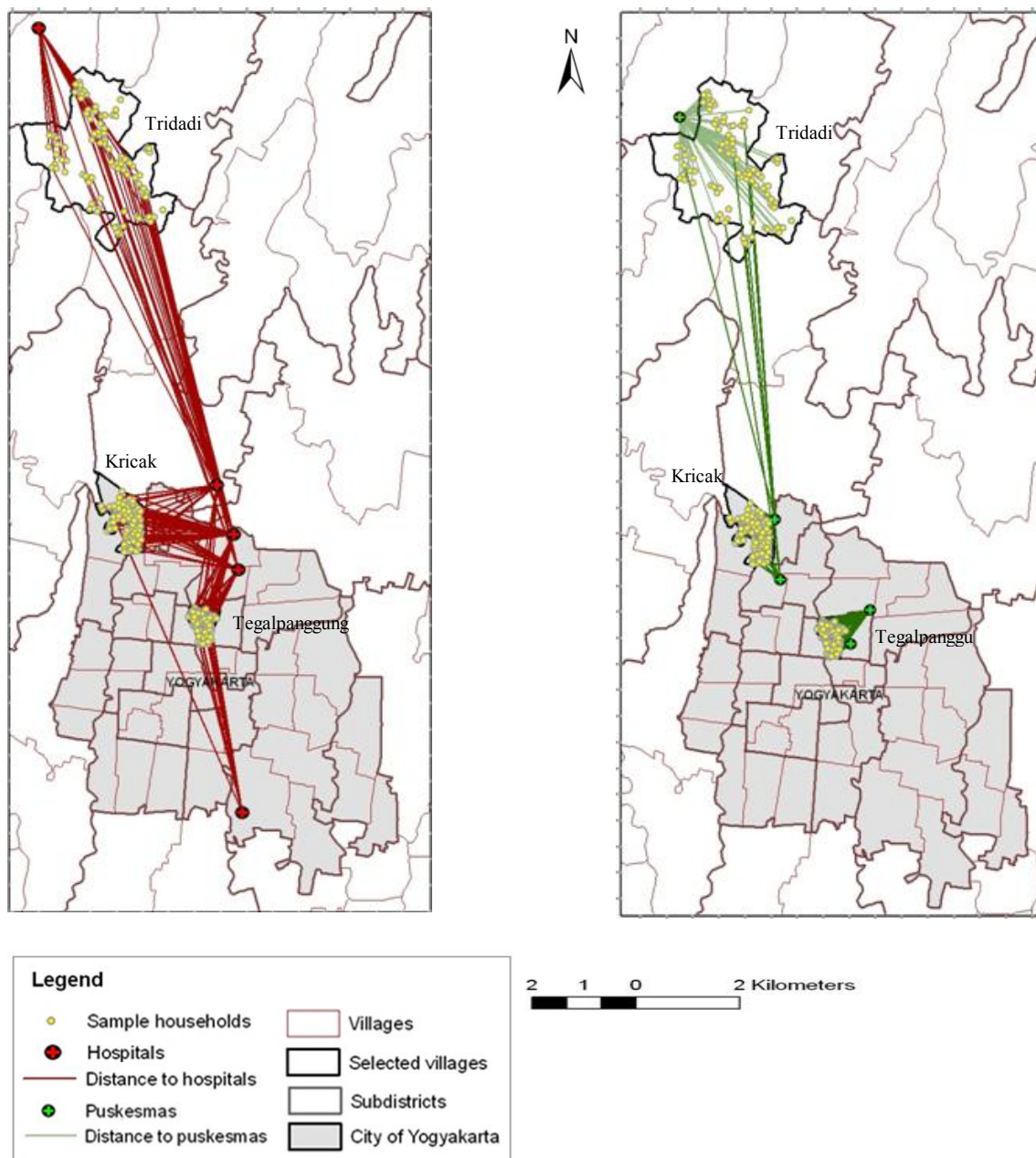


Figure 5-14: Euclidean distance from households to health facilities

Based on the nearest geographic distance, census stated a subjective opinion on the ease in reaching those health facilities. As distance was not considered to be a problem in case of these villages, all of them were given 'easy' or 'very easy' status in terms of physical accessibility in census. The perception over physical distance obtained from primary data also stated accessibility to be less problematic, in spite of the fact that people does not necessarily visit the nearest healthcare facilities as per assumption. However some variation exists in the perception. Chi square test was done to see if there is any association between the respondent's perception over accessibility measures and the mode of transport they use to reach health facilities, which was asked during survey. Significant medium relation was found between these attributes with Cramer's statistics of .46 ($p < .05$). Hence, there was large variation in the respondents' perception over travel distance.

Due to lack of additional information on other dimensions of access to healthcare in census data, this study was limited to compare variables related to accessibility, although it did not seem to be a problematic issue in access to PHC in study area.

Comparing census distance to hospitals with primary data (all distance is in meters)

Tegalpanggung		Kricak		Tridadi	
Distance in census = 500 m		Distance in census = 3000 m		Distance in census = 4000 m	
Primary data					
<u>% of households within distance</u>					
Less or equal to 1000	= 0%	Less or equal to 3000	= 64%	Less or equal to 4000	= 24%
1001 - 2000	= 35%	3001 - 6000	= 0%	4001- 6000	= 5%
2001 -3000	= 9%	6001 -7000	= 3%	6001 -7000	= 15%
3001 - 4000	= 15%			greater than 7000	= 16%
Do not visit hospital	= 41%	Do not visit hospital	= 33%	Do not visit hospital	= 40%
Mean	= 2160	Mean	= 2255	Mean	= 5215
Minimum	= 1000	Minimum	= 1225	Minimum	= 1050
Maximum	= 4045	Maximum	= 7200	Maximum	= 11000

Comparing census distance to puskesmas with primary data

Distance in census = 500 m		Distance in census = 500 m		Distance in census = 3000 m	
Primary data					
<u>% of households with distance</u>					
Less or equal to 500	= 18%	Less or equal to 500	= 30%	Less or equal to 3000	= 60%
501 – 1000	= 44%	501 – 1000	= 53%	3001 – 6000	= 3%
Greater than 1000	= 17%	1001 – 3000	= 7%	Greater than 6000	= 7%
Do not visit puskesmas	= 21%	Do not visit puskesmas	= 28%	Do not visit puskesmas	= 30%
Mean	= 750	Mean	= 625	Mean	= 1970
Minimum	= 240	Minimum	= 1210	Minimum	= 500
Maximum	= 1210	Maximum	= 3000	Maximum	= 7850

Table 5-6: Distance to healthcare facilities from Census and primary data

5.5.2 Comparing Variation within Village with Variation at Sub district Level

Coefficient of variation (CV) was computed to further compare variability in selected socioeconomic and access attributes at village level with that at sub districts level, using primary and secondary data respectively. Variation in common socioeconomic attributes was found higher for all villages as compared to their sub districts. This is shown in Table 5-7 (a). Although, private toilet was the dominant toilet type in all sample villages, some variation was found within each village, whereas census had a single value of toilet type for all three villages. Significant variation was observed in the possession of health card in village Kricak and Tridadi which is directly related to affordability in access to PHC.

Variation, in terms of access to healthcare, was found in physical distance to hospitals and puskesmas at village level in Tegalpanggung, shown in Table 5-7 (b). This variation could not be observed at its sub district level, as all villages in this sub district were given same value for respective distance according to census. The variation in physical distance to puskesmas was significantly large in Tridadi when compared with the variation at its sub district using aggregated village data. As Tridadi belongs to rural regency, significant portion of respondent reported to visit health facility in Yogyakarta city, resulting in larger variation in travel distance as well as their perception over it. In case of Kricak, variation was found to be less than the variation in its sub district, however the difference was small. Regarding the relative subjective perception on these distances, sub districts of

Tegalpanggung and Kricak does not show any variation as all the villages within these sub districts were stated as having a ‘very easy’ accessibility to mentioned facilities in census.

Table below displays the variation at sub district level using census data available for each village within the sub districts. Rows specified as ‘census(s)’ shows this variation. Rows specified as ‘Primary data (v)’ displays the variation within sample villages using primary household data. Purpose is to compare variation within village to that with its corresponding sub district. Tegalanggung belonged to sub district Danurejan; Kricak to Tegalrajo and Tridadi to Sleman, hence comparison is done correspondingly.

