

# **Equal access for a healthy community**

## **Research report on inequality of accessibility of hospitals in Yogyakarta, Indonesia**

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## **Abstract**

This research assesses inequality of the accessibility of health care. There is a need for a strong social commitment to good health. Good health increases the life expectancy of society, gives human beings the capability to participate in the community and contributes to the quality of life. A healthy population will stimulate economic growth which will reduce poverty.

Accessibility is defined as availability, concerning capacity and cost, and the physical accessibility, determined by travel time. To assess the accessibility of people to health care, a model has been developed and implemented in a case study in Yogyakarta province in the heart of Java. The model is GIS-based and uses the villages, hospitals and road network as input. Using a 30-minute maximum travel time, the model optimizes the service area of the hospitals. Poor people are limited in travel budget, hospital expenses, and travel mode.

The model shows that there exists no inequality in health care accessibility due to spatial distribution of the population. However, the different limitations for poor people cause their access to be worse.

Limited facilities cause poor people to have worse access to hospitals, as they can only use their health insurance for the poor at public hospitals. For the remote villages the establishment of public private partnerships has been proposed and also their locations, to reduce the existing inequality in health care access.

Poor people have limited means to travel to the hospitals. Those that are dependent on public transport have much worse access to hospitals. Establishing new hospitals at favorable locations would be expensive, as 28 extra hospitals are needed. Instead, the introduction of high quality moving health facilities is proposed, located at optimal locations of Puskesmas facilities to cover a maximum amount of villages and residents.

Limited budget for travel costs also have major effect on health care accessibility, as was shown in the model results. Therefore a subsidy for travel expenses is recommended to be included in the free health insurance for the poor.

Finally, the poor suffer from the sub optimal distribution of the 120 Puskesmas in the province. Considering the 30-min travel time limit the coverage could be reached by less facilities at better locations, thus relocation would improve accessibility. The modeling results suggest that the government should reevaluate the locations and policy on the Puskesmas locations.

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# 1. Introduction

## 1.1 Introduction

**“Infrastructure systems are essential to provide a range of services in support of economic development and quality of life.”** (Master Programme of Management of Infrastructure and Community Development).

This is the vision of the MICD course that wants to develop professionals that have a heart for community development through better infrastructure systems. Quality of life is highly influenced by being in good health and sufficient access to health care is essential to contribute to a healthy community.

In this research the accessibility of primary health care service is assessed across different socioeconomic classes to decide if inequality exists in health care access. The special region of Yogyakarta will serve as a case study.

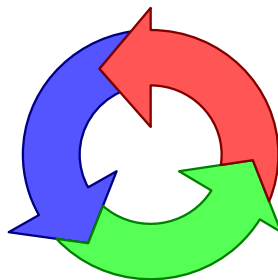
## 1.2 Background

Sen (2008) argues that there is a need for a strong social commitment to good health and that it one of the most important things in the contemporary world. Good health increases the life expectancy of society as a whole and gives human beings the capability to participate well in the social life of the community, and so contributes to the quality of life.

Poverty and disease affect each other, with a relationship that will never end unless there is an intervention on one or both sides, in poverty or illness. Poverty affects the health of the poor so that people become vulnerable to various kinds of diseases, and an unhealthy community suffers from low productivity and high medical expenditure. (JPKM, 2007)

Poor people:

1. Malnourished
2. Lack of health knowledge
3. Lack of health behavior
4. Bad neighborhoods
5. Health costs is not available



Unhealthy people:

1. Low labor productivity
2. High medical expenditure
3. Inadequate investment and savings
4. No level of advanced education
5. Low fertility and high mortality rates
6. Unsteady economic stability

**Figure 1: Never ending relation poverty and illness**

Implementation of health services for poor people is of significant importance because of three main reasons (JPKM,2007):

1. To ensure the fulfillment of social justice for the poor. Health services for the poor decrease infant mortality as it is three to five times higher in poor families in Indonesia.
2. To meet global commitments to poverty reduction through efforts concerning health care for poor families. Enhancing the development efforts (including health) in poor areas will also preserve the integrity of the nation.
3. A healthy population will stimulate economic growth. Overcoming poverty will be more successful.

The importance of health services for the poor is pointed out. It is an impetus to accelerate poverty reduction and an absolute necessity to improve the health status of poor people. Moreover, entering the era of globalization, the desire to have economic growth and be competitive requires human resources with high quality and quantity.

However, one of the main problems with urban health care is not simply that it lacks quality and comprehensiveness but that, because of maldistribution of facilities, it is often not easily accessible to those in need (World Health Organization, 1993). This is worrisome, because everyone should have access to health care irrespective of status.

This variation in the accessibility of health care services can be assumed to be a result of rapid population growth and socioeconomic heterogeneity (Shestha, 2010). 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 socioeconomic status. Most governments have declared that citizens should get universal and equal access to good quality of primary healthcare (Shestha, 2010). However, prevailing approaches to infrastructure provision are known to often fail in fulfilling socioeconomic development objectives.

A relatively new dimension of measuring variations in public service and the capacity of people to use these services is through the strategic use of Geographic Information Systems and statistical techniques. GIS tools have the ability to incorporate measures or indicators that show spatial variations in public services provision (Angela, 2010).

In this research GIS tools will be used to assess the accessibility of primary health care.

### 1.3 Research problem

The central government of Indonesia acknowledges the importance of health services for the poor and spends great efforts on improving health care provision for all. The government has invested in equal access by establishing a Puskesmas (health center) in every sub district. The next paragraph about the study area will explain about sub districts. The government has also invested in Jamkesmas, which is the free health insurance for the poor, covering health expenditures in hospitals and Puskesmas for the very poor.

The policy to establish one Puskesmas in every sub district has provided for primary health care capacity and physical access to primary health care as well. However, the level of service in Puskesmas is not very high. There are no beds and you cannot be hospitalized. This research will show if there is an inequality issue in physical access to hospitals and will show, if necessary, how to improve this.

### 1.4 Study area

The Special Region of Yogyakarta (Indonesian: Daerah Istimewa Yogyakarta, or DIY), is the smallest province of Indonesia (excluding Jakarta). This province will serve as a case study to assess inequality in health care accessibility.

Yogyakarta has, along with adjacent areas in Central Java, some of the highest population densities of Java. It is located on the island of Java, in south-central Java and the city of Yogyakarta is the capital of the province.



Figure 1: Java and Yogyakarta

Yogyakarta province is subdivided into four regencies (kabupaten) and one city (kota): Bantul, Gunung Kidul (GK), Kulon Progo and Sleman Regencies and Yogyakarta City. Beneath is a map of the province. This is a map that will appear a lot in this report, in the same format. GK is a kabupaten to which will be referred a lot, it is in the east of DIY.



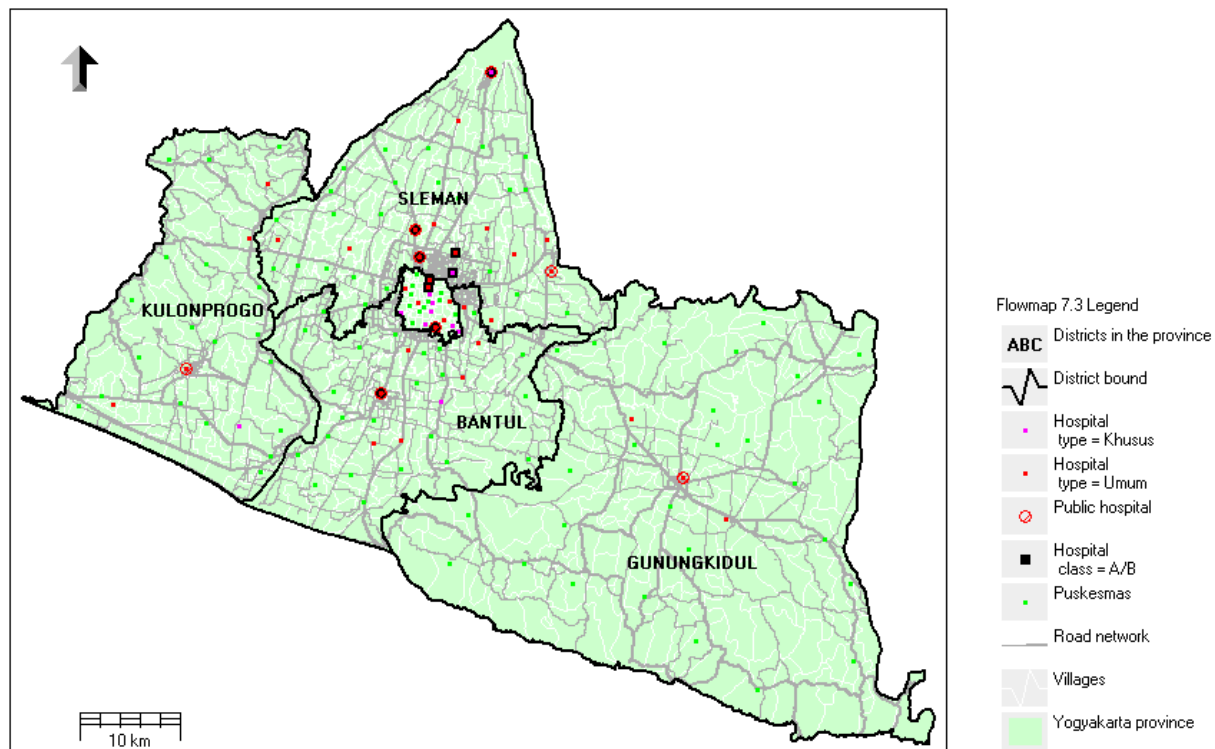


Figure 2: Map of DIY with districts

Some important data is summarized in the table below.

Special Region of Yogyakarta (Daerah Istimewa Yogyakarta)	
Capital	Yogyakarta
Governor	Sri Sultan Hamengkubuwono X
Area	3185,8 km <sup>2</sup>
Population	3.220.797 (2004)
Density	1011,0 /km <sup>2</sup>
Ethnic Groups	Javanese (97%), Sundanese (1%)
Religion	Islam (91.8%), Christianity (7.9%), Hinduism (0.2%), Buddhism (0.1%)
Language	Bahasa Indonesia, Javanese
Time Zone	WIB (UTC+7)
Source:	<a href="http://www.pemda-diy.go.id">www.pemda-diy.go.id</a>

Tabel 1: Special Region of Yogyakarta

## 1.5 Research objectives

Goal of this research is to contribute to the analysis of health care accessibility using GIS tools and to explore the possibilities and limitations that these modeling approaches hold to perform spatial analysis, in particular to assess inequality in access. This leads to the following objective:

*The objective of this research is to analyze inequality in accessibility of primary health care between different socioeconomic classes in the province of Yogyakarta using GIS tools.*

## **1.6 Research questions**

The objective leads to the research question and a number of sub questions. By answering these questions, the objective will be achieved step by step. The main research question is:

*Is there inequality in accessibility of hospitals between social economic classes in the province of Yogyakarta?*

Accompanying sub questions are:

1. How can the social economic position of people in the study area be determined?
2. What are the characteristics of the health care system in the study area?
3. What are the characteristics of the transportation system in the study area?
4. Is health care provided for sufficiently in the study area in terms of accessibility?
5. How does this accessibility vary across social economic classes?
6. What measures could improve equality in health care accessibility in the study area?

## **1.7 Conceptual framework**

To answer these questions and to get a good understanding of the problem, this research is put in a conceptual framework. This means that the main concepts that describe the problem and their interrelationships will be explained and visualized.

### **1.7.A Access defined**

Access can be described in five dimensions: Availability, accessibility, affordability, acceptability and adequacy (Shrestha, 2010). The first two dimensions are objective and can be modeled. 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 more subjective, related to cost, cultural factors and perception of health care. In this study, only objective dimensions are accounted for, because this study looks into a spatial analysis and only objective indicators can be modeled using GIS tools. Affordability is added to availability, as a property of hospitals and a criterion, i.e. which health services qualify for which population.

Defined:

- Availability refers to the degree of fit between existing health care services and needs of people
  - o The degree of fit between capacity of health care provision and demand of people
  - o The degree of fit between health care cost and people's ability or willingness to pay
- Accessibility refers to the degree of fit between geographical location of hospitals, means to travel and the location of people

Concluding, in this study access consists of availability (including costs) and accessibility.

## 1.7.B Accessibility

As this is a study on the physical accessibility, three main components are of importance: The population (origin), the health care service (destination) and the transportation network that connects these two.

It is important to note that accessibility consists of two parts: That the needs of the population are met by the hospitals (availability) and that the transportation network provides sufficient access to the hospitals (accessibility).

The main components of the accessibility study will now be further explained.

### Population

The population has different kinds of properties that should be taken into account.

1. Most obvious is the **population density**. For the analysis, the locations of origins should be known.
2. **Socioeconomic heterogeneity** results in inequality and thus should be assessed. The heterogeneity is measured discretely by defining poor people.

### Health care service

Health care also has many properties. In this study the following will be attended.

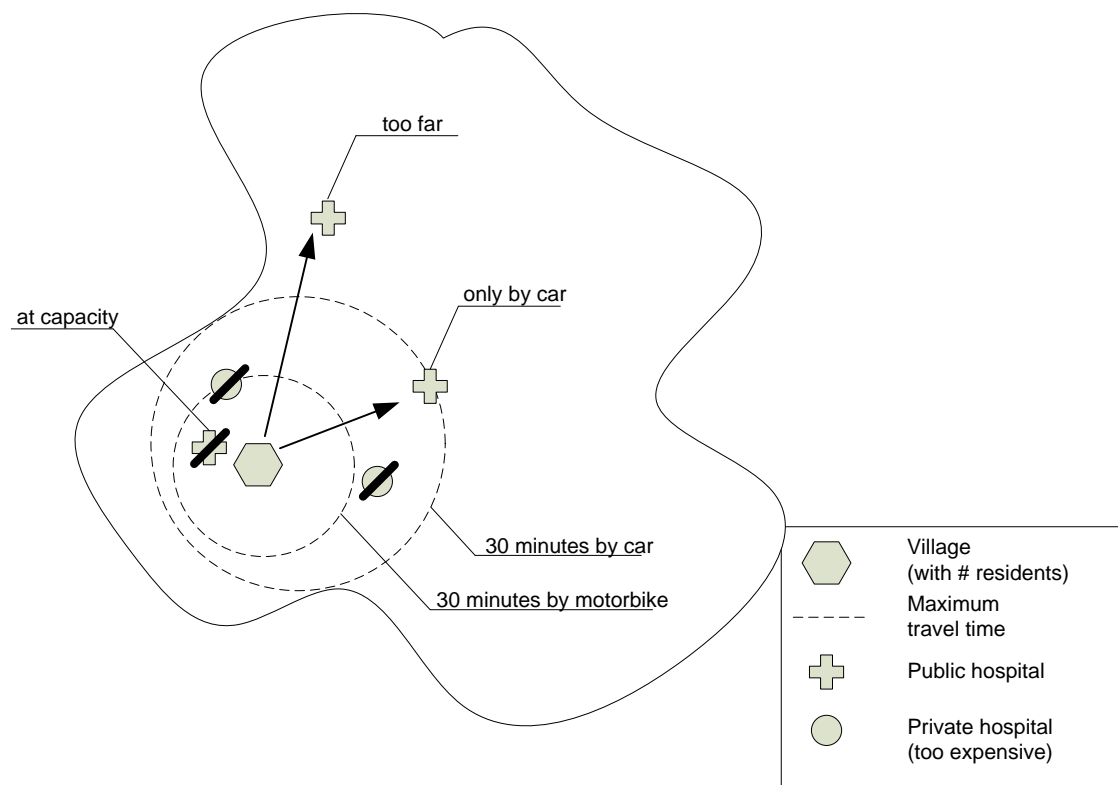
1. Health care facilities are located at specific **locations**
2. **Capacity** relates to the number of people the facility can handle, e.g. represented by the number of beds
3. Each hospital has its own **cost**, more expensive hospitals tend to supply better service
4. The **service level** relates to the kind of services that a hospital can supply and its limitations

### Transportation Network

The network connects origins and destinations

1. Nodes connected by each **link**
2. The length of the links, in other words the **distances**
3. The user can take different kind of **modes**
4. Each mode has its own **cost** and **travel time**
5. Different types of roads allow different **speeds**

To illustrate the use of these terms, here is a brief example:



**Figure 3: Simplified conceptual example**

The poor people in the village have one small hospital within 30 minutes travel time by motorbike, but it is already at capacity and thus inaccessible. Other nearby hospitals are private and too expensive. There is one hospital accessible within 30 minutes travel time by car, which is faster than the motorbike. Most poor people unfortunately do not own a car.

A complete overview of the conceptual framework can be found on the following page:

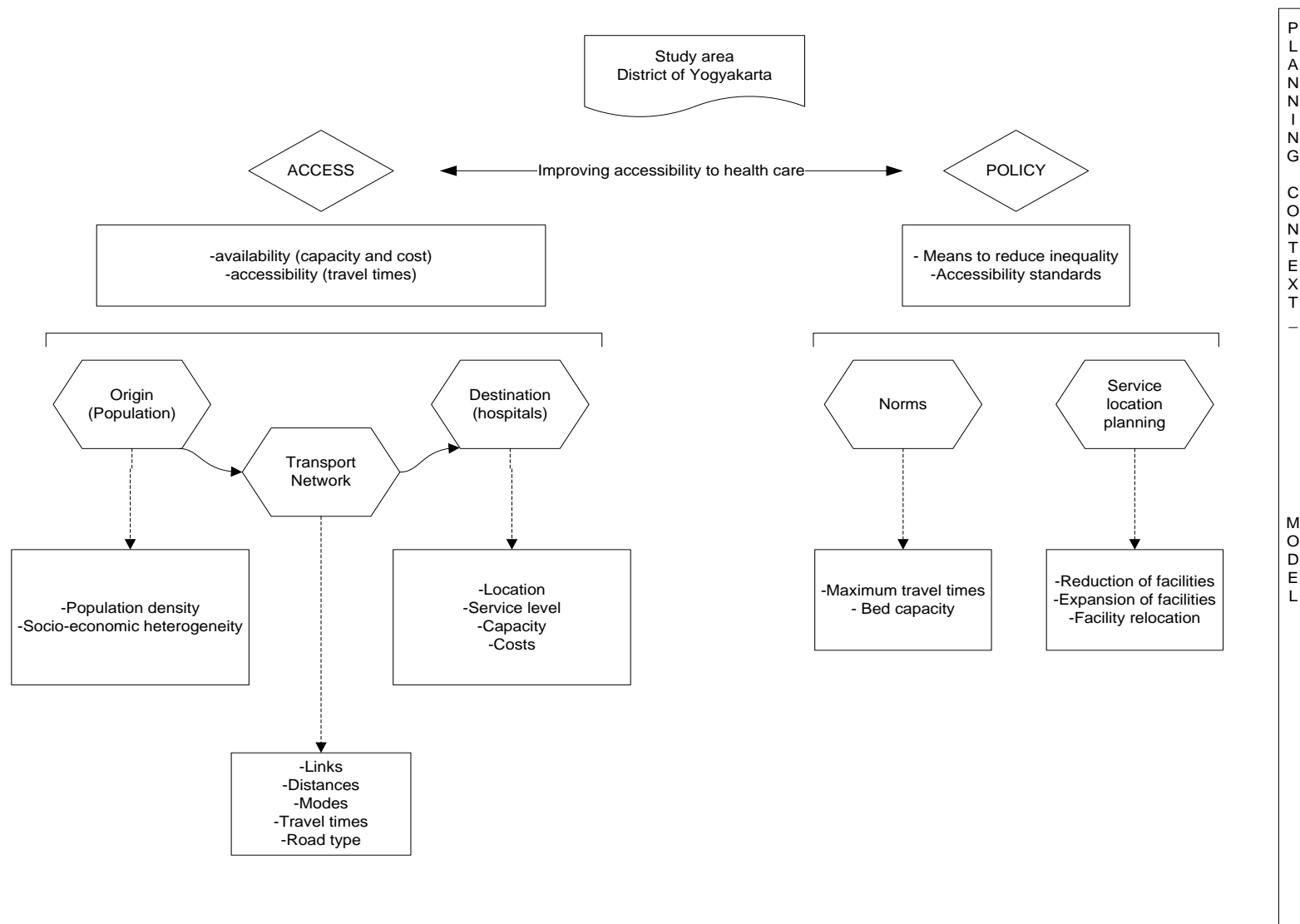


Figure 4: Conceptual framework

## ***1.8 Structure of the report***

### **Chapter 1 – Introduction**

This chapter gives an introduction on the research problem, describes the background, explaining the research problem, describing the study area and formulating research objectives and questions. A conceptual framework explains the basic idea of the model.

### **Chapter 2 – Research methodology**

This chapter will describe the most important aspects of the research: Assessing poverty, explaining the health care system, describing the road network.

### **Chapter 3 – Assessing inequality in health care accessibility**

In this chapter the results of the modeling are presented, first describing the current health care accessibility. Later reviewing different causes of inequality in health care accessibility and proposing measures.

### **Chapter 4 – Discussion**

The chapter will critically evaluate assumptions and data.

### **Chapter 5 – Conclusion and recommendations**

In this chapter the modeling results will be converted into conclusions for the health care access in the study area. Also various recommendations are given to improve equality.

### **Chapter 6 – Summary**

A summary of the report is represented in one figure, explaining the overall structure of the research.

## 2. Research methodology

This chapter will describe the research methodology. First an overview of all my doings explains the steps that I took in the course of my internship in Indonesia and the difficulties that I faced in performing the research. Then this chapter describes the most important aspects of the research: Assessing poverty, explaining the health care system, describing the road network. The approach is to implement data about origin, destination and network in a Flowmap model and calculate accessibility in travel times. Starting with a simple model, layers of complexity are added.

### *2.1 Modeling line*

The first chapter was the result of the first steps I took in this research: Creating a conceptual model, getting an idea of the concept and defining research problem, a literature review and interviews to learn about inequality and the health care system in Indonesia.

There was no model available for assessing health care access in this province, so it was developed for this research. The computer program used for the modeling was Flowmap, a very basic tool for analyzing data that relate to pairs of locations, like travel times. Data preparation was performed in ArcGIS.

To do this, data had to be collected, assessed and implemented before numerous modeling activities could describe the health care access situation in Yogyakarta.

Data collection was a difficult part of the research, as it was often not complete or consistent, when compared to referential data or fieldwork. Data about the network was only sparsely available and a lot of assumptions had to be done in order to implement the network in the model. Hospital data was very difficult to acquire, especially more detailed data like the type of hospital and capacity values.

For the implementation in the model several hurdles were taken, for example translating the road network from the collected ArcGIS data to Flowmap took several weeks. There was a difficult consideration about the implementation of hospital data, because exact locations were not known, but together with the staff of Pustrat the villages where the hospitals were located could be determined. The bias caused by this conversion was also assessed.

Finally when all the data was ready for the modeling, a large number of scenarios was determined based on the functionality of the model and real context problems that were brought up in the interviews. Layers of complexity, like capacity restraint, service levels, status, gatekeeper functionality of Puskesmas were added. In the end the model could give an indication of solutions to inequality issues by being creative with the service location model functionality. Maps were created to display the results. The next page gives an idea of all the steps taken in this research.

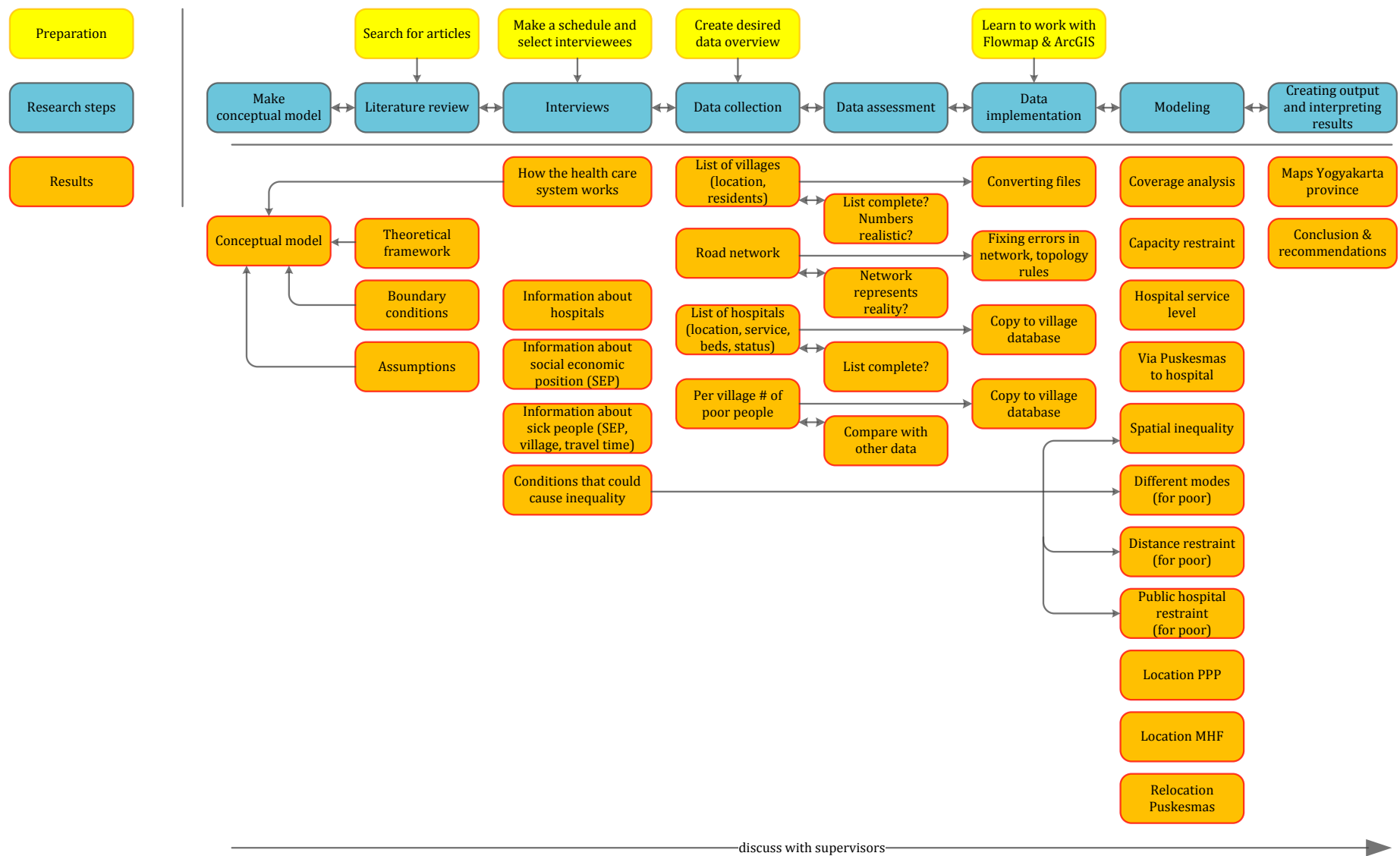


Figure 5: Activities during internship Pustral



## **2.2 Social economic position**

### **Selection and description of indicators**

To look at inequality in the study area of Yogyakarta province, indicators have to be determined to assess the social economic position (SEP) of the residents. In the study area there are five districts with about the same population. The rural area's can be considered poorer than the urban (Agus Joko Pitoyo, 2010). The districts from poor to rich: Gunung Kidul (GK), Kulon Progo, Bantul, Sleman and Kota Yogyakarta.

The reason that GK is poor is not only the low income, but also for example the fact that the area is mountainous. This causes the land to be less fertile and the land is also relatively dry. The water quality is bad.

It is hard to determine SEP and there are several ways to do this. Well known methods are the HDI (human development index) or HPI (human poverty index). The three main components of these indexes are Economic, Education and Health.

The Indonesian government also deals with assessment of SEP, for they have declared subsidies to help the poor people in Indonesia. The instrument used was the so called 'letter of the poor'.

The exact determination of who is poor, is difficult. People that are not poor will still pretend to be poor to receive the insurance. The government uses for this analysis five levels of poverty. Indicators that are used to determine the very poor and poor households, can be summarized as:

- Economic indicators: eat twice or more a day, have a different outfit for activities, got a new set of clothes during last year
- Non-Economic Indicators: If the child was sick, he/she is taken to health facilities. In healthy condition in the last three months, had a steady income, at the age 10 - 60 years they can read and write letters, at the age 6-15 years they go to school, having more than two children joined Family Planning.

According to Agus Joko Pitoyo, from PSKK, the center of populations and policy studies of Gadjah Mada University, these letters of the poor are the best indicator to use to determine poverty at a village level, because they have a similar and extensive way of assessing poverty compared to Human Development Index (HDI), which is used by UN.

In this research, poverty is therefore assessed by the indicator 'letters of the poor'. At a village level the total number of poor people can be estimated. The total numbers of poor letters is known and divided by the number of families. By comparing the results of these calculations, the relative poverty of the villages compared to each other can be derived. Only the relative poverty will be used, not any absolute numbers. According to the HDI data, the calculated number heavily underestimates the number of poor people, as it indicates that about 6,3 % of the total population can be considered as poor, while HDI data shows that about 18% of the province population is poor.

## **2.3 Health care provision**

### **Characteristics of health care system of DIY**

The health care facilities present in DIY can be summed up as: Hospitals, Puskesmas, Puskesmas Pembantu, Puskesmas Keliling, Posyandu.

Puskesmas have the function of gatekeepers for the hospitals. People need a letter of referral before they can go to the hospital (unless in case of emergency). The Puskesmas pembantu is like a satellite of the Puskesmas, to increase physical accessibility. The facility is only open on a few days each week

Puskesmas keliling consists of a movable facility, for example a car, wherein volunteers move to remote villages to do screening. Posyandu is a community initiated information service on health care and prevention. Screening is part of it, but difficult for the often inexperienced nurses or midwives.

### **Classification of hospitals in Indonesia**

Hospitals exist in different types: Umum (general) and Khusus (special): KIA, Bedah, Mata, Jiwa and THT. This translates roughly respectively in a special Maternal, Surgical, Eye, Psychic and ENT hospital. The hospitals also have different classes: A/B/C/D. The four different classes are based on level of service. A has the highest level of service and Sarjito hospital is the only class A type hospital in DIY.

Standard facilities for all types are surgery, KIA, pediatric care and internal care. The level of severity that can be treated depends on the class of the hospital. Complicated surgery can only be performed in class B or even in class A hospitals.

The definition of the general hospital according to the Klassifikasi Rumah Sakit 2010 is: A general hospital is a hospital which gives health care services for all kind of specialties and diseases. A special hospital is a hospital which provides health care treatment for a particular kind of disease, which is based on major, age, part of body or type of disease. A hospital must provide basic services such as general medical service, emergency unit, nursing service, outpatient, inpatient, surgery, pharmacy, nutrition, sterilization, medical documentation, administration and management service, health education for the community, mortuary, ambulance.

The details of this classification can easily be looked up in the Klassifikasi Rumah Sakit 2010, available at the library of Pustrapal.

### **Jamkesmas**

The Indonesian government has instituted a free health care insurance for the poor, called Jamkesmas. The objective is to increase the coverage of the poor to get health services in health centers and hospitals. And to increase the quality of health services for poor people. The implementation of the financial management should be transparent and accountable (JPKM,2007).

If a family wants to qualify for Jamkesmas, they can arrange a Jamkesmas card via the head of the village. They can use this card to go to public hospitals and Puskesmas for free.

### **Public hospitals and affordability**

Poor people can only go to public hospitals, if they want to use Jamkesmas (or Jamkesos or Jamkesda). Poor people cannot pay the medical expenses, but if they have proof of the fact that they are poor (Jamkesmas card), a public hospital can claim the expenses from the government.

Private hospitals and government can together decide to establish a public private partnership (PPP), consisting of a claiming system for the private hospital. They can claim expenses supplied to poor people at fixed prices. This way poor people can also go to private hospitals. Still about 50% of the population is uninsured. They have to pay Out Of Pocket (OOP). Civil servants or other employees enjoy insurances by their employer.