(a) Socioeconomic variability in terms of coefficient variation (CV)						
Data source	Sub-district (s) / Village (v)	Type of toilet	Water source	Telephone connection	Possession of letter of poor	Possession of health card
Census (s)	Danurejan	NA	NA	0.72	0.45	0.54
Primary data (v)	Tegalpanggung	0.28	0.60	1.03	0.60	0.70
Census (s)	Tegalrajo	NA	0.16	1.18	0.39	0.13
Primary data (v)	Kricak	0.24	0.54	1.50	0.86	1.12
Census (s)	Sleman	NA	0.16	0.8	0.64	0.22
Primary data (v)	Tridadi	0.22	0.48	1.01	0.65	0.96

(b) Variability in accessibility to PHC in terms of coefficient variation (CV)					
Data source	Sub-district (s) / Village (v)	Distance to hospital	Subjective perception on distance to hospital	Distance to puskesmas	Subjective perception on distance to puskesmas
Census (s)	Danurejan	NA	NA	NA	NA
Primary data (v)	Tegalpanggung	0.435	0.276	0.375	0.279
Census (s)	Tegalrajo	0.556	NA	0.707	NA
Primary data (v)	Kricak	0.450	0.264	0.675	0.288
Census (s)	Sleman	0.520	0.248	0.476	0.248
Primary data (v)	Tridadi	0.530	0.261	0.941	0.257

Table 5-7: Socioeconomic and access to PHC variability in terms of CV

[NA = not applicable; if census have one value for all villages within that sub district]

6. Discussions on Findings

This chapter presents the analytical discussion of the results obtained to address sub objectives of this study in three main sections. Main findings and limitations in methodologies applied in this research are discussed. In the first section, results of variation in access between villages and different socioeconomic classes are discussed. Perceived major factors that influences the overall satisfaction level are also discussed in this section. Second section discusses the result of access to healthcare in relation to contextual health policies comparing it with results at micro level. Last section contains a discussion over the findings of variation in results obtained from aggregated and disaggregated data source.

6.1 Sub-objective 1: Measuring Access to PHC at Micro Level

Socioeconomic stratification

To address one of the research questions of sub objective 1, related to variation in access across different socioeconomic strata, sampled households were classified into three classes using two step cluster analysis. This stratification was relevant to measure intra village variation in terms of socioeconomic characteristics which was assumed to have direct relation with access to healthcare. Analytical discussion over the strength and limitations of the method used for stratification is important as large part of subsequent analyses and findings was related to this result. Along with advantages offered by cluster analysis explained in section 4.6.1, it had some limitations which were experienced in this study. As explained by Wong (2006), cluster analysis require detailed and often debatable operational decisions throughout statistical procedure. First, measurement of some form of similarity in attributes between samples is needed in order to decide number of clusters. Once different clusters were obtained, next step was the profiling of clusters to give them appropriate labelling based on the composition of various input attributes. Although clusters were labelled according to the characteristics exhibited by them, it was somehow a subjective judgement. For instance, middle socioeconomic cluster in this study did not exhibit terribly distinctive characteristic, rather it had some common characteristics from both higher and lower socioeconomic clusters. This could be one reason that summary scores for dimensions of access developed for each socioeconomic class within 3 sample villages in section 5.3 (Table 5-4) did not show much variation. Also other statistical analyses, for example, Chi square did not have strong association (Cramer's $V = .45$) between these classes and other variables like selecting type of health facilities. Another limitation is that no ranking of individual cases within each cluster can be obtained as the samples were either in or out of the cluster. Other cluster analysis such as K mean offers relative ranking of cases within each group based on how strongly cases represent the belonging cluster, this was lacking in two step cluster analysis. However, due to the advantage of simplicity and mainly its ability to create clusters using both categorical and continuous variable two step cluster analysis was used for this study.

One of the assumptions made for selection of sample village was socioeconomic heterogeneity within villages. This assumption was met as each sample village was composed of considerable percentage of high and low socioeconomic classes. Also the assumption that poor informal settlement exists along river bank, was met in case of village Tegalpanggung (see Figure 5-3).

Measuring access to PHC

Factors related to physical accessibility and availability of health facilities has been important concerns in most of the empirical studies in evaluating access to healthcare. Literatures like Black,

Ebener et al. (2004); Bagheri, Benwell et al. (2005); Amer (2007) etc have been able to demonstrate significant variation in these spatial component of access while evaluating health service variation. However these dimensions in general, were not found to be the major problematic issues in this study as the result of high priority given in the implementation of existing health policies related to physical accessibility and availability of public healthcare facilities. Below 10% of total respondents, dominantly from rural regency Sleman, stated physical distance to hospitals or puskesmas to be far. This was not due to absence of health facilities within their administrative boundary, rather due to user's personal preference to visit facilities in city of Yogyakarta.

Along with above mentioned spatial components, affordability and acceptability has also gained priorities in evaluating equitable access to healthcare referring to literatures like Andersen, McCutcheon et al. (1983); Fosu (1989); Obrist, Iteba et al. (2007) etc. However, as the result of free or nominal cost of primary healthcare service including medicine supply in public facilities, affordability in general was perceived as less problematic issue in the study area. Only about 13% of total respondents were discontent with the total cost for primary healthcare. Noticeable fact related to affordability was that none of the respondents from low socioeconomic class visited private clinic in spite of their feeling about better service quality, short waiting time and good inter personal treatment being provided by private clinics. The reason was directly linked with the higher service cost in private facilities. This was confirmed when majority of respondents visiting public hospitals or puskesmas stated that they would like to visit private facilities for primary healthcare, if their income gets doubled. Also the satisfaction level with total cost showed a negative correlation with the satisfaction level with trust in medical ability of health facilities (see Table 5-3. a). As respondents visiting private clinics stated the cost to be higher, however they were very satisfied with medical ability of the facility. Therefore affordability still had significant relevance in access in this manner.

Long waiting time under availability and unfriendly inter-personal treatment by medical staffs under adequacy, were found to be dominant factors influencing the overall satisfaction of respondents especially visiting public health facilities. Only satisfaction with these two factors showed highly significant positive correlation with the overall satisfaction level ($r = .546$; $r = .600$ respectively at $p < .001$). All other factors under five dimensions of access did not seem to influence the overall satisfaction level of public facility users. Hence, it can be assumed that people tend to emphasize on negative issues when asked about their satisfaction with present situation of access to PHC. Satisfaction with factors like travel distance, service cost and trust in medical ability were important in case of private health facility users, as these perceptions were found to influence the overall satisfaction of people going to private clinics. Noticeable difference was observed in the perception about similar waiting time between public and private facility users. As puskesmas provided free primary healthcare for poor households, people might have accepted the longer waiting time or they might be used to this situation hence, found it normal in general case. But majority of households visiting private clinics belonged to higher socioeconomic class, who might be willing to pay more but expects faster service. Due to the hierarchy in service provision by public health facilities, patients seeking for free service might have experienced unfriendly behaviour by medical personnel. This might create an issue of inequality in terms of inter-personal treatment among different socioeconomic strata.

To evaluate combined effect of relevant factors under each dimension of access, summary scores were developed which showed some limitations in this study. Along with the advantage of easy interpretation especially at decision making level, a common disadvantage of developing summary scores was that it loses underlying information to some extent. For instance, the problem of waiting time and inter-personal behaviour in public health facilities was over shaded by the higher score of other corresponding indicators while developing availability and adequacy summary scores. Another

limitation of this process was the weighting system. Although equal weights were applied to each indicator, the relative value differed due to different numbers of indicators under different dimensions. Larger the number of indicators within a dimension, lesser will be the impact while developing a summary score for dimension. This influenced the final score for different dimensions with varying number of indicators. This issue was addressed by using standardized residuals which helped to visualize the variation in perceived satisfaction on each indicator under dimensions of access. This also enabled to observe indicator(s) with large variation in perception within each dimension, which could be hidden while using summary scores.