Public hospitals are cheaper than private hospitals. The cost of private hospitals differs, often dependent on class.

For the model the assumption is made that poor people can only access public hospitals. PPP locations are proposed.

### **Capacity**

A good capacity variable for hospitals is the hospital bed to population ratio. The number of beds give an indication of the capacity of the hospital and the data is the most easy accessible. The hospital bed to population ratio is defined as the number of hospital beds per 1000 population (WHO, 1993).

Hospital beds are used to indicate the availability of inpatient services. There is no global norm for the density of hospital beds in relation to total population. In the European Region, there are 63 hospital beds per 10 000 population compared with 10 per 10 000 in the African Region. Statistics on hospital bed density are generally drawn from routine administrative records but in some settings only public sector beds are included.

For developing countries a 2 beds / 1000 people is recommended. These standards are not met, as in Indonesia the average hospital bed per 1000 population ratio is 0,6.

### **Family responsibility**

Another important characteristic in health care provision is the Indonesian culture that family members will have the responsibility to stick by the side of their brother, sister, mother or dad. This causes hospitals with bad accessibility to be often full of family members that stay at the hospital overnight because the travel time or cost is too large to return home every day.

## 2.4 Transportation characteristics in DIY

The road network in DIY consists of different types of roads. For this research, the roads have been distinguished by their status, being either Provincial, National or Regional. Unpaved roads were excluded from the model. These roads provided a too high level of detail, causing implementation difficulties, high calculation times and high complexity of the model. This was compensated by introducing a conversion factor that allows the model to take the distance for that location to the nearest network node or line into account. The distance from a village to the nearest road is multiplied by a factor that also reckon with the fact that you usually can't travel in a straight line but have to swerve around obstacles.

Often used modes of transport in DIY are the car, motorbike and bus (public transport). These modes play the most important part in the analysis. The travel speeds of each mode varies per type of road. By conducting some fieldwork, discussing with researchers and by evaluating modeling results a table has been iteratively constructed for this research. An overview is shown in the following table.

Status	Walking	Bicycle	Motorbike	Car	Bus
Off-road	3.6	5	15	15	15
National	3.6	12	50	60	30
Provincial	3.6	12	50	60	30
Regional	3.6	8	30	30	15
City main road	3.6	8	30	20	20
City road	3.6	5	20	15	15

Table 2: Speeds and modes (kmph)

The speeds are in kmph and an estimation of the average travel speeds per mode per type of road. The roads in the city of Yogyakarta are given a penalty because of the congestion in the city. The following map shows the road network in DIY.

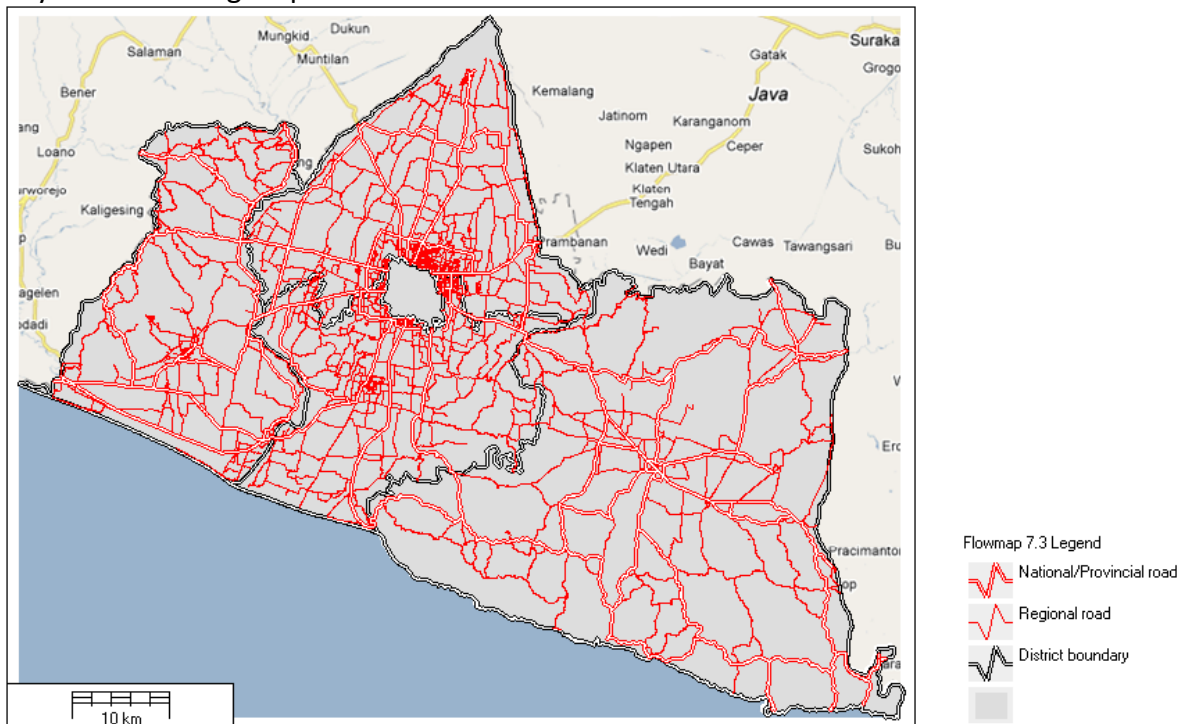


Figure 6: Road network in DIY

### **A 30-min travel time standard**

Accessibility will be defined in this research by a combination of availability, including capacity and costs, and physical access. For each village, the nearest hospital is determined using a GIS-based model. To indicate whether a village has appropriate access to the nearest hospital, a yes/no criterion had to be formulated. Discussions with MSc Arif Wismadi suggested a maximum travel time of 30 minutes from the village to the hospital.

In Indonesia there is a strong culturally specified obligation to visit your family member every day if they happen to get sick and need to go to the hospital. Several interviews at the hospital and consultation with researchers from Pustrat confirm this.

A maximum travel time of 30 minutes (nonemergency) is appropriate. It means that the family of the patient can go to visit on a day with a total travel time of one hour. Interviews at hospitals verified that this was about the maximum travel time that people are prepared to travel. When they live further, often the family will stay at the hospital overnight (and if they are more wealthy, they rent an apartment nearby).

In America, a 30-min travel time is also a common standard (Bosanac, 1976).

With this 30-minute travel time standard, the model will optimize the service area of the hospitals. It is of course desired to cover the whole province of Yogyakarta with as few hospitals as possible, at strategic locations.

### 3. Assessing inequality in health care accessibility

In this chapter, the results of the developed model and assessment of health care accessibility in the Special Region of Yogyakarta will be presented. After exploring the current health care accessibility in DIY a number of causes for inequality in accessibility is explained and evaluated including a couple of proposed measures to reduce this inequality.

#### 3.1 *Current health care accessibility in DIY*

##### 3.1.1 Coverage analysis

To have a first impression of the study area, a coverage analysis was performed. Flowmap calculates the minimum number of needed destinations to cover the entire region given the origins, the distance table and the maximum travel time and Flowmap shows their optimal locations.

A coverage analysis of a 30-minute travel time by car was performed. The coverage analysis shows that the minimum number of needed hospitals would be 13.

The minimum of hospitals at the optimal locations to cover the whole province:

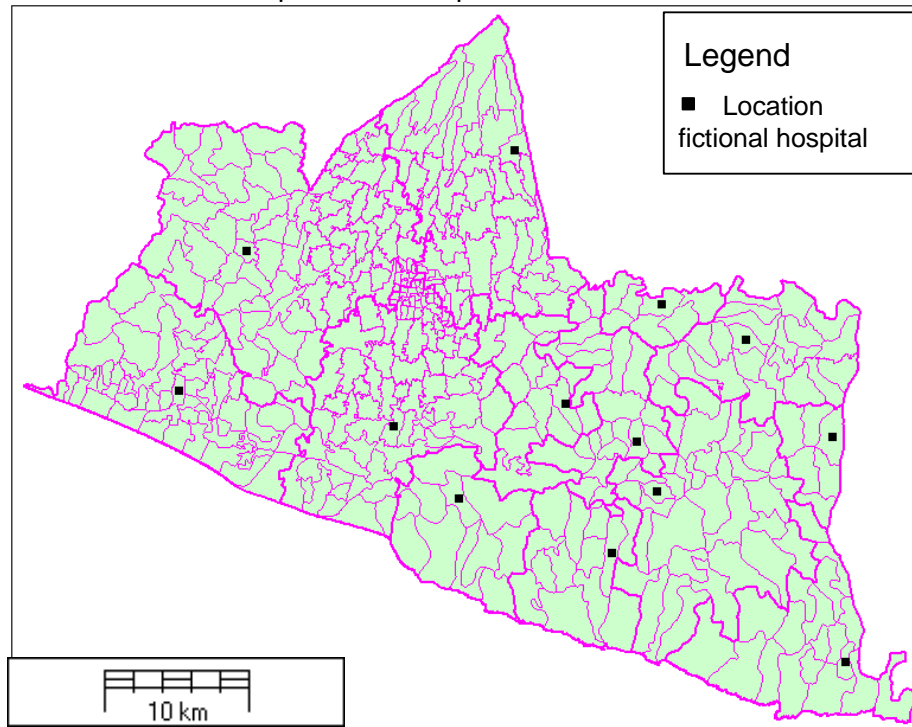


Figure 7: Coverage analysis of service centers in DIY

The black points indicate the optimal locations of the 13 service centers to cover the entire province. With 33 general hospitals in the area, this number is certainly met.

However, when one looks at the locations of the hospitals in the coverage analysis, the large number of hospitals in Gunung Kidul catch the eye. In the current situation there are not so many hospitals in Gunung Kidul, as is shown in the following figure, so maybe this could cause bad accessibility in that area.

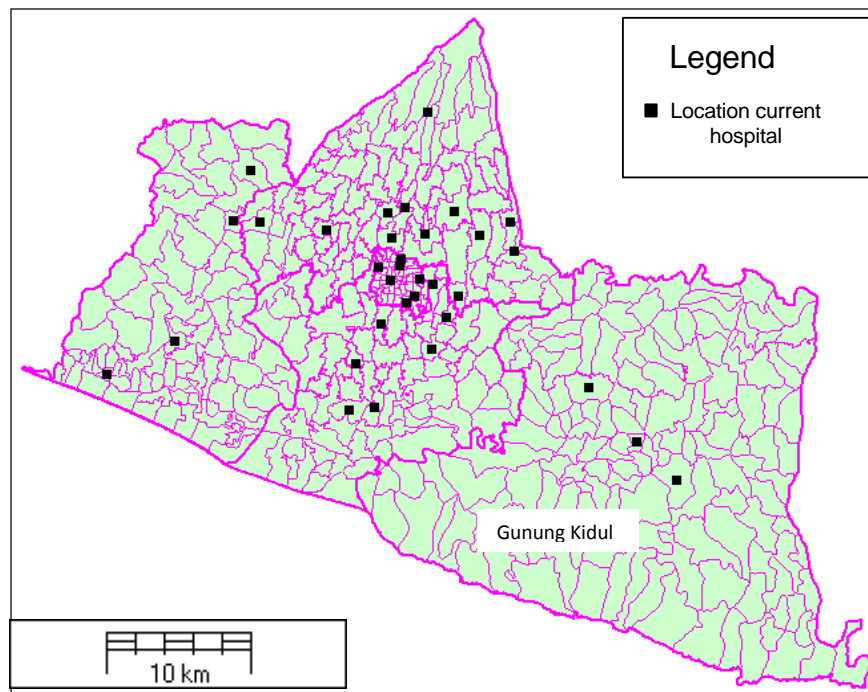


Figure 8: Locations of general hospitals in DIY

### 3.1.2 Regular catchment area analysis

A regular catchment area analysis shows the travel time from each origin to the nearest destination, in this case from villages to general hospitals and also for each origin the nearest destination (to which the travel time was calculated).

It is possible to set a maximum travel time and a capacity restraint, but in this first simple analysis these are not used. For those optional settings the catchment area analysis will also calculate the assigned demand to each destination and possible remaining demand, due to capacity or maximum travel time.

The catchment area analysis for car accessibility to general hospitals show that the province seem to have decent accessibility to general hospitals by car.

Adding maximum travel time to the model, the model shows that 22 villages have 'bad access', to the nearest general hospital, defined by a maximum travel time of 30-minutes. The largest travel time is 56 minutes.

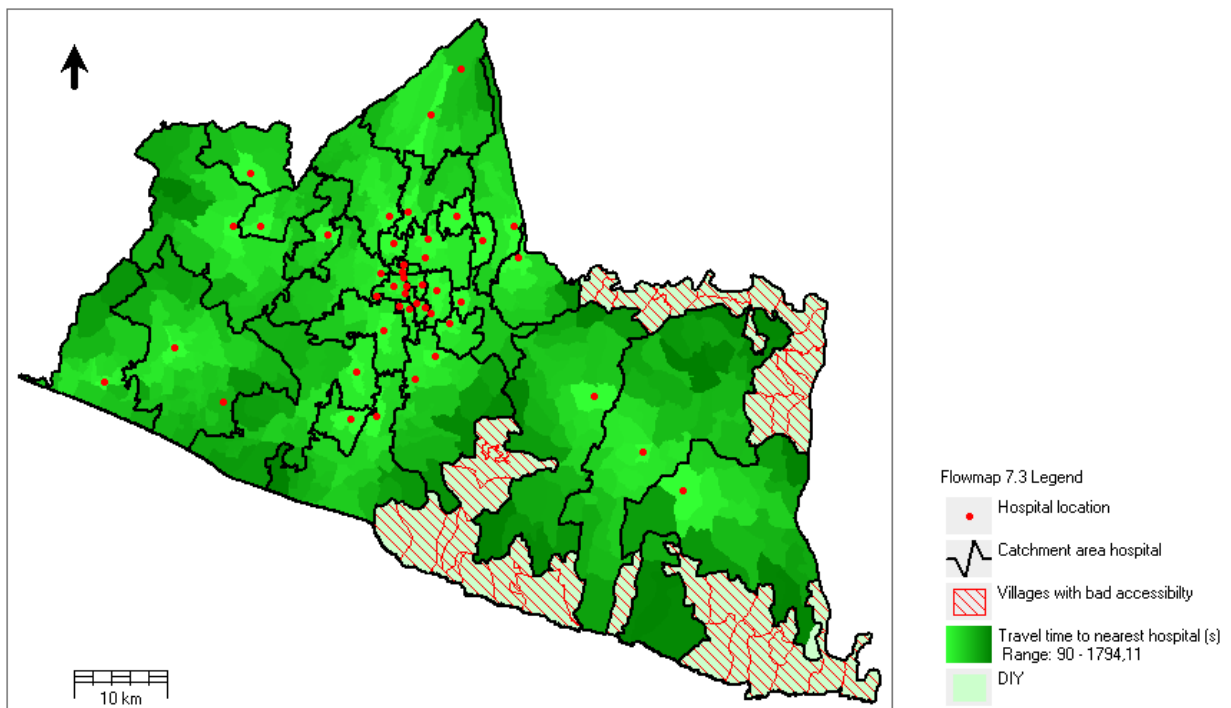


Figure 9: Catchment area analysis of general hospitals by car



### 3.1.3 Capacity restraint

In the model a capacity restraint was implemented. This means that only the villages that are nearest to a certain hospital can go there, until the hospital is full. The capacity is determined by the number of beds per hospital and applying a standard, for example 2 hospital beds per 1000 population. A hospital with 50 beds now has the capacity to serve 50000 people. People from villages that cannot access the hospital have to travel further to the next hospital, but when the travel time exceeds 30 minutes they do not have appropriate access.

When applying the international standards of 2 hospital beds per 1000 population, the province cannot provide the required bed capacity and there is major inaccessibility in the province. This is shown in the figure below, where a much smaller area is covered compared to the map of last page.

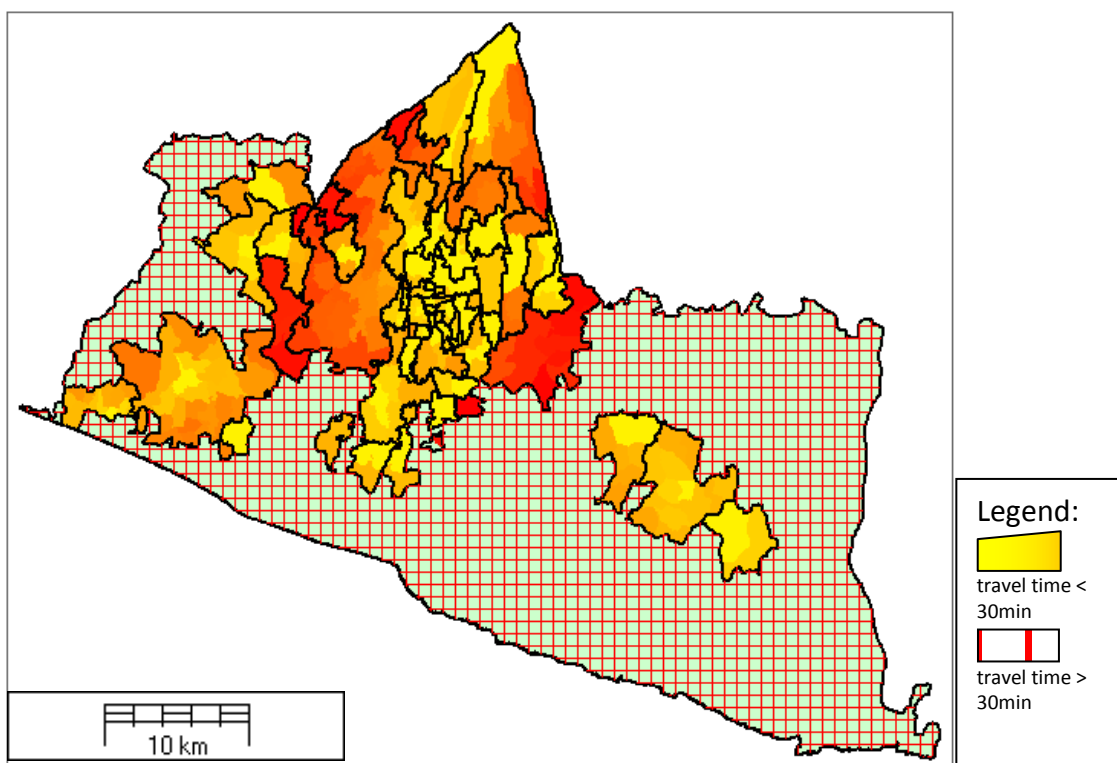
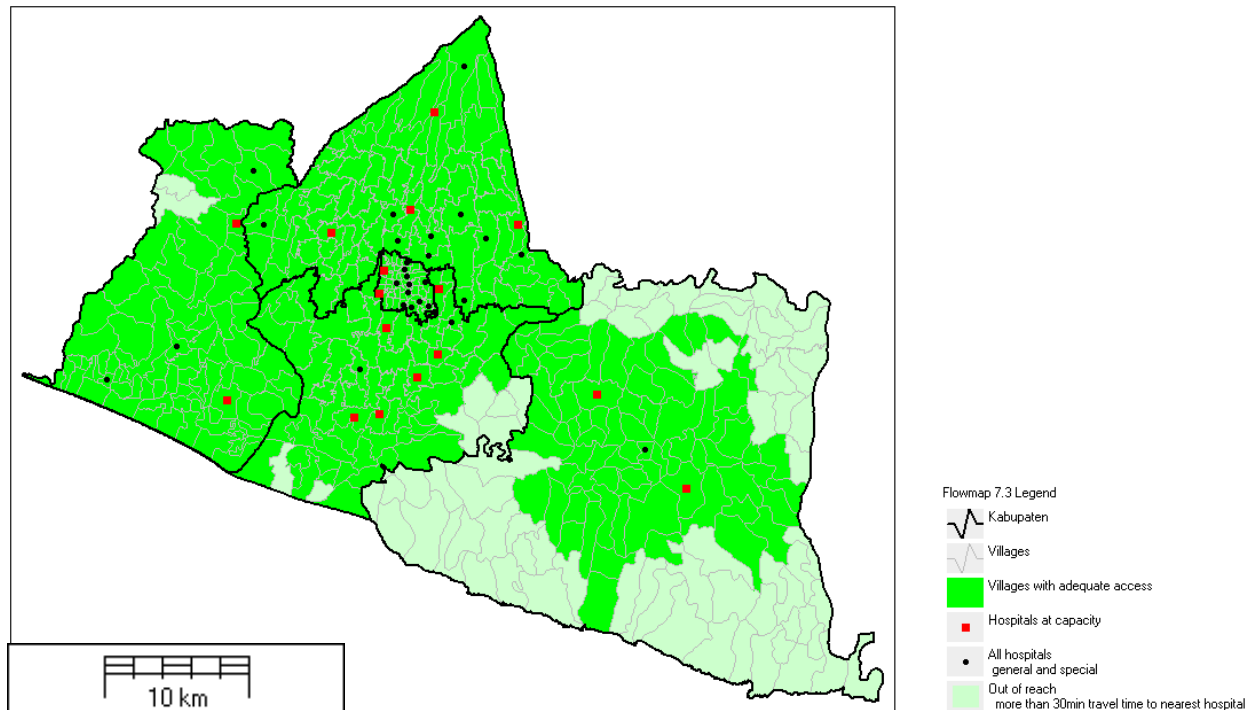


Figure 10: Capacity restraint 2 hospital beds in 1000 population

In this map the colored area has a travel time within 30-min to nearest general hospital. This corresponds to the interview at Sarjito hospital, that made clear that insufficient capacity causes a lot of referral and extremely high bed occupancy rates.

However, when another standard is applied, the national average of 0,6 hospital beds per 1000 population, the capacity restraint doesn't produce mayor effects on health care accessibility. The next map shows the results of the modeling using this standard, and is almost similar to the results of the modeling without capacity restraint (figure 7).



**Figure 11: Capacity restraint 0,6 hospital beds in 1000 population**

It is difficult to determine one legitimate standard for the capacity. People at the hospitals, doctors, government or researchers did not know what a good standard should be. The conclusion is that compared to the rest of Indonesia, DIY performs satisfactory.

### 3.1.4 Spatial distribution of bed capacity

When assuming that the number of beds would be exactly enough to cover the entire population needs, there remains the issue of the spatial distribution of these beds. The following figure shows the demand of each hospital in blue and their bed capacity (scaled to population) in red.

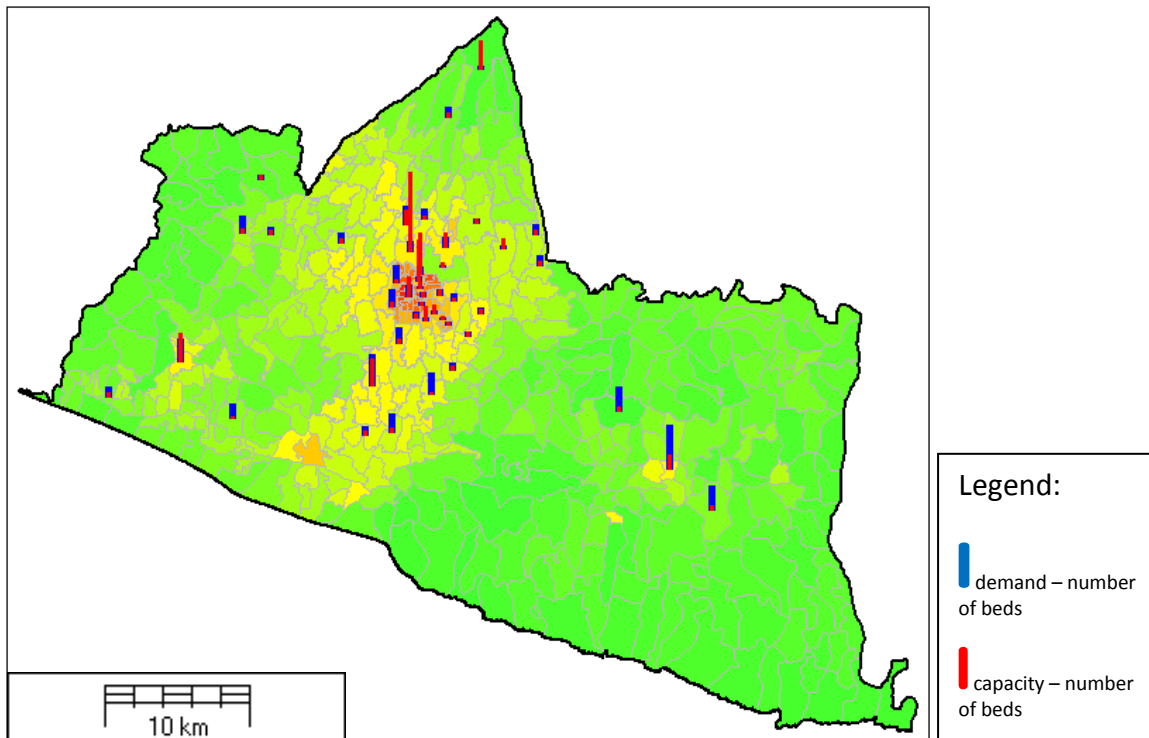


Figure 12: Undercapacity and overcapacity

From this figure it can be concluded that especially in Gunung Kidul (the eastern district) there is a lack of bed capacity and in the city of Yogyakarta there exists overcapacity. This will cause the people in Gunung Kidul and other areas with the same problem to be referred to hospitals that are further away when the nearest hospital is at capacity already, thus causing worse access.

In this research on inequality in health care accessibility this matter is not evaluated further, because it makes the model complicated and more difficult to interpret. Also market forces are reckoned to take care of this problem, as bad accessible hospitals will face relative low demand and hospitals with higher demand are able to expand their facilities.

### 3.1.5 Hospital service level

In the province of Yogyakarta only few hospitals can provide the highest service, indicated by level A or B hospitals. The only A-level hospital in the province is Sarjito hospital.

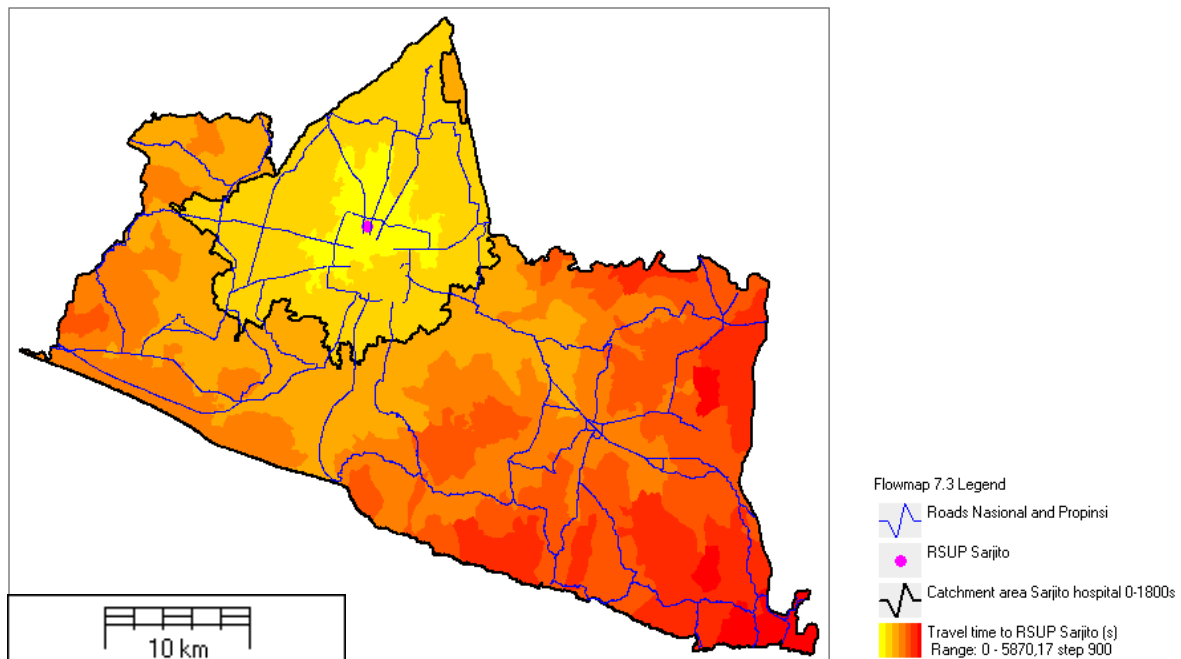


Figure 13: Travel times by car to Sarjito hospital

Only a small part of the province can access RSUP Sarjito within 30-min. Travel times amount to a maximum of 1,5 hours by car to the outskirts of Gunung Kidul.

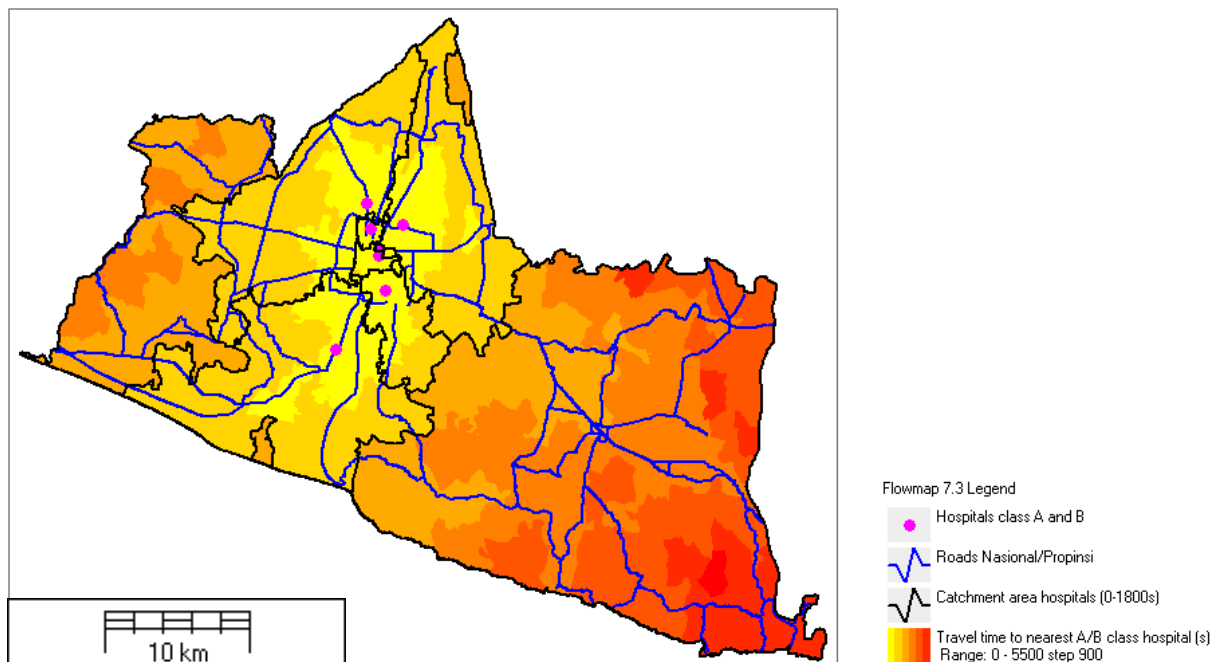


Figure 14: Travel times by car to A/B class hospitals

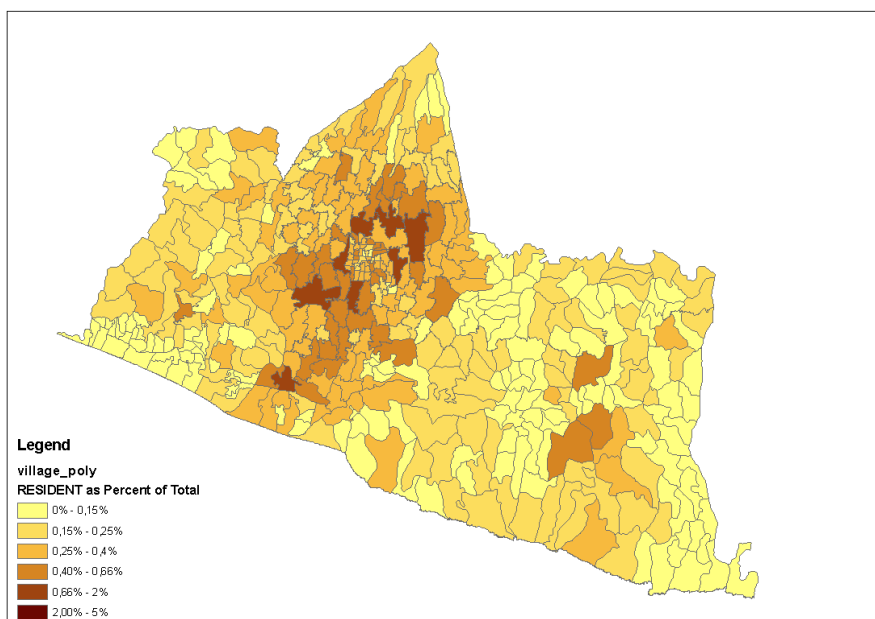
When A and B class hospitals are both taken into account, the distribution of the hospitals towards the centre of DIY catch the eye. This causes the districts of Gunung Kidul and Kulon Progo to have inadequate access to these facilities.