From analyses, intra village variation in access to PHC was more prominent than inter village. Presence of different socioeconomic classes within each village met the assumption about intra village heterogeneity which to large extent influenced the selection of health care facilities, public or private. Further the perceived satisfaction with individual factors as well as overall access was greatly related to the type of facility being visited.

6.2 Sub-objective 2: Existing State of Access in Relation to Health Policy

From the results obtained in section 5.2, existing situation of access to healthcare in study area can be considered to be in accordance to the current health policy standards of DIY. Physical distances to healthcare, availability of public health facilities to provide affordable and adequate quality of service were the main health policy visions in line. Traditional approach in evaluating access to public services has also given physical accessibility and availability of public facilities vital importance while measuring service deprivation. These dimensions have also received considerable attention in the policy aspect of Indonesia at various hierarchies starting from national level, Ministry of Health, to district level health organizations. All sub districts in DIY contains one or more public healthcare centres, puskesmas, which was one of the criteria in health policy. Also the ratio of puskesmas to population as stated in policy was met in present condition. However, there was no consideration of geographic area of sub districts for allocating health facilities, as there was vast difference in area and population in sub districts in DIY. Sub districts in city of Yogyakarta were small with minimum area of 0.65 km² but highly pupulated and those in rural regencies were large with maximum area up to 105 km² with less population in Gunung Kidul. Therefore, geographic distance to health facilities differs accordingly.

Two sample villages in this study were from urban sub districts in the city of Yogyakarta with areas of 1km² and 3 km². The third village was in periphery of the city in Sleman regency with 31 km² area. Hence physical accessibility did not seem to be a problematic factor in access to PHC except in few cases from Sleman sub district. However, situation might be different in larger rural sub districts with sparse population settlement, although it fulfils the policy standard.

The ratio of puskesmas to population per sub district in the whole province was within the policy standard which was 1:120,000. But waiting time in puskesmas under availability was found to be one of the main problems as perceived from household survey also from interviews with medical staffs in five puskesmas. This refers that the ratio stated in policy norm is large which does not reflect reality, hence require further attention. Also there was no consideration of ratio of medical staffs to population in policy standard. Ratio of population to doctor in sample villages was found to be within the national average ratio (1:7000) in Indonesia, which was again contradicting with the higher dissatisfaction with long waiting time. It refers to the fact that ratio of health facilities to population mentioned in policy and the national average ratio of population to doctor were large and unrealistic when compared to international standards. Although WHO mentions that there are no specific standards for assessing the sufficiency of medical personnel to address the healthcare need of a given

population, average ratio of physician to population was estimated (1:1000) in accordance to achieve adequate coverage rates for primary healthcare. This ratio was met in only four sub districts out of 78 in the DIY. Although the implementation of existing policies regarding availability of one puskesmas for every 120,000 look optimistic, however if looked into international health standards, the standard does not seem to be applicable.

Health policy concerning government health insurances was found to be well implemented primarily focusing on poor population. By providing free primary healthcare service including medicine cost, issue of equitable access in obtaining adequate primary healthcare was ensured at macro level. However, service quality in terms of inter personal treatment was a remarkable problematic issue found in this study. Although poor people are getting free PHC service, they expressed the feeling of inequality when it comes to personal behaviour of medical staffs in public health facilities. As a result, majority of people wish to change their health facility to a private clinic if applicable.

If access to PHC was evaluated only considering the factors mentioned in health policy of DIY, then result might have shown higher level of access than what was found by this study by measuring five dimensions of access. Hence evaluating access by considering such dimensions have demonstrated underlying variations that exists in present situation which might not be in policy focus.

6.3 Sub-objective 3: Variations in Results Obtained from Census and Primary Data

Comparative analyses between aggregated census data and primary household data showed significant variation in socioeconomic composition of villages. Census presented very small percentage of households with the letter of poor and health card in sample villages as compared with the findings from household survey (refer section 5.1). From this observation it can be said that in comparison, aggregated census data overestimated the socioeconomic condition of sampled households, over-shading the heterogeneity within them. Such information on census might not reflect the real situation when it is being used for studies, where socioeconomic characteristics of people play a vital role. Also such aggregated data might not provide accurate information while making purposive selection of study area as in this study.

Loss of variation while aggregating can be one of the reasons behind such variation. Also, it could be that census and primary data were collected in different ways for different purposes. Sample size used might be small and by chance, may not be a good representative of the villages. Other reasons could be that the sample villages in this study might not be very representative and could be an extreme case, although unlikely. Time gap in collection of information could be another factor in such variation, as the census data was from 2005 and primary data was collected in 2009.

Variation in the geographic distance from villages to nearest health facilities stated in census and that obtained from survey was expected. As census simply considered distance from village centre to the nearest facility without consideration to the mode of transportation, assuming people will visit the nearest one. But in reality, this distance varies as people have their own preference in choosing a health facility. Decision of not choosing the nearest facility is mostly related to their dissatisfaction with certain factors in that facility. This could be an indication of some drawbacks in such health facilities seeking for improvements.

Higher variations within villages than its sub districts refer that intra village variation can get lost in aggregation process. Hence studying variation in access to healthcare at lower level, than administratively defined village boundaries can provide better understanding of problems in various dimensions of access to healthcare for improvement.

7. Conclusions and Recommendations

This chapter gives an overview on the main building blocks of this study starting from the theoretical conceptualisation to the methodological operationalisation in achieving answers to all research questions formulated in this study. It is composed in two main sections. First section presents the conclusive remark on the main findings of this study. Second section proposes recommendations on possible aspects or directions for further research development based on the findings and limitations of this study.

7.1 Conclusions

This study was primarily concerned with the evaluation of access to primary healthcare considering various physical, financial and social factors using province of Yogyakarta as a case study. Unlike common approach of evaluating access by focusing merely on physical accessibility and availability, this study conceptualised and operationalised access as consisting of five dimensions developed as follows: *accessibility; availability; affordability; acceptability and adequacy*. To achieve the main objective of this study, three supporting objectives were formulated along with number of research questions. Coming subsection draws conclusion over the findings of this study in order to address the research questions to achieve the main objective.

7.1.1 Main Findings from Sub-objective 1

- Analyses to address research questions of first sub objective showed that intra village variation in access to PHC was higher than inter village due to socioeconomic heterogeneity within each sample villages. Although variation was not large, Tegalpanggung had slightly lower satisfaction with access when compared to other two villages, as it contained comparatively large proportion of poor households. Study of higher spatial resolution than at administratively defined area boundaries, for instance village in this study, can give better insight of the situation on access to PHC. Also if areas with high socioeconomic homogeneity can be identified for evaluation, then results of analyses might give clear variation between such areas.
- By quantifying and measuring relevant indicators under each dimension of access, it was realized that perceived importance of different factors or dimensions in access was related to the socioeconomic characteristics of individual to a large extent. Healthcare cost seemed more important than fast service and better personal treatment basically among lower socioeconomic class. As despite of dissatisfaction with these issues people continued to visit public health facilities for free or cheap service cost. In contrary, despite of comparably high service and medicine cost, mostly high socioeconomic class preferred to visit private facilities for faster and better service. Hence availability and adequacy, as defined in this study, seemed to be more important dimension than affordability for well off people. Noticeable variation was observed in overall satisfaction level with access to PHC between different socioeconomic classes. Majority of unsatisfied respondents were from lower socioeconomic class and satisfied from higher class. However, the satisfaction level was related to the type of facilities being visited rather than the socioeconomic class. Therefore while evaluating variation in access to PHC, type of facility should be considered, which can provide better indication of problematic factors related with certain type of health facility for further improvement.
- Satisfaction level with access to PHC was found to be influenced by satisfaction with individual factors under dimensions. As in most of cases, despite of higher satisfaction with majority of factors under five dimensions of access, the overall satisfaction level was lower (34%) than the

dissatisfaction level (48%) in total respondent. In general, factors related to accessibility, affordability and acceptability were found to be less problematic in study area, as compared to the long waiting time under availability and dissatisfaction with inter personal treatment by medical staffs under adequacy. Only these two factors were found to be associated with the overall satisfaction level of people visiting public health facilities. Feeling of inequality in personal treatment by medical staffs under adequacy was expressed by lower socioeconomic class visiting public healthcare, which was related to their dissatisfaction. Other factors like cost, distance and trust on medical ability or quality of service showed importance while evaluating access to private health facilities. Short waiting time in facility, good inter personal treatment and high trust on medical ability seemed to be important reasons for people to visit private clinics. Hence, their satisfaction level with access had positive relation with their perception over these issues. This refers to the fact that all these issues are relevant and should be considered while evaluating access to healthcare in general.