For the assessment on inequality of health care accessibility the service levels of the hospitals are also not taken into account.

## ***3.2 Inequality in health care accessibility***

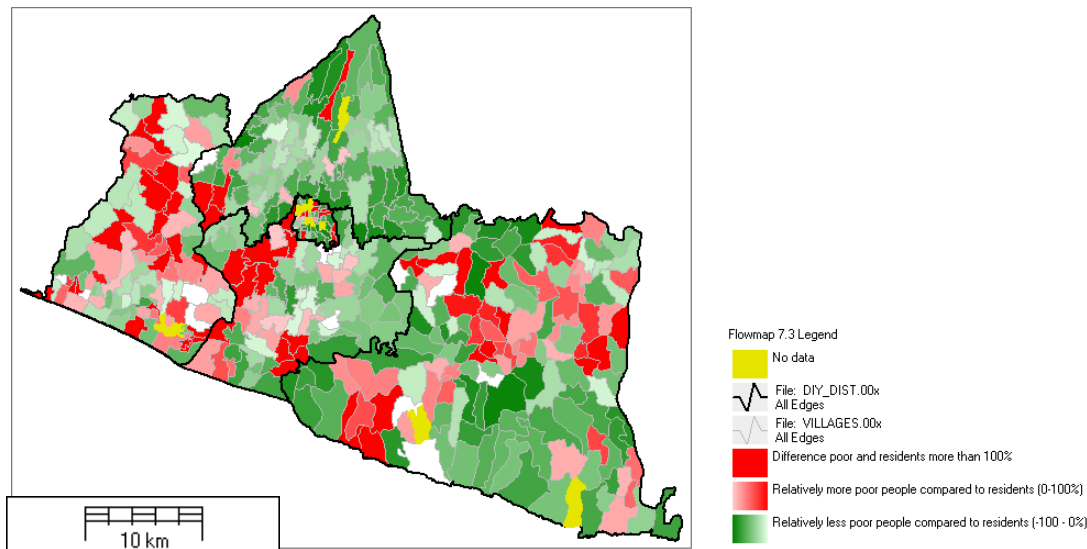
### **3.2.1 Spatial distribution and inequality**

In evaluating inequality in the accessibility of hospitals it is important to know where people live and if the poor people live in different areas than the non-poor. The map below shows the population density of the province of Yogyakarta. The total population was about 3,2 million in 2004.



**Figure 15: Population density DIY**

To see if the poor people live in different areas, a map was computed of the relative population density of residents to poor people.



**Figure 16: Scaled population density map and poor people density map**

The maps show that poor people do concentrate in different areas than the non-poor. In Gunung Kidul there live relatively many poor people in the south west and north east. Bantul (located in the middle under the city) seems to be the poorest district, which can be explained by the 2006 earthquake inflicting major damage in the district.

The spatial distribution of poor people can lead to inequality, when hospitals are located mainly in areas where non-poor people live. Prof. Sunyoto suggested in the interview that the villages where poor people live in general have worse access than people with relative wealthier residents.

To assess this, two catchment profile displays were created weighted by residents and poor people. The figures show that the travel time distribution is very similar. Average travel time is for the total population 800 seconds and for the poor 790 seconds, so there is no significant difference. Gini coefficients for figures below are 42,4 and 39,9. The Gini coefficient is a measure of statistical dispersion, ranging from 0 and 100. Higher Gini coefficients indicate a more unequal distribution.

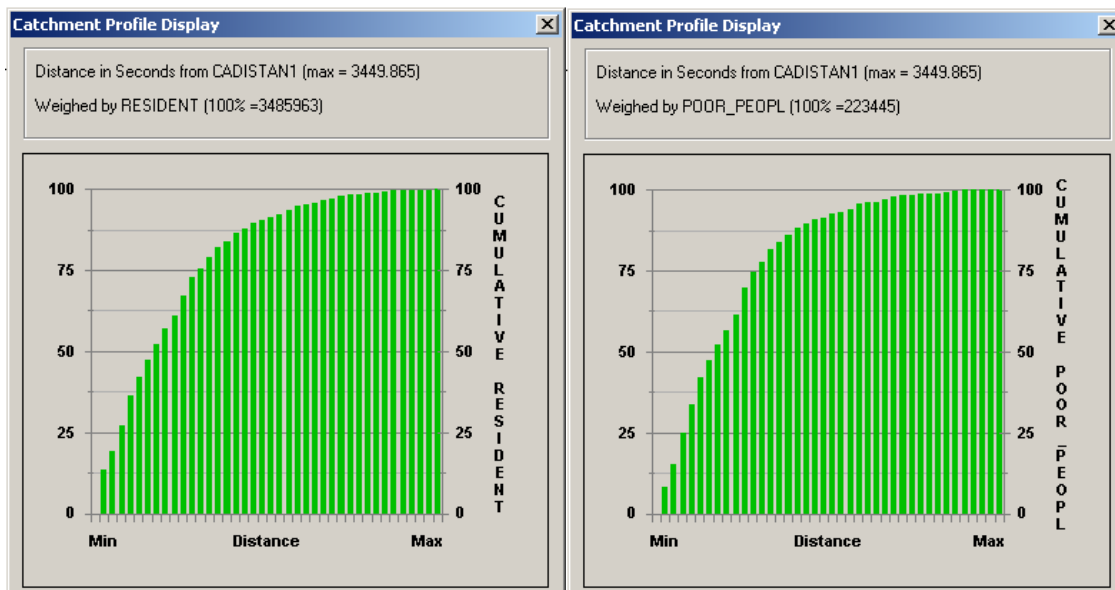


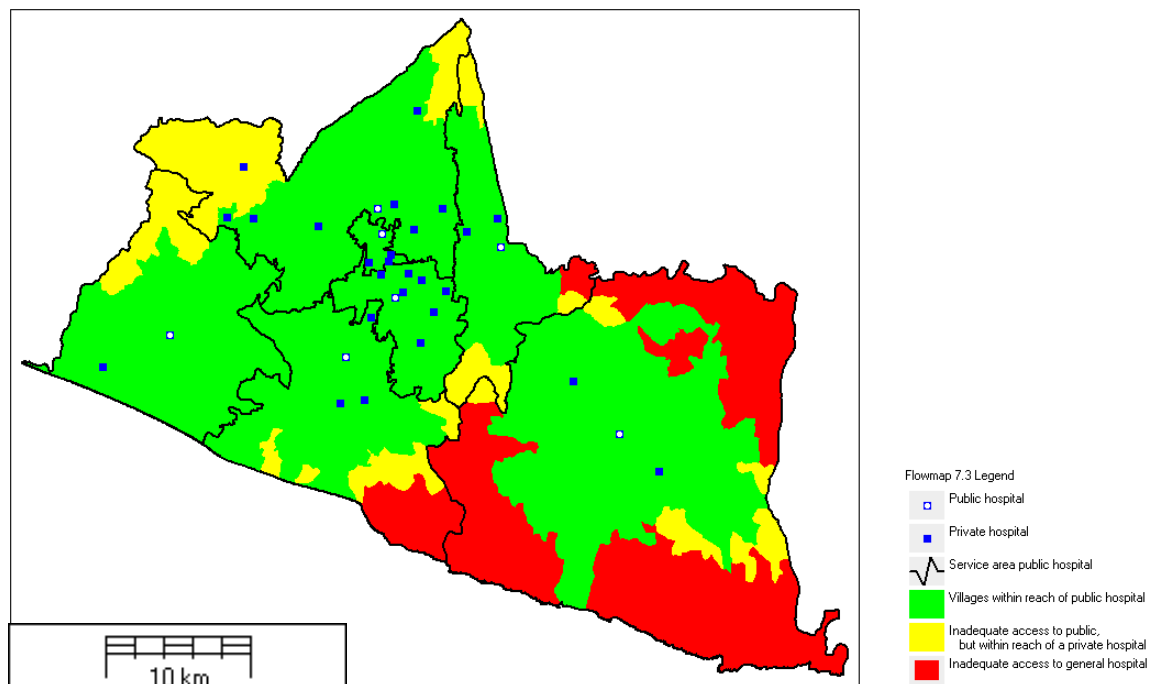
Figure 17: Catchment profile displays residents and poor people

Finally, the amount for people that have inadequate access to general hospitals is 8,7% of the total population and 7,5% of the poor people, again no significant difference.

Concluding, the spatial distribution of the poor people is unlikely to cause inequality in health care accessibility in Yogyakarta province.

### 3.2.2 Health care access and the need for PPP

Inequality in health care access not only exists due to the locations poor people live. Interviews indicate several other causes that influence the accessibility, for example their means to reach the hospitals are also limited and the hospitals they can go to are limited as well. As said before, the Indonesian government has developed a health insurance program for the poor which pays for their costs and allows them to attend a hospital when they get ill. The program very much improves the affordability of health care in DIY, but the poor can only use this insurance (called Jamkesmas) in public hospitals. In terms of physical accessibility, this means that they have limited service centers and thus possible less access. The next figure shows the 'gap' in access for the poor and residents that can access private hospitals. The transport mode used for this model was the motorbike, as this is the most frequently used mode in the province, by poor and non-poor.



**Figure 18: Gap in health care accessibility due to limited facilities for the poor**

The map displays the villages that have sufficient access to public hospitals with a green color. The residents and poor people that live in these villages have sufficient access (earlier defined by a 30-minute maximum travel time) to public hospitals. The villages with a yellow color have insufficient access to public hospitals, but are within reach of a private hospital. About 5% of the poor people of Yogyakarta live in these villages.

The red colored villages have insufficient access, also to private hospitals. These villages contain about 8% of the poor people and 9% of the total residents of the province.

For the poor people in Yogyakarta province that live in the yellow area, a construction for private hospitals to allow them to use their Jamkesmas there would majorly improve their access to health care. Such a construction would concern a public-private partnership, a so called PPP. The interview at the faculty of medicine of UGM showed that the concept of PPP is known in Indonesia and is well applicable for this problem.



The model shows us the favorable private hospitals for establishing a PPP, at the optimal locations. A proposed PPP is a private hospital that should be public too to improve access for the poor. In the first figure the proposed locations are shown in order of new demand from poor people, the second figure shows the locations of public (blue) and private hospitals with (circle) and without (red) PPP.

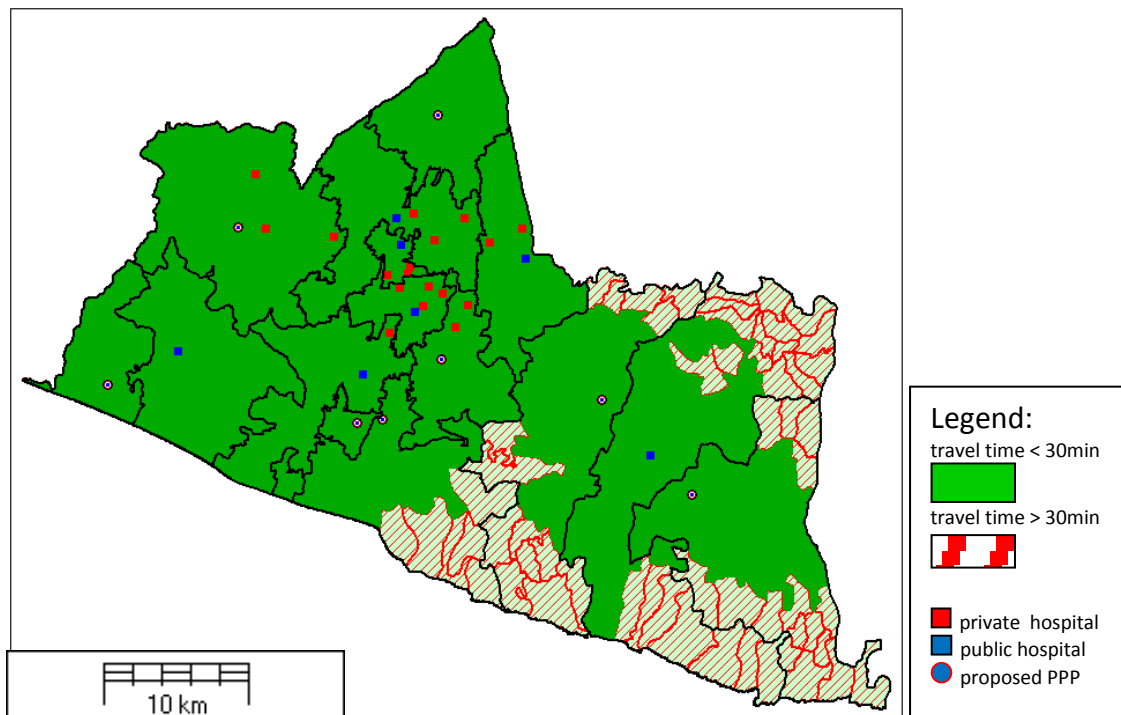


Figure 19: Expansion model at fixed locations and locations of proposed PPP

Of all the potential people that could benefit from establishing PPP's, living in the 'yellow areas', 62,9% could be covered by establishing a PPP at PKU Muhammadiyah Naggulan.

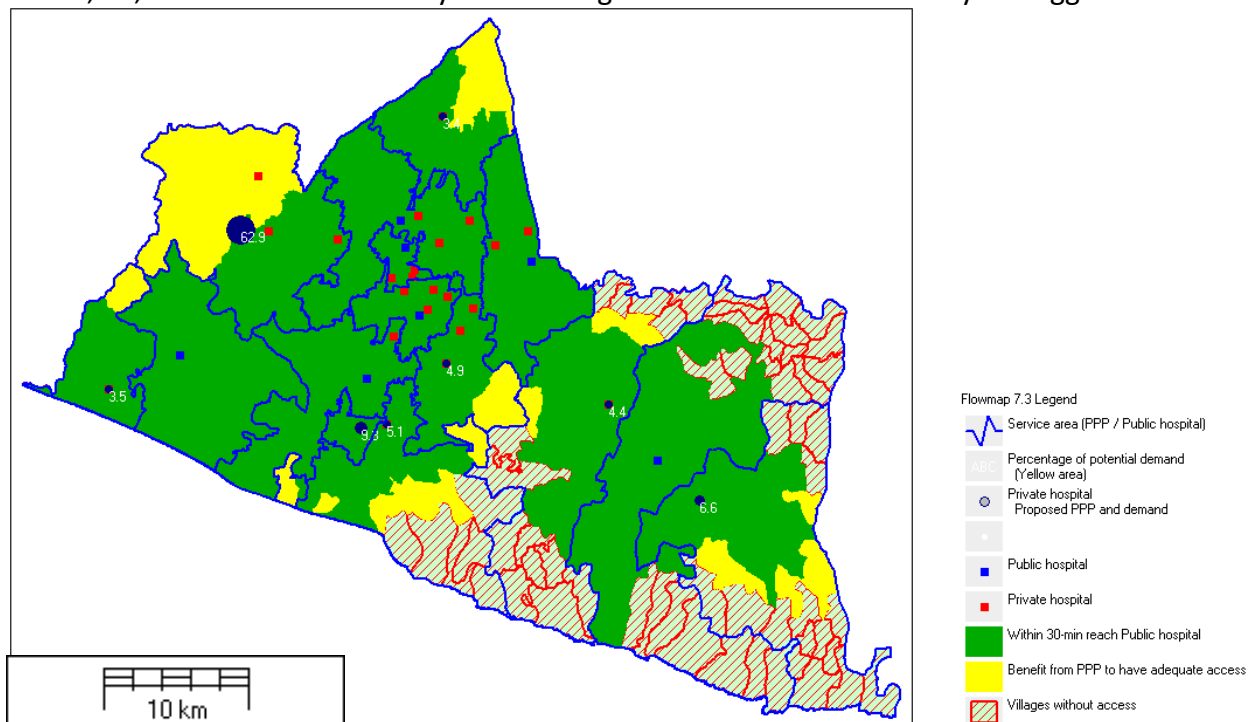


Figure 20: Improved access by PPP and their demand

All the proposed hospitals for establishing PPP and their potential demand are shown in the next table.