7.1.2 Main Findings from Sub-objective 2

- Second sub objective was to study the health planning system and policy standards in context of Yogyakarta. Aim was to compare existing situation of access to healthcare at micro level with the policy standards at macro level. Referring to the health policy of the province of Yogyakarta, the state of access to PHC was found to be in accordance to the existing policy norms. Access related policy for healthcare was focused on factors like availability of public health facilities; physical accessibility; affordability and adequate quality of services. As a result of efficient policy implementation in these aspects, the existing situation of access was found to be in better state. Accessibility and affordability ranked higher summary scores, also in perceived level of satisfaction when evaluated at micro level. Limitation in policy intervention was found in case of perceived problems with availability of medical personnel and in addressing inequality experienced by people from different socioeconomic strata in terms of inter-personal treatment by medical staffs. Availability was perceived as the ratio of population to doctors in this study. Although this ratio was in line with the average population doctor ratio of Indonesia, it looked very large and inapplicable when compared with international health standards like WHO. Hence, further attention is required at policy making level in related problematic issues with consideration of international health standards if applicable. If issues related to personal treatment along with long waiting time in public health facilities can be addressed from policy level, then existing access to public healthcare can score remarkably higher satisfaction level at micro level.

7.1.3 Main Findings from Sub-objective 3

Third sub objective of this study was to evaluate the consistency in results obtained from different scale of analysis. To address this sub objective, comparative analyses was done between common socioeconomic and accessibility variables, using aggregated census data from 2005 and disaggregated primary data obtained from household survey. Large difference in socioeconomic and accessibility variables was observed. Comparative analyses between socioeconomic attributes demonstrated that aggregated census data often overestimated the socioeconomic characteristics of people at village level. Also variation found in socioeconomic and accessibility attributes within villages were reduced or lost when checked at higher administrative unit than village. These results indicated that aggregation at larger scale, i.e. village, can average out the variability in socioeconomic and accessibility variables that exists at small scales, i.e. socioeconomic clusters within villages. In general, the findings indicate that large scale study might hide the variability in access to PHC at small scales. If homogeneous socioeconomic clusters can be used as the scale of analysis rather than census data at village level, then the evaluation of access to healthcare can

provide more realistic results. Care should be given to the fact that scale and configuration of spatial units may affect the outcome of analyses. Therefore care should be taken while drawing conclusion or in decision making when aggregated data are used.

7.2 Recommendations

Following the findings and methodological limitations faced in this study, number of possible areas can be recommended for future research development that can further enhance the findings of this study.

- As this study was carried out in the areas located in city core and immediate periphery of the city, large variation could not be seen in the state of access to PHC between sample villages. Rural area with sparsely located settlement can give more space to compare the variation in access between urban and rural regions within one province under similar health policies. Detail spatial analysis, for example using road network or gravity based models, can be another practical approach to evaluate accessibility measures under access.
- Another possible field can be to evaluate variation in access at different scale of analysis using same source of data. As in this study, comparison in aggregated and disaggregated data was done using secondary census data and primary household data respectively. Evaluating the consistency of statistical results obtained from aggregated and disaggregated data will be more precise and accurate if same source of data can be used.
- Following the result of this study that showed variation in access between different socioeconomic classes, new zone design technique can be proposed for further research development. This technique can be used to create new zone boundaries by considering maximum internal socioeconomic homogeneity. Rather than limiting analyses within administratively defined boundaries, i.e. village, this technique can show more effective and realistic variations in access to healthcare across different socioeconomic classes. It also allows to observe the effect of modifiable areal unit problem.

As a final remark of this study, even the most powerful diagnostic tests, medicines and existence of supreme quality healthcare service cannot improve peoples' health status, if they do not reach to needy people. To ensure equal access in all dimensions to health services by people, regardless of their socioeconomic strata, is a major challenge in itself. Hence additional efforts should be made from policy level to enable all population to gain equitable access to primary healthcare. Also health policies should be formulated in a way to meet the minimum threshold lines for relevant factors. Consideration to internationally accepted healthcare standards could be more rational in achieving adequate access to primary health care.

It is expected that the findings of this study, have been useful to define and measure access to primary healthcare from broader perspective, highlighting the existing underlying problematic factors for further improvement and enhancement of access to healthcare in the region.

References

- Amer, S. (2007). Towards spatial justice in urban health services planning : A spatial - analytic GIS - based approach using Dar es Salaam, Tanzania as a case study.299 pp, Utrecht University.
- Andersen, R. M., A. McCutcheon, et al. (1983). "Exploring Dimensions of Access to Medical Care."
- Bagheri, N., G. Benwell, L., et al. (2005). "Measuring spatial accessibility to primary health care."
- Black, M., S. Ebener, et al. (2004). Using GIS to Measure Physical Accessibility to Health Care. International Health Conference World Health Organization.
- Campbell, S. M., M. O. Roland, et al. (2000). "Defining quality of care." *Social Science & Medicine* 51(11): 1611-1625.
- Carstairs, V. (1981). "Small area analysis and health research." *Community Medicine* 3: 131-139.
- Cockings, S. and D. Martin (2005). "Zone design for environment and health studies using pre-aggregated data." *Social Science & Medicine* 60(12): 2729-2742.
- Das, D. (2008). "Urban Quality of Life: A Case Study of Guwahati." *Social Indicators Research* 88(2): 297-310.
- Dash, L. N. (2000). World Bank and economic development of India. New Delhi, APH Publ. Corp.
- ESCAP (2009). Statistical Yearbook for Asia and the Pacific 2008, United Nations.
- Field, A. (2005). Discovering statistics using SPSS. London etc., Sage.
- Foo, T. S. (2000). "Subjective assessment of urban quality of life in Singapore (1997-1998)." *Habitat International* 24(1): 31-49.
- Fosu, G. B. (1989). "Access to Health Care in Urban Areas of Developing Societies." *Journal of Health and Social Behavior* 30(4): 398-411.
- Fosu, G. B. (1989). "Access to Health Care in Urban Areas of Developing Societies."
- Frankenberg, E., J. C. Caldwell, et al. (2004). "The effects of access to health care on infant mortality in Indonesia."
- Guagliardo, M. F. (2004). "Spatial accessibility of primary care: concepts, methods and challenges." *International Journal of Health Geographics* 3.
- Gulliford, M., J. Figueroa-Munoz, et al. (2002). "What does 'access to health care' mean?" *Journal of Health Services Research and Policy* 7(3): 186-188.
- Gulzar, L. (1999). "Access to Health Care." *Journal of Nursing Scholarship* 31(1): 13-19.
- Haynes, R., K. Daras, et al. (2007). "Modifiable neighbourhood units, zone design and residents' perceptions." *Health & Place* 13(4): 812-825.
- Higgs, G. (2005). "A Literature Review of the Use of GIS-Based Measures of Access to Health Care Services " *Health Services and Outcomes Research Methodology* 5(2): 119-139.
- Hyera, M. B. (2003). Assessment of accessibility to elementary education in informal settlements : the case of Cebu city, the Philippines. Enschede, ITC: 39.
- Ibrahim, M. F. and S. W. Chung (2003). "Quality of Life of Residents Living near Industrial Estates in Singapore." *Social Indicators Research* 61(2): 203-225.