Name	District	% of total improved poor
RS PKU Muhammadiyah Nanggulan	Kulon Progo	62,9
RS Santa Elisabeth	Bantul	9,3
RS Pelita Husada	Gunung Kidul	6,6
RS Rachma Husada	Bantul	5,1
RSU Permata Husada	Bantul	4,9
RS Nur Rohmah	Gunung Kidul	4,4
RS Rizki Amallia	Kulon Progo	3,5
RS Panti Nugroho	Sleman	3,4

Tabel 3: Proposed PPP and their potential demand

### 3.2.3 Inequality due to travel costs by motorbike

For the poor people not only a maximum travel time, but also a maximum distance limits their access to health care. Cost of transport in terms of fuel cost will limit their possibilities to go to their family in the hospital daily, as is the culture in Indonesia. This will force them to stay in and near the hospital day and night and abandoning their life in their own village, as well as their jobs and will cause the hospitals to be full of family members day and night.

To assess inequality due to a limited travel budget, a maximum distance has to be determined. The maximum distance can be estimated by converting the income of the poor to a daily budget for transport and calculating the corresponding distance. In consultation with my supervisor Arif Wismadi, a reasonable budget has been determined and converted.

The minimum income in Indonesia is 700.000 rupiah per capita per month. When one of the family members has to go to the hospital, one has to travel to the hospital every day. In such a period the people can spend about 30% of their income on travel costs. Using a fuel consumption of 8l/100km and the standard Indonesian price of 4500rp/l the threshold amounts to 9700m.

The following figure shows the accessibility in DIY using this threshold.

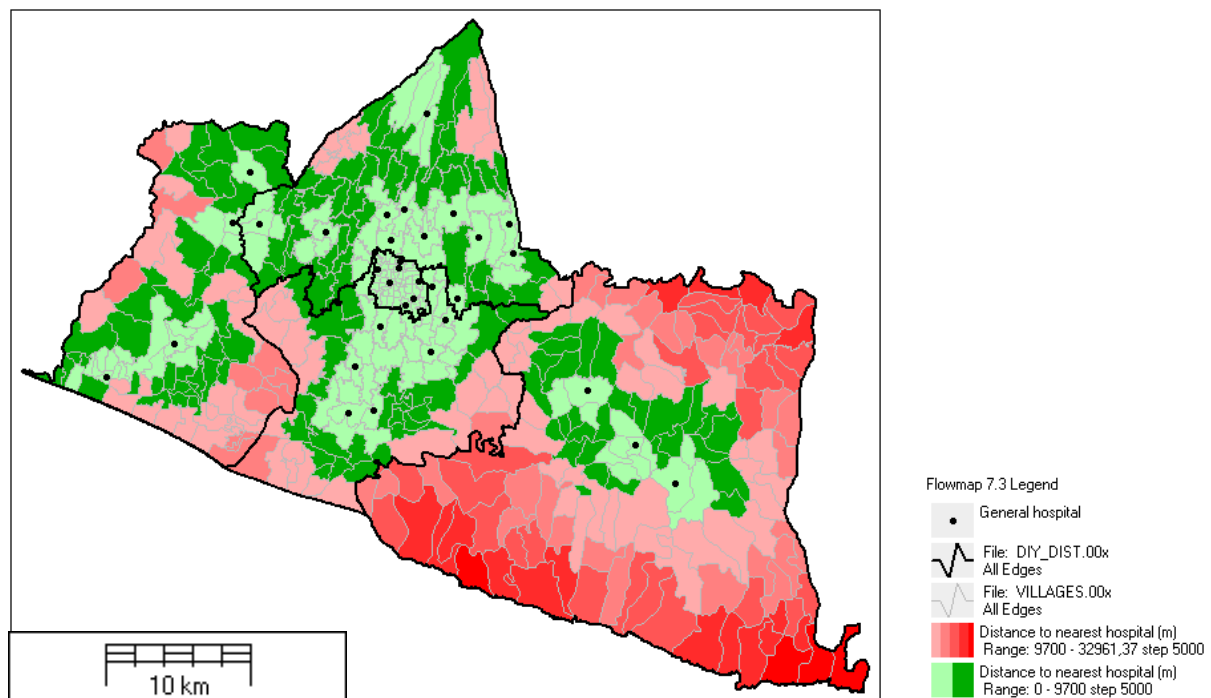


Figure 21: Access to general hospitals using a distance threshold of 9700m

Comparing to the accessibility to hospitals by motorbike using the maximum travel time (yellow area), it shows that this distance restraint has a big impact on health care access. About 17% of the poor people have no adequate access because of this distance restraint (inadequate access because of 30-min travel time excluded).

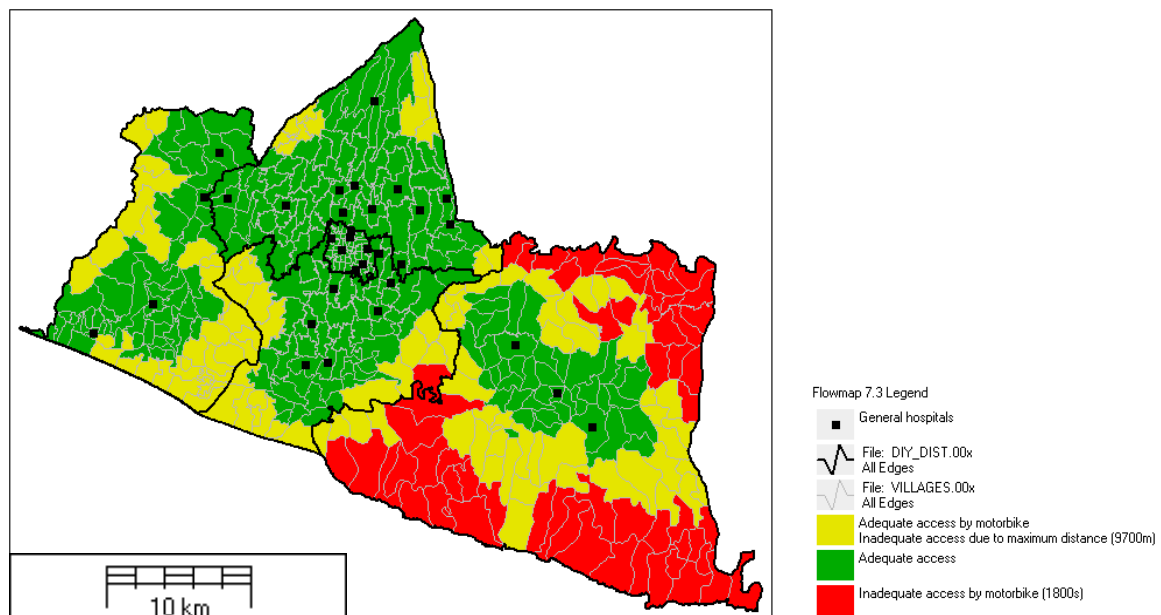


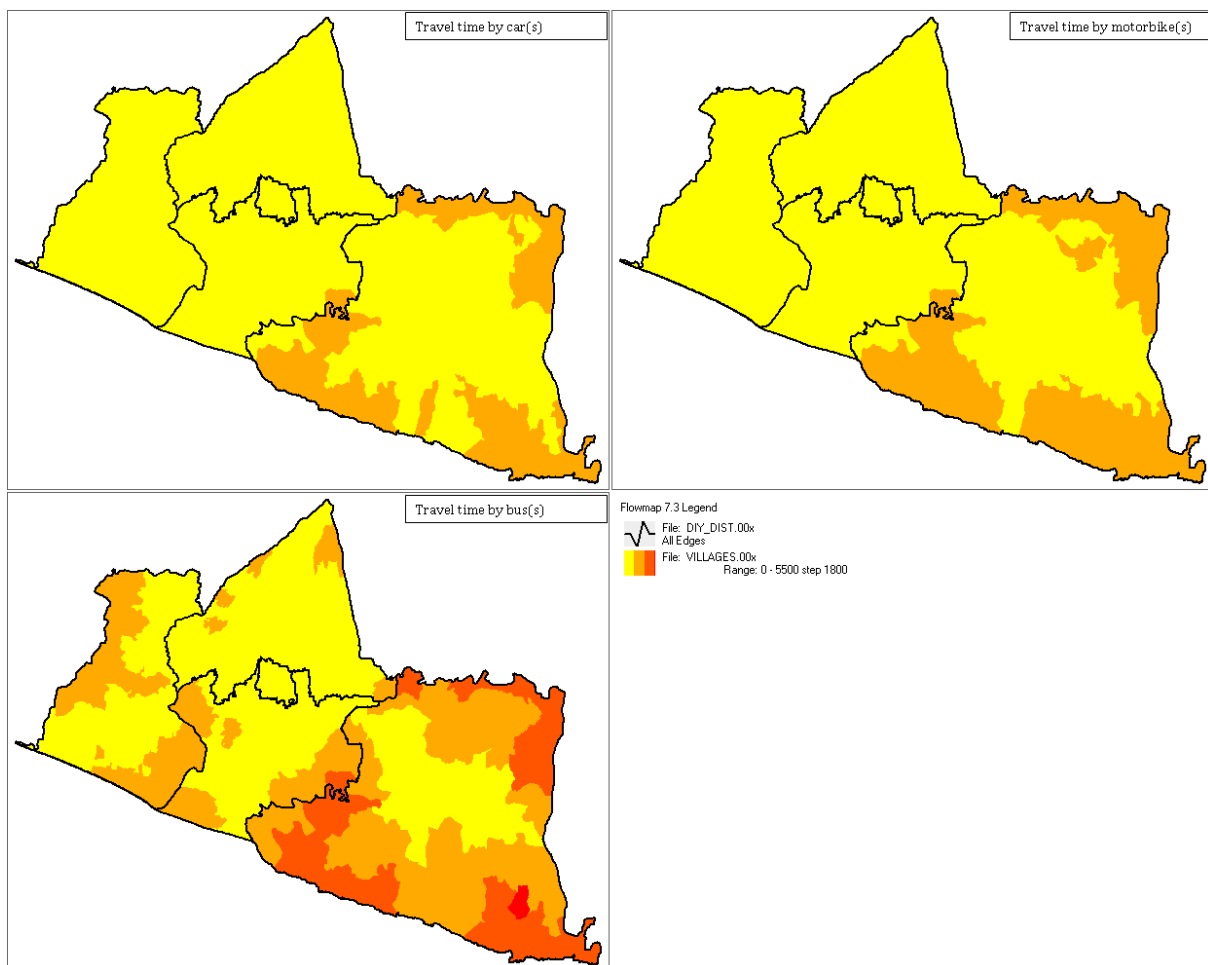
Figure 22: Distance threshold compared to travel time threshold

This is in accordance to several interviews, that indicated that one of the flaws in the health insurance for the poor is the lack of travel cost compensation.

From this model it can be concluded that travel costs should definitely be included in the health insurance for the poor, to make efforts to improve physical access by spatial planning effective.

### 3.2.4 Different modes and limited access

Where the more wealthy residents of Yogyakarta province can use the car or motorbike as their transport means, the poor are sometimes dependent on the use of public transport by bus. Earlier we have seen that the bus speed is a much slower mean of transport and it can be expected that access to general hospitals by bus is worse. The following figure shows the different travel time maps for these three main modes of transport.



**Figure 23: Access by different modes of transport**

Only the yellow area indicates adequate access to general hospitals and it is clear that this access is insufficient in large parts of the province. In addition, often people have to wait for the bus to come and have to transfer a few times before they are at the hospital.

The difference in access is emphasized even more in the following figure, that first shows hospital access by car, then by bus.

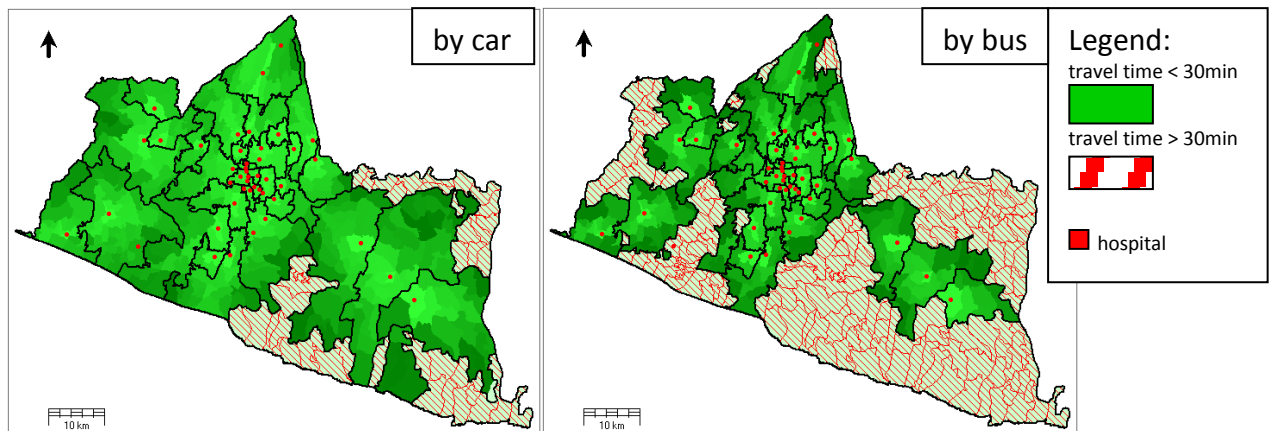


Figure 24: Coverage of hospitals by car and bus

To see the minimum number of service locations to cover the entire province by means of public transport, a coverage model has been performed. The model locates hospitals in optimal locations to cover the whole province with health care access within 30 minutes. This model shows the following result.

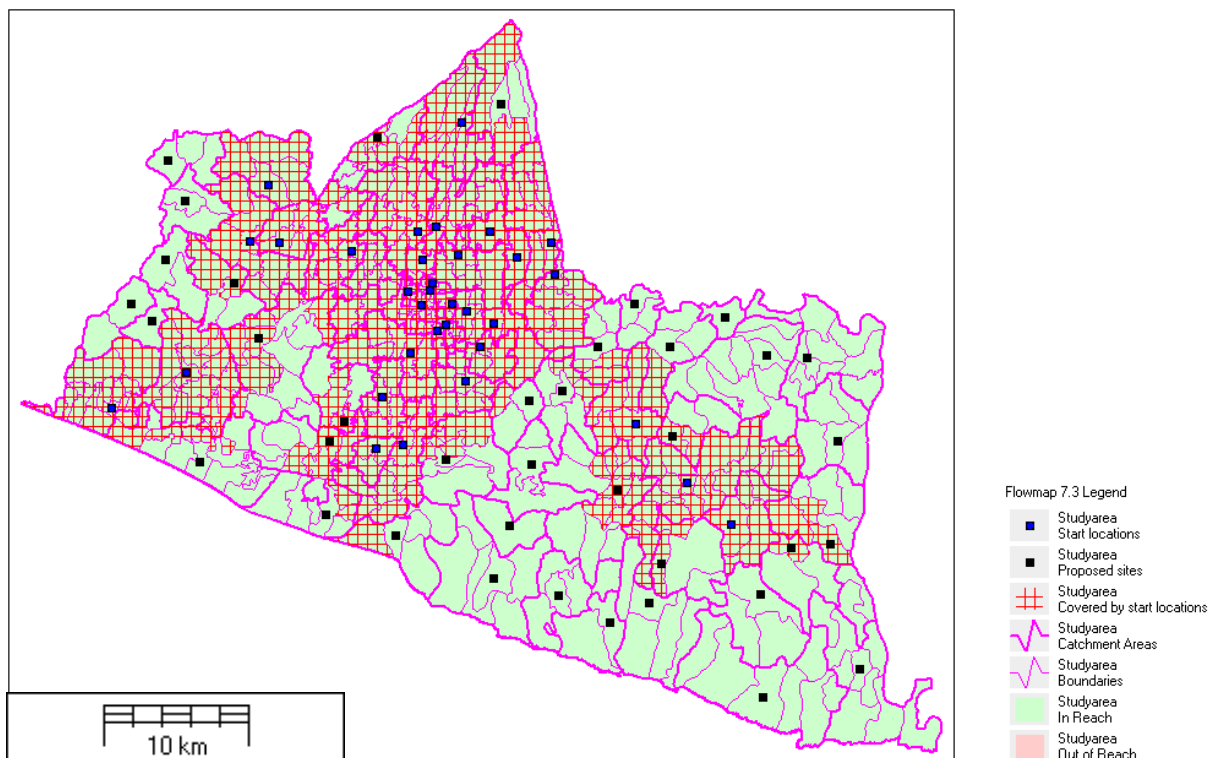


Figure 25: Coverage model on DIY for public transport

On this map the blue locations indicate villages where already a hospital is located. The black squares represent the optimal locations to cover the turquoise area that represents the villages with inadequate access in the current situation. The amount of extra hospitals is 28, clearly an impossible target for health care planning.

However, the result reminds of the locations of Puskesmas and are quite similar, as is shown in the following figure.

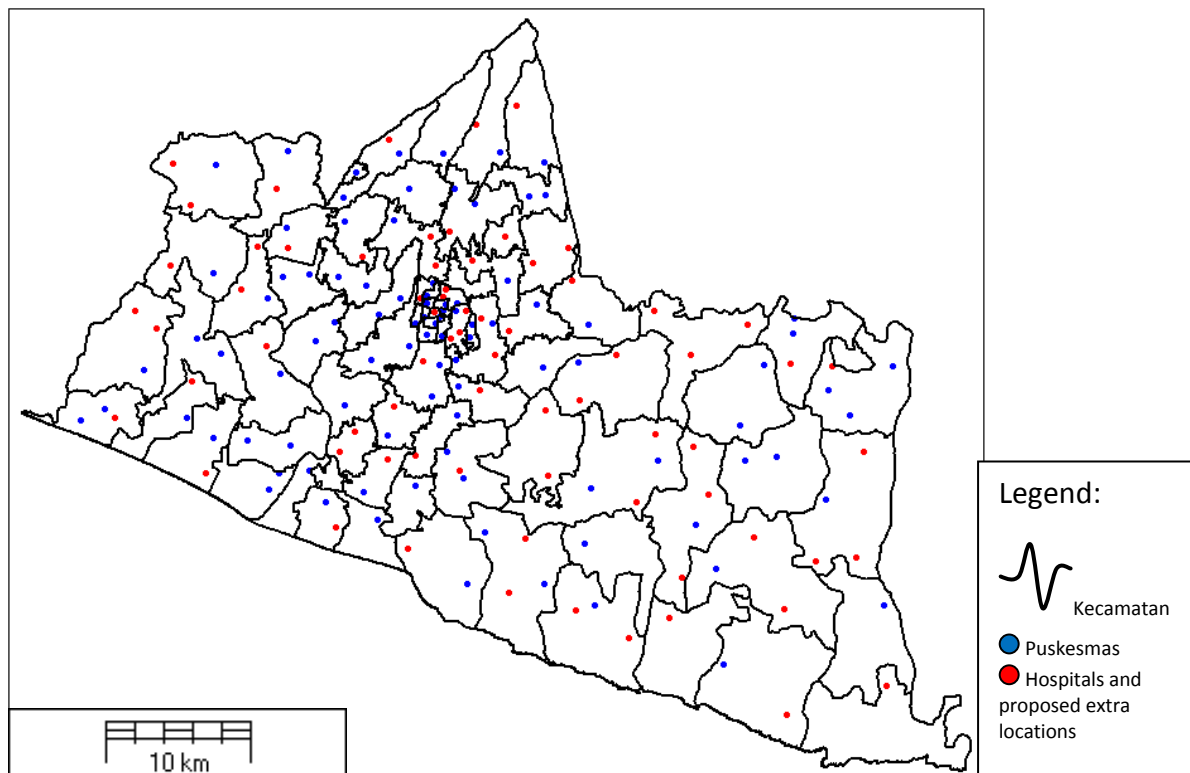


Figure 26: Similarities coverage model hospitals and Puskesmas locations

The blue dots represent the locations of all Puskesmas and the red dots represent the general hospitals and proposed extra service locations. Government policy that requires at least one Puskesmas in each Kecamatan, of which the borders are drawn in the figure above, has established this network of Puskesmas. The results of the model point in a direction in which Puskesmas and their service contribute to health care access to hospitals.

The next paragraph will therefore look at the accessibility of Puskesmas locations.

### 3.2.5 Accessibility of Puskesmas in Yogyakarta province

As we have seen, a first view of the Puskesmas' locations gives the impression that their locations are well spread in the province. This is also exactly the goal of government policy, to establish adequate physical access to Puskesmas. Results of modeling the access to Puskesmas by public transport indicate however that the locations of Puskesmas are not optimal.

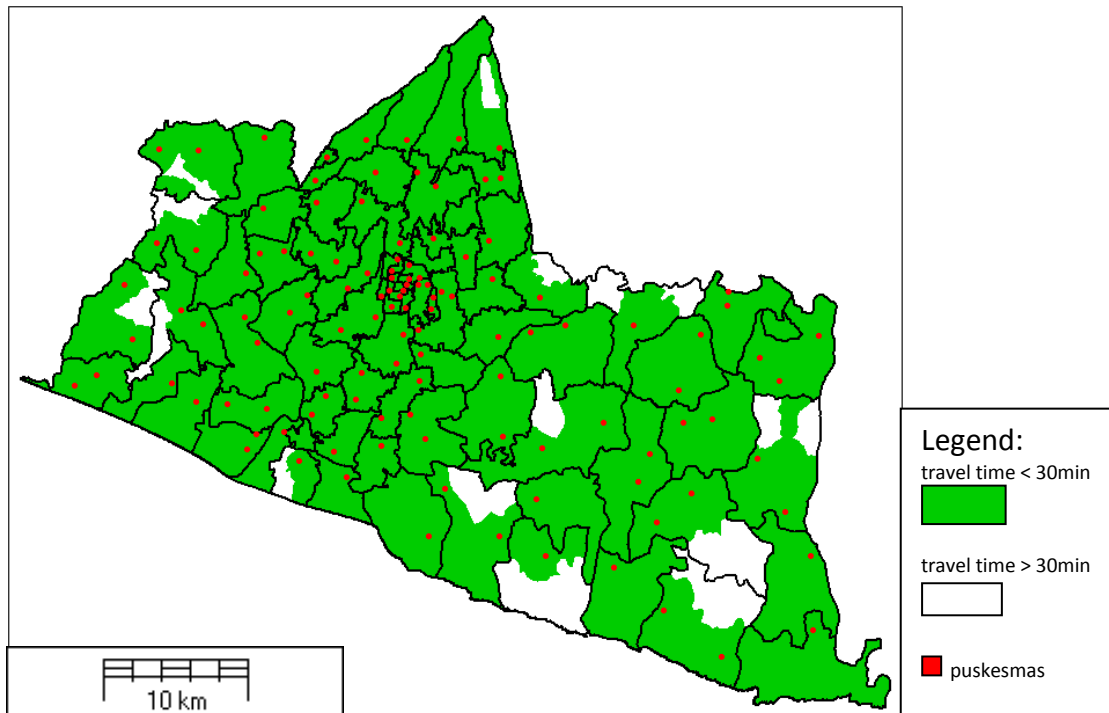


Figure 27: Coverage of Puskesmas by public transport

The white area shows the villages that have inadequate access to Puskesmas, defined by a 30-minute travel time. The residents amount to about 7% of the entire population. These results are remarkable, as a coverage model has already shown that about 70 service locations (of which 33 were fixed) could easily cover the entire province in terms of health care accessibility.

The 120 Puskesmas that are located in DIY seem not to be located in optimal locations. To show this, a reduction model has been carried out to show which Puskesmas could be closed without any loss of coverage. This is presented in the following figure.

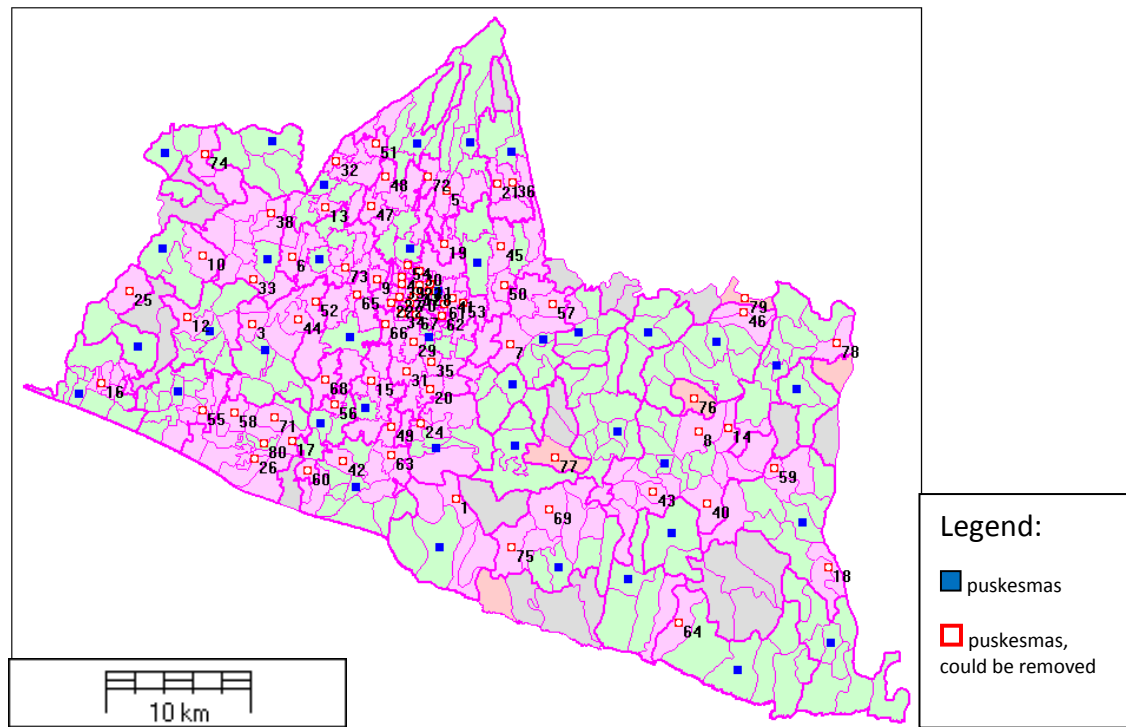


Figure 28: Reduction of Puskesmas locations

A staggering amount of 80 Puskesmas could be closed without any loss of coverage. The red colored villages represent villages that are affected by the closure, but still keep their travel time to the nearest Puskesmas within 30-minutes. As expected, remaining Puskesmas need to expand their facilities to have enough capacity for the new demand. 21 Puskesmas need to expand, when a the norm of one Puskesmas per 120.000 population is used.

Expansion of Puskesmas capacity brings the advantages of higher efficiency and a higher level of service, because the number of good doctors are limited. The Puskesmas are in the current situation sometimes known for their lack of service, which is understandable with 120 Puskesmas in the province that cannot all offer a number of good doctors and facilities. Additionally, Puskesmas in suboptimal locations could face a low demand which would introduce a negative spiral of service and demand.

Some areas remain without proper access. To improve this, extra facilities need to be established. This essentially means that some of the existing Puskesmas will be relocated while others can be closed.



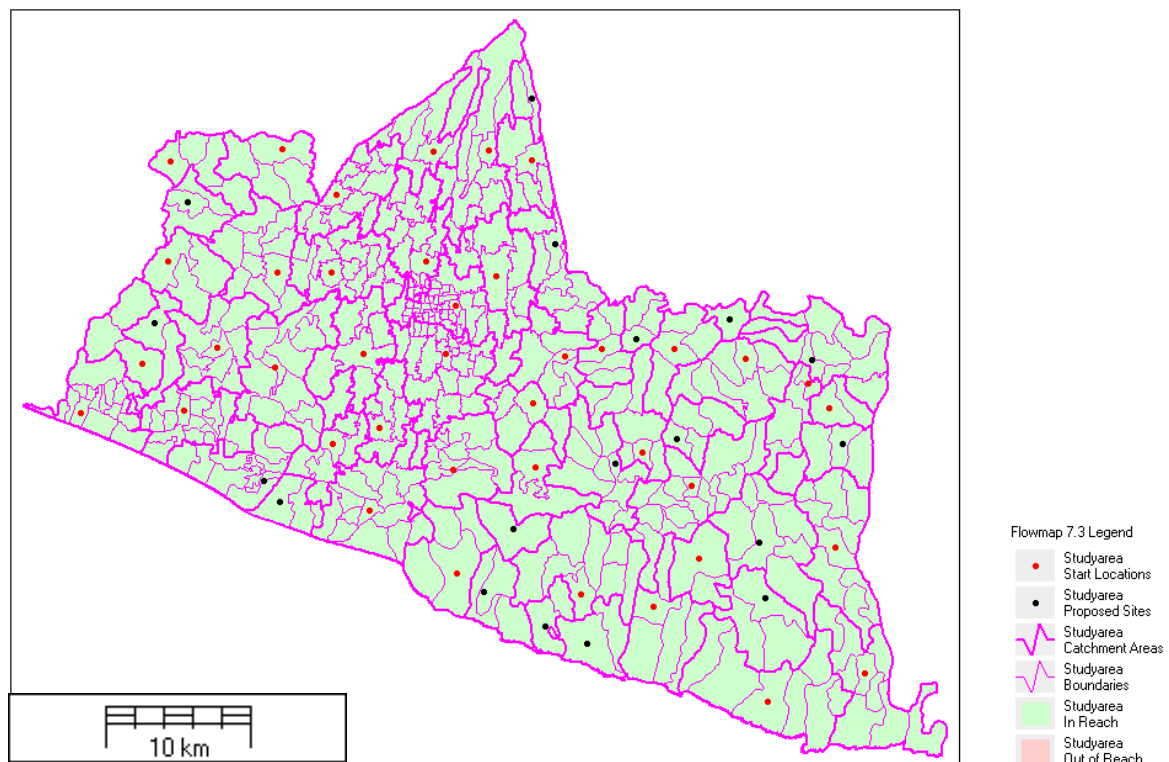


Figure 29: Proposed locations for relocating/establishing Puskesmas

The model shows that an extra of 14 service locations are needed to cover the entire region, which would make the total number of locations 54. The following figure summarizes the conclusions on reduction, expansion and relocation for the Puskesmas facilities.