- Lahelma, E., P. Martikainen, et al. (2004). "Pathways between socioeconomic determinants of health." *J Epidemiol Community Health* 58: 327–332.
- Leisinger, K., M. (2008). Annual report 2008 Creating access – for better health, Novartis Foundation for Sustainable Development.
- Martin, D., A. Nolan, et al. (2001). "The application of zone-design methodology in the 2001 UK Census." *Environment and Planning A* 33(11): 1949-1962.
- Martinez, J. A. (2005). Monitoring intra - urban inequalities with GIS - based indicators : with a case study in Rosario, Argentina, Utrecht University ITC.
- Maxwell, R. J. (1992). "Dimensions of quality revisited: from thought to action." 1(3): 171-177.
- May, R., K. Rex, et al. (2000). "UN Habitat Indicators Database: evaluation as a source of the status of urban development problems and programs." *Cities* 17(3): 237-244.
- McGrail, M. R. and J. S. Humphreys (2008). "Measuring spatial accessibility to primary care in rural areas: Improving the effectiveness of the two-step floating catchment area method." *Applied Geography* In Press, Corrected Proof.
- Millman, M. L. (1993). Access to health care in America, Institute of Medicine.
- Moeloek, F. A. (1999). Health Development Plans Towards Healthy Indonesia 2010, Ministry of Health, Republic of Indonesia.
- Moseley, M. J. (1979). Accessibility: the rural challenge, London, Methuen and Co.
- Obrist, B., N. Iteba, et al. (2007). "Access to Health Care in Contexts of Livelihood Insecurity: A Framework for Analysis and Action." *PLoS Med* 4(10): e308.
- Oliver, A. and E. Mossialos (2004). "Equity of access to health care: outlining the foundations for action."
- Omer, I. (2006). "Evaluating accessibility using house-level data: A spatial equity perspective." *Computers, Environment and Urban Systems* 30(3): 254-274.
- Parker, A. W., J. M. Walsh, et al. (1976). "A Normative Approach to the Definition of Primary Health Care." *The Milbank Memorial Fund Quarterly. Health and Society* 54(4): 415-438.
- Parnell, S. and M. Poyser (2001). The value of indicators as a tool for local government, Democratising Local Government: The South African Experiment. University of Cape Town Press, Cape Town. pp. 251-260.
- Penchansky, R. and J. W. Thomas (1981). "The Concept of Access. Definiton and Relationship to Consumer Satisfaction, Medical Care." 19(2): 127-140.
- Rogerson, P. A. (2006). Statistical methods for geography : a student's guide. London etc., Sage.
- Roghmman, K. J., A. Hengst, et al. (1979). Satisfaction with Medical Care: Its Measurement and relation to Utilization, Medical Care.
- Schuurman, N., N. Bell, et al. (2007). "Deprivation Indices, Population Health and Geography: An Evaluation of the Spatial Effectiveness of Indices at Multiple Scales." *Journal of Urban Health* 84(4): 591-603.
- Smith, D. M. (1994). Geography and Social Justice, Colchester, Blackwell.
- Stafford, M., O. Duke-Williams, et al. (2008). "Small area inequalities in health: Are we underestimating them?" *Social Science & Medicine* 67(6): 891-899.

- Talen, E. and L. Anselin (1998). "Assessing spatial equity: an evaluation of measures of accessibility to public playgrounds." *Environment and Planning A* 30: 595-613.
- Tsou, K. W., Y. T. Hung, et al. (2005). "An accessibility-based integrated measure of relative spatial equity in urban public facilities." *Cities* 22(6): 424-435.
- Turksever, A. N. and G. Atalik (2001). "Possibilities and Limitations for the Measurement of the Quality of Life in Urban Areas." *Social Indicators Research* 53(2): 163-187.
- Unger, A. and L. W. Riley (2007). "Slum Health: From Understanding to Action." *PLoS Med* 4(10): e295.
- Veenhoven, R. (2002). "Why Social Policy Needs Subjective Indicators." *Social Indicators Research* 58(1): 33-46.
- Wagstaff, A. (2002). "Poverty and health sector inequalities." *Bulletin of the World Health Organization* 80: 97-105.
- WHO (2009). "Indonesia Country Health Profile - Development of the health system." Retrieved 22-12-2009, 2009, from www.searo.who.int/EN/Section313/Section1520_6822.htm.
- Wong, C. (2006). *Indicators for urban and regional planning : the interplay of policy and methods* : also e-book. London etc., Routledge.
- Yamauchi, F., S. Chowdhury, et al. (2007). "Spatial coordination in public good allocation: Nonparametric evidence from decentralized Indonesia " *International Food Policy Research Institute (IFPRI)*

Appendix A: Empirical references to indicators used in this study

Indicators		Penchansky and Thomas (1981)	Andersen, McCutcheon et al. (1983)	Fosu, G.B. (1989)	May, Rex et al. (2000)	Wagstaff (2002)	Guagliardo (2004)	Frankenberg, Caldwell et al. (2004)	Oliver and Mossialos (2004)	Unger and Riley (2007)	Obrist, Iteba et al. (2007)	Amer (2007)	Leisinger (2008)	Gulzar (1999)
Socio-economic	Attributes													
Household characteristics	Education level	√	√	√	√	√		√	√	√	√	√	√	√
	Age dependency	√	√	√	√							√		
	Employment status / dependency	√		√						√		√	√	
	Household income	√	√		√	√	√	√	√	√	√	√	√	√
Housing condition	House ownership				√			√	√	√	√	√		
	Land ownership				√					√		√		
	Construction type			√	√				√	√		√		
	House crowding			√						√		√		
Physical infrastructure	Toilet type			√	√	√				√	√	√	√	
	Source of water			√	√	√				√	√	√	√	
	Electricity				√						√	√	√	
	Sewage disposal			√	√	√				√	√			
Assets possession	Type of vehicles				√						√	√		√
	Telephone				√									
	Television											√		
	Refrigerator											√		
Dimensions of Access to PHC														
Availability	Type of PHC facility	√	√	√		√		√	√		√	√	√	√
	PHC facility-population ratio		√				√	√			√			
	Doctor - population ratio		√			√	√	√			√	√		
	Medical drug store			√		√					√	√		√
	Ease to get appointment	√									√			
	Waiting time to get check-up	√	√						√		√	√	√	
	Subjective perception	√	√								√	√	√	

Indicators Dimensions of Access to PHC		Penchansky and Thomas (1981)	Andersen, McCutcheon et al. (1983)	Fosu, G.B. (1989)	May, Rex et al. (2000)	Wagstaff (2002)	Guagliardo (2004)	Frankenberg, Caldwell et al. (2004)	Oliver and Mossialos (2004)	Unger and Riley (2007)	Obrist, Iteba et al. (2007)	Amer (2007)	Leisinger (2008)	Gulzar (1999)
Accessibility	Travel distance	√	√			√	√	√			√	√	√	√
	Travel time	√	√		√	√	√	√			√	√	√	√
	Mode of transport	√	√		√	√	√				√	√	√	√
	Subjective perception	√	√		√						√	√	√	
Affordability	Possession of health card Or health insurance	√	√			√						√	√	√
	Insurance coverage	√	√			√							√	√
	Direct and indirect costs	√	√		√	√			√		√	√	√	√
	Subjective perception	√	√		√	√					√	√	√	
Acceptability	Religious or cultural factors	√	√	√										
Adequacy	Quality of medical care	√	√		√			√	√		√	√	√	√
	Personal treatment	√	√		√				√		√	√	√	√
	Cleanliness	√									√		√	√
	Opening hour	√									√	√	√	
Satisfaction level with access to health care		√	√	√								√	√	

Appendix B: Description and rationales of indicators used in this study

Indicators	Attributes	Description	Rationale
<u>Socio-economic</u> Household characteristics	Highest education level	Highest level of education attained by household members	“Education provides formal qualifications that contribute to the socioeconomic status through occupation and income” (Lahelma, Martikainen et al. 2004). In this study it contributes to observe the influence of education level on the attitude of household towards healthcare and their perception on different factors related to the access to PHC.
	Age dependency	<i>Numerator:</i> Household members within age of 16 - 60 years old <i>Denominator:</i> Total household members	People between 16 – 60 years (<i>referring to census data and official retirement age in Indonesia</i>) are assumed to be active and able to work for earning. Household containing more members between this age group can have more possibility in improving the economic status.
	Employment dependency	<i>Numerator:</i> Full time employee + part time employee / 2 <i>Denominator:</i> Total household members	Household earning is derived primarily from paid employment. Household with large number of employed members can be assumed to have more earning and better economic status.
	Range of income	Range of household monthly income, in Indonesian Rupiah 1. Less than 700,000 2. 700,000 – 1,400,000 3. 1,400,000 – 2,800,000 4. 2,800,000 – 5,600,000 5. Above 5,600,000	Income determines the purchasing power of household. It also contributes to resources needed in maintaining good health. Income being a sensitive matter, a range is used to put respondent at ease and also to avoid overestimation or underestimation to some extent. (<i>Referring to Statistics of Indonesia 700,000 Indonesian Rupiah is considered as the income poverty line for a household with 4-5 members.</i>)
	Possession of ‘letter of poor’	Asking if the household have the letter of poor	It is an official letter issued by the local government which is an indication of a poor household in context of Indonesia.
Housing condition	House and Land ownership	Status of house and land ownership; owned, rented or squatted	Ownership of house and land ensures less financial burden on household in terms of monthly rent.
	Construction type	Construction type of the house, if it is permanent, semi permanent or temporary	Physical condition and type of construction can express the living standard of household members.

		structure	Definition of construction types from census questionnaire: -Permanent house is the one with brick, concrete or wooden walls, roof made out of aluminium sheets or wooden slates and floors with concrete or ceramic tiles. -Semi permanent house are made with half concrete, wood or bamboo walls with roofs made of tiles or aluminium sheets or wood or asbestos. -Temporary or simple house are those made out of mud, wood and leaves.
	Crowding	Ratio of total number of bedrooms to the total household members	Number of people per bedroom is calculated to see the influence of bed sharing as it is considered as a sensitive crowding indicator also for health studies.
Physical infrastructure	Toilet type	Type of toilet used, if it is private, public (shared) or no toilet (for example, in river)	Basic infrastructures like water supply, sanitation and electricity are commonly used indicator for socioeconomic stratification.
	Source of water	If household have public piped water supply (PAM), well, rainwater or from river as the source of water	Being basic needs for daily activities, these infrastructures reflect the living standard also the hygiene condition of household members. As source of drinking water supply and type of sanitation is directly related with health status.
	Electricity	If household have public electric supply (PLN), some other type or no electricity	
Assets possession	Number of vehicle	Number of bicycles, motor bikes or cars	Asset possession is another socioeconomic indicator which indicates the status and ability of household to maintain certain level of living standard.
	Number of phone; TV; refrigerator	Number of such household assets owned by the household	As income being a sensitive and sometimes confidential matter, evaluation of such assets can be a useful way for socioeconomic stratification.
Access to PHC			
<i>Availability Degree of fit between existing PHC services and needs of people</i>	Type of PHC facility	Type of PHC facility visited, if it is public(government) or private organization	Type of PHC facility being visited can be useful to evaluate respondent's perception towards various factors related to healthcare service. It can also express the socioeconomic status of respondent. As in context of Indonesia, government health centres provide free PHC service to poor people.
	PHC facility-population ratio	Number of PHC facilities divided by total population in each sub-district	The health policy in Indonesia have specified a minimum number of healthcare facilities per administrative units
	Doctor - population ratio	Total number of doctors divided by total population in each sub-district	The ratio of facility or doctors to population shows the demand-supply ratio of PHC service. It also enables to compare the existing situation with the DIY policy and

			international health standards.	
Medical drug store	Availability of medical store in PHC facility visited	Availability of drug store for prescribed medicine is an important factor considered in many empirical studies (Wagstaff 2002; Amer 2007; Obrist, Ireba et al. 2007) while evaluating access to healthcare. It is assumed that peoples' opinion on overall availability of healthcare is influenced by how easy or difficult it is to get required medicine is.		
Ease to get appointment	Do they have to get an appointment prior visiting the facility or just walk in? If yes, how long does it take to get it?	Query about appointment system aid to understand the process by which people can enter different healthcare facility to obtain the service. Also to know how long they have to wait before actually entering the facility, if appointment is needed.		
Waiting time to get check-up	Waiting time after registration in the facility till the visit to doctor for check-up	Waiting time in healthcare facility is an important and commonly used indicator in healthcare related studies. Despite of physical availability of service centre, patients might have to wait long to obtain medical service due to inadequate personnel, equipment or some other reason. Hence, this indicator can give an indication of relation between volume of healthcare service demand and supply.		
Subjective perception	Opinion about the waiting time in facility before getting checkup in five Likert scale; Very short. Short, Normal, Long and Very long	Subjective perception on waiting time is relevant in this study as it was assumed that perception might differ depending on socioeconomic characteristics of people and also depending on the type of healthcare facility visited.		
Is the visited facility the nearest one	Do the household visit the nearest PHC facility	It was assumed that people are rational and visits the nearest PHC facility in ideal case. This indicator helps to ensure the assumption.		
Travel distance	Physical distance to the PHC facility visited	Travel distance and time are the commonly used indicators to evaluate travel impedance in any accessibility related studies. It can be used to analyze how far or how long people are willing to travel to get PHC service.		
Travel time	Total travelling time to reach the PHC facility	Mode of transport is another factor to be considered in this study as it is directly related to physical accessibility. For instance, non-motorize, motorized or public transportation.		
Mode of transport	Mode of transport used to visit PHC facility			
Subjective perception	Opinion about the travel distance and travel time to reach the PHC facility	Subjective perception on travel impedance can help in understanding behavioural difference in various demographic or socioeconomic classes of people.		
Possession of health card	If the household have the health card, 'Katu Sehat'	'Katu Sehat' is a type of government health insurance providing free PHC service which has a direct relation with the dimension affordability in this study.		
Insurance	If the health card covers medical and	Apart from direct service cost like doctor's fee, there are many indirect expenses in		
Accessibility <i>Degree of fit between geographical location of PHC service and the location of people</i>				
Affordability				
<i>Degree of fit</i>				

<i>between PHC service cost and peoples' ability or willingness to pay</i>	coverage	Laboratory expenses	healthcare which should not be ignored while evaluating over all access to PHC.
	Direct and indirect costs	Cost of registration, doctor's fee, medicine, laboratory and travel.	Understanding of insurance coverage (health card in this case) of these indirect expenses is relevant, as it can completely influence peoples' opinion on healthcare cost.
	Subjective perception	Opinion about the overall cost for PHC	
<i>Acceptability Degree of fit between the characteristics of the provider and those of people</i>	Religious or cultural factors	Do respondent have any cultural or religious preference to visit certain PHC facility?	People might have certain religious or cultural preference in visiting a particular healthcare facility, either because of some social behaviour or personal wish. For instance, people normally wish to visit a facility where they can communicate in local language. Similarly, gender preference is another factor in acceptability, as in some case female patients wish to be checked by female doctors and male patients by male doctors.
	Gender preference	Is there any gender preference of doctors?	
<i>Adequacy Degree of fit between peoples' expectation and service provided</i>	Trust on medical quality	Opinion about the medical ability and service quality of the visited PHC facility?	Despite of short physical distance to healthcare facility or being provided with free healthcare service, people might not be happy with the service due to several other reasons.
	Personal treatment	Opinion about the personal treatment by facility personnel in 5 Likert scale (Very good, good, normal, bad and very bad)	For example poor service quality compared to other healthcare facilities, unfriendly personal treatment by medical personnel, unpleasant or dirty physical environment etc.
	Cleanliness	Opinion about the cleanliness or physical appearance of the visited facility	Opening hour of healthcare service should also be considered as people might have problem visiting the facility due to overlapping in opening time of the facility and their working (employment) schedule.
	Opening hour	Opening hour of the PHC facility and if it suits their working hour	Such indicators are relevant in this study as they influence the overall satisfaction level of people towards access to PHC.
<i>Subjective perception on overall access to PHC</i>	Satisfaction level	Taking all the factors and dimensions of access into consideration, opinion on the overall satisfaction level towards access to PHC facility	Rational opinion on satisfaction level towards access to PHC can reflect the actual situation, in terms of peoples' perception, of access to PHC taking each dimension in account.

Appendix C: Content of household survey questionnaire

Sub-district: Interviewer name:

Village: Date:

House no. : Duration:

This survey is purely for study purposes to understand the existing condition in accessing health care facilities in the city of Yogyakarta, Indonesia. The individual perception of citizens is of immense value for a successful completion of this study. Your responses to this questionnaire will be treated with strict confidentiality. Hence, your honest comments and cooperation will be highly appreciated.

Socio-economic Information

[* Read: I will start this interview with some questions related to your household information.]

A.	General information of respondent			
A.1.	Respondent is	☐ Male ☐ Female		
A.2.	Position in family	Head of family ☐ Yes ☐ No ☐ Husband ☐ Wife		
A.3.	Household members [Tick the box for those who are currently living in the house from atleast past 1 year]	☐ Below age 6 years: ☐ Age 7 – 15 years: ☐ Age 16 – 45 years: ☐ Age 46 – 60 years: ☐ Above 60 years: Total number (including respondent):		
A.4.	Highest education level in household	☐ No education ☐ Elementary school ☐ Junior high school ☐ Senior high school ☐ University education ☐ Others		
A.5.	Employment status of household members	Household member (eg. husband / wife / son)	Full time job	Part time job
			☐	☐
			☐	☐
			☐	☐
A.6.	Average monthly income of household in Indonesian rupiah	☐ Less than 700,000 ☐ 700,000 – 1,400,000 ☐ 1,400,000 – 2,800,000 ☐ 2,800,000 – 5,600,000 ☐ Above 5,600,000		
A.7.	Do you have 'letter of poor' (Surat Keterangan Tidak Mampu)?	☐ Yes ☐ No		
A.8.	In which socio-economic group your household belongs to?	☐ Sangat kaya (High class) ☐ Kaya (Upper middle class) ☐ Menengah (Middle class) ☐ Miskin (Lower middle class) ☐ Sangat miskin (Poor)		

[* Read: Now, I will ask some general questions about your house condition.]

B.	Housing Condition		
B.9.	Status of house	☐ Owned ☐ Rented ☐ Other	
B.10.	Status of land	☐ Owned ☐ Rented ☐ Squatted (informal)	
B.11.	Number of rooms occupied by household	Bedroom: Kitchen: Toilet / Bathroom: Others:	
B.12.	Construction type	Type: ☐ Permanent ☐ Semi-permanent ☐ Temporary	
B.13.	Type of toilet	☐ Public ☐ Private ☐ Open air (no toilet) ☐ Shared ☐ Not shared	
B.14.	Wastewater disposal (sewage waste)	☐ Septic tank ☐ Sewer line ☐ None ☐ Other	
B.15.	Trash disposal (garbage)	☐ Garbage collection system (.....how often) ☐ In container ☐ Burn ☐ Roadside ☐ In river ☐ Other	
B.16.	Main source of water supply in house	☐ PAM piped water to house ☐ Buy from vendors ☐ PAM piped water in public tap ☐ Ground water (well) ☐ Others.....	
B.17.	Which source of electricity supply you have in house?	☐ PLN (State electricity company) ☐ Local government agency ☐ Private corporation ☐ Public self reliance agency ☐ No electricity ☐ Others.....	
B.18.	Which of these assets does your household have?	Cycle..... Telephone..... Motorbike..... Television..... Car..... Refrigerator..... Other mode of transport.....	

Existing health care facility

[* Read: I will now ask you about health condition in your household and health facility you visit.]

C.	General information on access to health care																																							
C.19.	In the last 6 months, how many times have your household members suffered from diseases mentioned in the table at right box?	<table border="1"> <thead> <tr> <th>Disease</th> <th>Members</th> <th>Age</th> <th>How many times</th> </tr> </thead> <tbody> <tr> <td>Severe flu (cough, cold)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Fever</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Diarrhea & vomiting</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Malaria</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Measles (<i>Campak</i>)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Dengue fever (<i>Demam Berdarah</i>)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Upper Respirator Tract Infection (<i>ISPA</i>)</td> <td></td> <td></td> <td></td> </tr> <tr> <td>Other.....</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Disease	Members	Age	How many times	Severe flu (cough, cold)				Fever				Diarrhea & vomiting				Malaria				Measles (<i>Campak</i>)				Dengue fever (<i>Demam Berdarah</i>)				Upper Respirator Tract Infection (<i>ISPA</i>)				Other.....					
Disease	Members	Age	How many times																																					
Severe flu (cough, cold)																																								
Fever																																								
Diarrhea & vomiting																																								
Malaria																																								
Measles (<i>Campak</i>)																																								
Dengue fever (<i>Demam Berdarah</i>)																																								
Upper Respirator Tract Infection (<i>ISPA</i>)																																								
Other.....																																								
C.20.	** Which health facility do your household members visit for primary health care?	<i>(Tick the boxes)</i> <i>Order of visit</i> ☐ Hospital ☐ Health care (Puskesmas) ☐ Health sub-care (Puskesmas Pembantu) ☐ Integrated health posts (Posyandu)																																						

[illegible]

		☐ Not eligible ☐ Long process to get the card ☐ Have to travel long distance ☐ Unaware ☐ Don't need it ☐ Other.....	
C.30.	How much do you have to pay to get health insurance?	Rupiah ☐ Free If not free , what do you think about the cost? ☐ Very inexpensive ☐ Inexpensive ☐ Normal ☐ Expensive ☐ Very expensive	
C.31.	** Does the insurance cover all health care expenses?	☐ Yes ☐ No ☐ Only primary health care If no , up to what amount does it cover for bigger diseases? Does it cover all medicine expense? ☐ Yes ☐ No	
C.32.	In which health facilities does the health card or insurance give free health check up? (See C.20. for reference)	Government (Public) ☐ Hospital ☐ Puskesmas ☐ Puskesmas Pembantu ☐ Posyandu ☐ Midwife (Bidan) ☐ Traditional birth attendance	Private ☐ Hospital ☐ Puskesmas ☐ Puskesmas Pembantu ☐ Posyandu ☐ Midwife (Bidan) ☐ Traditional birth attendance ☐ All ☐ Others
C.33.	How much additional cost does your household spend in health care?	 Registration cost Doctor's fee In medicines Travel cost Overall	
C.34.	What does your household think about these costs?		
	Doctor's fee	☐ Very inexpensive ☐ Inexpensive ☐ Normal ☐ Expensive ☐ Very expensive	
	Medication cost	☐ Very inexpensive ☐ Inexpensive ☐ Normal ☐ Expensive ☐ Very expensive	
	Travel cost to get health care	☐ Very inexpensive ☐ Inexpensive ☐ Normal ☐ Expensive ☐ Very expensive	
	Total cost	☐ Very inexpensive ☐ Inexpensive ☐ Normal ☐ Expensive ☐ Very expensive	
C.35.	Does your household feel welcome in the facility you visit?	☐ Yes No If no , how and why	
C.36.	Is there any cultural or religious preference in choosing a particular facility?	☐ Yes ☐ No If yes , what..... ☐ Very satisfied ☐ Satisfied ☐ Normal ☐ Unsatisfied ☐ Very unsatisfied	
C.37.	How is the cleanliness of the facility?	☐ Very Clean ☐ Clean ☐ Normal ☐ Dirty ☐ Very dirty	

C.38.	How is the personal treatment from all facility personnel?	☐ Very Good ☐ Good ☐ Normal ☐ Bad ☐ Very bad
C.39.	What does your household think about medical ability (trust) of the facility?	☐ Very Good ☐ Good ☐ Normal ☐ Bad ☐ Very bad
**C.40 .	If an equal number of male and female medical personnel is available, to whom will your household prefer to visit for check up?	☐ Male household members to male doctor
		☐ Female household members to female doctor
		Does not matter for ☐ male ☐ female
		☐ Does not matter at all
		How satisfied are you with existing situation in this regard? ☐ Very satisfied ☐ Satisfied ☐ Normal ☐ Unsatisfied ☐ Very unsatisfied
C.41.	Does the opening hour of the facility suits your household time?	☐ Yes ☐ No
C.42.	If your household income is doubled, will your household still go to the same health care facility?	☐ Yes ☐ No
		If no, then which one (name) Why?
**C.43 .	Which of these factors is more important for you to get better health care?	Please rank your preference from 1 to 6 Waktu tempuh (<i>Reduced travel time</i>) Waktu tunggu (<i>Reduced waiting time</i>) Biaya (<i>Reduced cost</i>) Faktor budaya dan agama (<i>Cultural / religious factors</i>) Kualitas yang baik (<i>Improved quality of service</i>) Keramahan personel (<i>Friendliness of facility personnel</i>)
C.44.	Over all satisfaction level towards existing health care that you are getting.	☐ Very satisfied ☐ Satisfied ☐ Normal ☐ Unsatisfied ☐ Very unsatisfied
C.45.	How do you think access to health care can be improved?	☐ Mengurangi waktu perjalanan (<i>Further reduced travel time</i>) ☐ Mengurangi waktu tunggu (<i>Further reducing waiting time</i>) ☐ Mengurangi biaya (<i>Further reduced cost</i>) ☐ Banyak pilihan dengan mempertimbangkan factor agama dan tradisi (<i>Better options regarding cultural factors</i>) ☐ Meningkatkan kualitas jasa pelayanan (<i>Further improving quality of service</i>) ☐ Meningkatkan personal dari pelayan rumah sakit keramahan (<i>Further improving personal treatment by facility personnel</i>)

Thank you very much for your time and cooperation!!

Appendix D: Content of Interview with Health Facility Personnel

Sub-district: Interviewer name:

Village: Position of interviewee:

Name of facility: Type of facility:.....

Location : Date:

(Coordinates:.....) Duration:

This survey is purely for study purpose to understand the existing condition in accessing health care facility in the city of Yogyakarta, Indonesia. Individual perception of citizen is of immense value for a successful completion of this study. Your responses to this questionnaire will be treated with strict confidentiality. Hence, your honest comments and cooperation will be highly appreciated.

[Read: I will ask some general questions related to the service of this health care facility]*

A.	General information from facility personnel	
A.1.	In which year did this service start?	
A.2.	Type of service	☐ Primary examination ☐ Curative care ☐ Maternity care ☐ Dental care ☐ Inpatient ☐ All ☐ Other
A.3.	Number of medical doctors	 Male Female
A.4.	Number of nurse or other medical assistants	 Male Female
A.5.	Number of patients' bed	 for general primary care for emergency case for indoor patients (admitted for few days)
A.6.	Does this facility have all laboratories and equipments required for primary health care?	☐ Yes ☐ No
A.7.	Does this facility provide any extra service or treatment equipment that others don't have?	☐ Yes ☐ No If yes, what.....
A.8.	Is appointment required?	☐ Yes ☐ No By telephone? ☐ Yes ☐ No If yes, before..... hours or days.
A.9.	Number of patient attendance in last month	 (total) (from poor family)

A.10.	Number of patient attendance in last year	 (total) (from poor family)		
A.11.	Attendance of poor patients in last 6 months suffering from mentioned diseases	Disease	Total number	Number of poor patients with card
		Severe flu (cough, cold)		
		Fever		
		Diarrhea & vomiting		
		Malaria		
		Measles		
		Dengue fever		
		Upper Respiratory Tract infection (ISPA)		
		Others		
A.12.	Opening hour			
A.13.	Does this facility provide emergency service?	☐ Yes ☐ No Number of ambulance..... ☐ Don't have it		
A.14.	Where do majority of patients come from?	 Village Sub-district Regency		
A.15.	Cost	Registration cost:..... Doctor's fee (for primary care)n Other (if any):		
A.16.	Do patients have problem in paying?	☐ Yes ☐ No		
A.17.	Any subsidized rate of treatment for special group of people?	☐ Yes ☐ No If yes, who..... (with health card , letter of poor or others)		
A.18.	How far does the health insurance cover the cost?	Cover all the cost Cover partially (.....% of total health care cost) Does health insurance cover medication cost? ☐ Yes ☐ No		
A.19.	Do patients have any preference for male or female doctors / medical personnel?	☐ Yes ☐ No		
A.20.	Do patients have any common complain?	☐ Yes ☐ No If yes, what.....		

Self observation

- Amount of patients in waiting lobby.....
- Enough seating provision in waiting lobby.....
- Cleanliness
- Availability of medical store.....
- General mode of transport used by patients.....
- Distance to nearest public transport transit

Appendix E: Distribution of summary scores of dimensions of access

Figure E-1 displays the distribution of summary scores for each dimension using box plot which depict the median, quartile and outliers. The outliers are the household with values between 1.5 inter quartile range (IQR) and 3 IQR's from the end value of a box. Outliers with low accessibility scores in box plot showed in Figure (a) represented households visiting hospitals from village Tridadi.

And the outliers with higher adequacy scores were households from higher socioeconomic class who visited private clinic from village Kricak. Figure (b) shows the distribution of summary scores for households visiting three different health facilities. Distribution of accessibility score for hospital and affordability score for private clinics showed wide range with low median value as compared to other two. Adequacy score was much higher for private clinics.

Table E-1 presents the summary scores of dimensions of access for sample villages and different healthcare facilities.

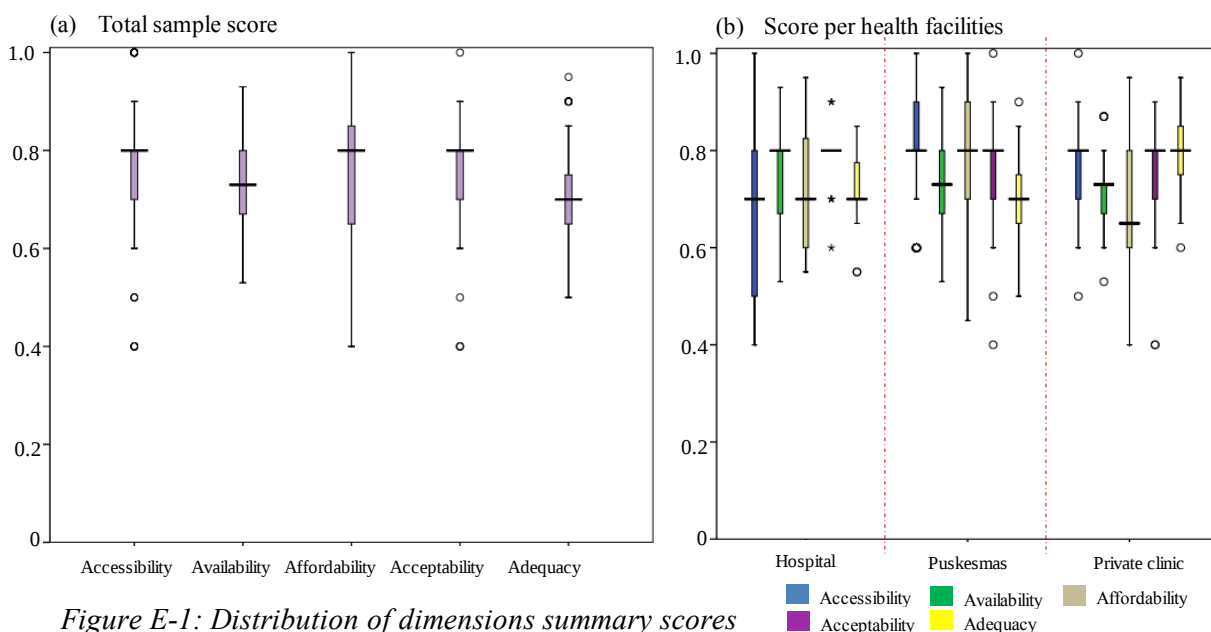


Figure E-1: Distribution of dimensions summary scores
[High score refers to higher satisfaction level; 1= highest score]

	Accessibility	Availability	Affordability	Acceptability	Adequacy
Village					
Tegalpanggung	0.92	0.73	0.78	0.84	0.72
Kricak	0.87	0.74	0.83	0.79	0.7
Tridadi	0.78	0.7	0.8	0.79	0.75
Healthcare facility					
Hospital	0.71	0.76	0.75	0.82	0.74
Puskesmas	0.79	0.73	0.8	0.76	0.65
Sub-puskesmas	0.8	0.74	0.82	0.77	0.66
Private clinic	0.76	0.82	0.67	0.81	0.79

Table E-1: Summary scores of dimensions of access for sample villages and different healthcare facilities

[Note: High values indicate high level of access; 1 = maximum value]