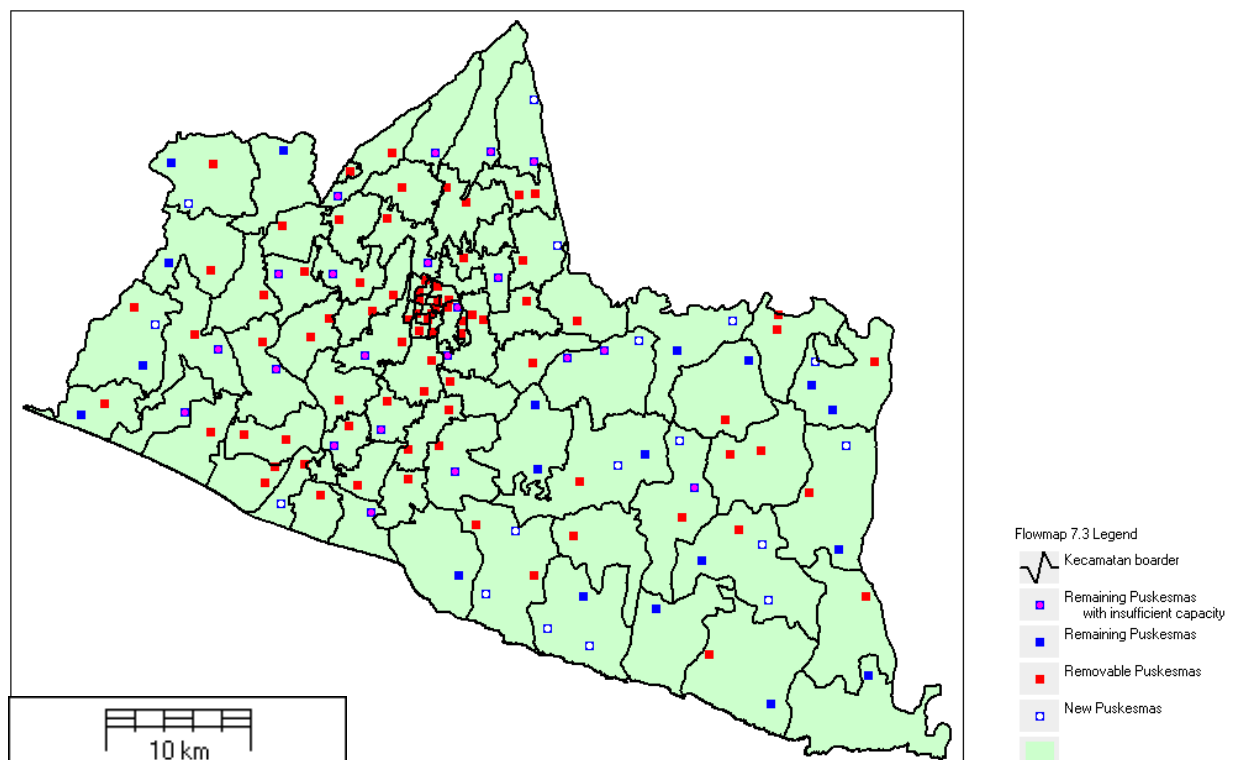


Figure 30: Overall solution on Puskesmas coverage

Red locations represent Puskesmas that do not attribute to the health care coverage and access in terms of the maximum travel time would not decrease as a result of closure of these facilities. The purple and blue locations represent the remaining Puskesmas, where purple means that capacity should be expanded. Note that these purple locations are often surrounded by red locations.

The kecamatan borders are also drawn, to show whether the norm of one Puskesmas per kecamatan holds. In all of the districts there are kecamatan that do not contain Puskesmas, for example in the south of Kulon Progo and in the north of Sleman district. Meanwhile, there exist quite a lot kecamatan that contain in an 'optimal situation', according to this model, two or sometimes even three Puskesmas.

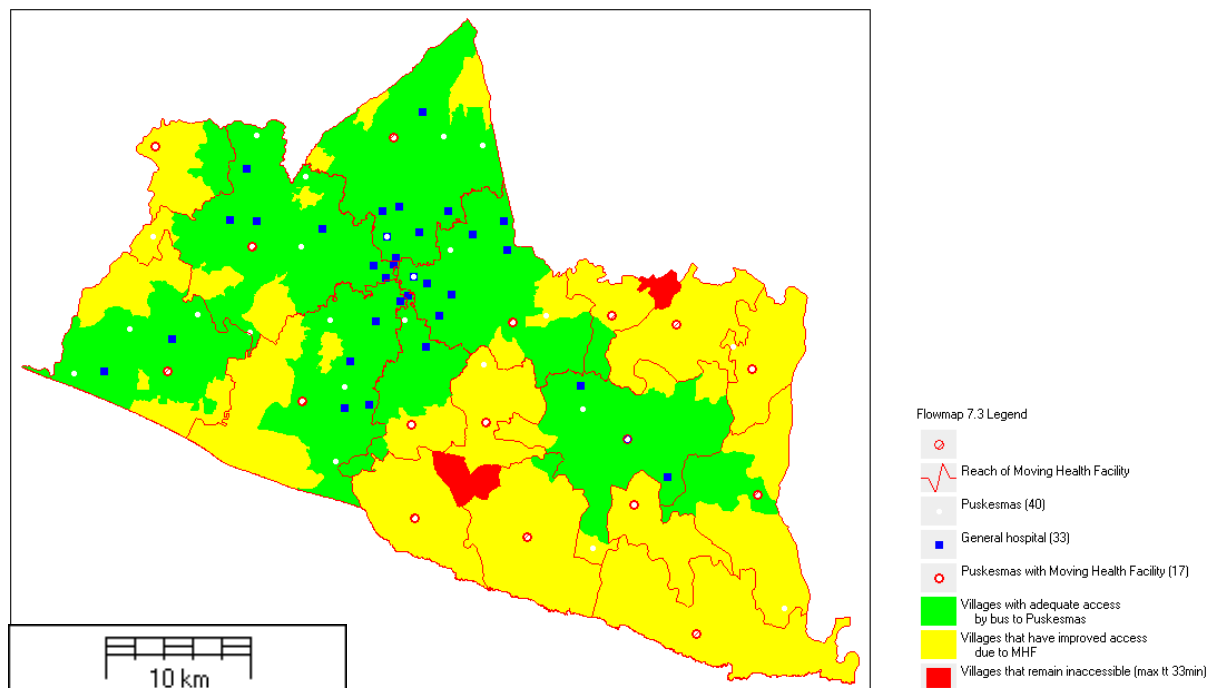
From this figure and model can be concluded that for adequate health care access to Puskesmas by public transport, there exist plenty of facilities. However the current locations of the Puskesmas are not always optimal and the kecamatan-norm does not always secure an optimal spatial distribution. It seems reasonable that the government would reevaluate the locations of Puskesmas locations and the method that is used to determine Puskesmas locations.

### **3.2.6 Moving Health Facilities**

Still access to general hospitals by public transport seems limited. Earlier it was concluded that a comparison of a coverage model and locations of Puskesmas point in the direction of Puskesmas services that will improve health care accessibility. One solution that was suggested in the interview with prof. Sunyoto concerns the establishment of Moving Health Facilities (MHF). These facilities consist of a team of doctors and nurses that use a Puskesmas Keliling (a minivan) to travel to the remote villages to provide for health care at these villages. This can be compared to the famous Flying Doctors of Australia. Difference with the current Puskesmas Keliling is that now the health care personnel consists of volunteers that do not have sufficient knowledge and skills to provide for the health care needs that are provided for in a hospital. So a MHF provides a high quality health care.

The new MHF is located at one of the Puskesmas, this is a feasible solution and easier to realize than establishing a MHF base at a totally new location. So there is a limitation in locations where the MHF can be established.

At the Puskesmas the minivan and appropriate equipment for health care could be put. The model was used to determine the optimal Puskesmas to establish these MHF. The MHF will have comparable speeds to the car. So the car model is used. The result is displayed in the following figure.



**Figure 31: Locations of moving health facilities and improved accessibility**

The locations of Puskesmas hosting MHF are displayed by the red/white dots. Note that MHF can only be located at Puskesmas locations, so The yellow area represents the villages that will benefit from this measure (about 25% of the population and poor) and the green area already have access to general hospitals, assuming PPP's are established. The red area villages have travel times of just a little over 30 minutes, up to 33 minutes. These villages cannot access a hospital by car within 30 minutes (just over 30 minutes) and thus the MHF just can't reach these villages.

Possible funding of the 17 MHF could be covered by establishing more efficient location and use of Puskesmas, as discussed in paragraph 3.2.5.

## **4. Discussion**

In this chapter the assumptions and results of the modeling will be discussed.

### **4.1.1 Model properties**

Travel time presents a good indication of site accessibility, as it takes into account travel routes. However, travel time, or essentially drive time, assumes that everyone has access to a motorized mode, and can drive. Travel time assumes that people can travel at constant speeds on different road types. However, this in itself is problematic. Road speeds vary depending on time of day, accidents, road works, weather conditions, and so on. Similarly classified roads will exhibit different average speeds. No account is taken of those who have to walk to a bus stop, wait for a bus, chance buses etc. People in rural areas are more likely to have access to a vehicle, as can be concluded from several interviews. A strong village culture ; urban residents may depend more on other transport.

There is no uncertainty implemented in the model, which makes it harder to interpret a result of for example the travel time to the nearest hospital is 1800s.

### **4.1.2 Dataset**

The quality of the PODES08 dataset that was used to assess the origins at a village level, as well to determine the appropriate travel speeds on different road types can be discussed. It is rare to have a complete dataset about every village, but the data might not always be right. For example, a few remarkable things found in the dataset were:

- Highest speeds claimed to sub district capital is 80 kmpu, by a village near Wonosari
- There are two villages that claim an average speed of 270kmpu to district capital, followed up by speeds in 60's
- 49 villages claim to use a motorized boat as primary public transport means, half of them have average speeds of 0
- Only 2 of 45 kota villages claim to use the motorbike as the primary public transport

This data contradicts daily observations in the province or the ratio. It means that maybe the number of residents per village or number of poor people are also not exact. This has a large impact on the quality of the results, as the model is highly dependent on this input data. The data that was implemented in the model showed no unrealistic or odd characteristics but might not be exact.

### **4.1.3 Assessing poverty**

It is very hard to know exact SEP of a village. As said before, the amount of poor people estimated by the letters of the poor variable heavily underestimates the total number of poor people according to HDI data.

#### **4.1.4 Spatial rationality**

The model assumes spatial rationality, which means that people will go to the hospital that is nearest to them. From conversations with local people this seems to be incorrect. Often a family has the preference for a certain hospital. Reasons why patients would prefer Sarjito over RSUD are according to an interview:

- The hospital has limited health care tools
- Emergency condition and the patient has to be handled by sub-specialist
- RSUD only has specialists, not sub-specialists like RSUP Sardjito
- RSUD has limited capacity

#### **4.1.5 Modeling results**

In general the modeling results seem reasonable and logical. Limitations in transport means, locations and expenditure are expected to result in worse access and they do. No weird or unusual results were found.

The model seems very well applicable for health care planning policy, as different alternatives can be implemented, evaluated and compared. However, results should be interpreted relative to each other, not absolute, as there is no uncertainty in the model and data quality is not optimal.

## **5. Conclusion and recommendations**

From the results of the research, four major conclusions are drawn.

Limited facilities cause poor people to have worse access to hospitals, as they can only use their health insurance for the poor at public hospitals. For the remote villages the establishment of public private partnerships has been proposed and their locations, to secure the same coverage as for the more wealthy people.

Poor people have limited means to travel to the hospitals. Those that are dependent on public transport have much worse access to hospitals. Establishing new hospitals at favorable locations would be too expensive, as 28 extra hospitals are needed. Instead, the introduction of high quality moving health facilities are proposed, located at optimal Puskesmas facilities to cover a maximum amount of villages and residents.

Limited budget for travel costs have major effect on health care accessibility, as was shown in the model results. Therefore a travel cost compensation is recommended to be included in the free health insurance for the poor.

Finally, the poor suffer from the sub optimal distribution of the 120 Puskesmas in the province. The amount could be much less considering the 30-min coverage and relocation would cause the accessibility to improve. Government could reevaluate the locations and policy on location Puskesmas.

From the discussion a strong recommendation can be concluded for the need of high quality data collection, as the model has shown to be well applicable in this health care planning context. Data collection like the exact locations of villages, as well as detailed data on poverty, hospitals and road network is recommended.

## 6. Summary

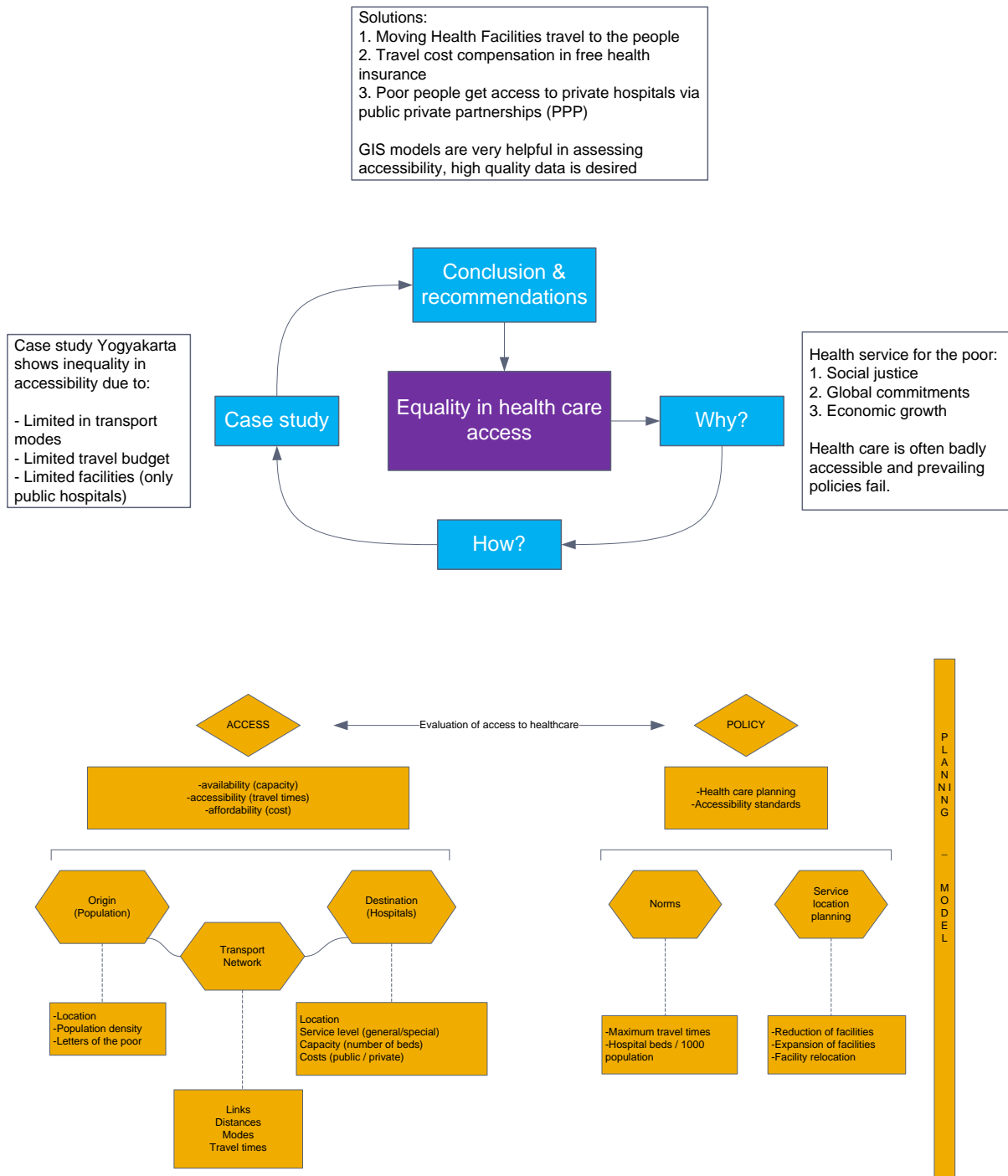


Figure 32: Summary research

## 7. References

Andersen, R. M., A. McCutcheon, et al. (1983). "Exploring Dimensions of Access to Medical Care."

Angela, Amoah Grace (2010). Analysis of the relationship between socioeconomic position and public services provision: An inter-village analysis of the province of Yogyakarta. Enschede, ITC. MSc.

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. Enschede, University of Utrecht, ITC. PhD.

Bosanac, Edward M., Rosalind C. Parkinson and David S. Hall (1976). Geographic Access to Hospital Care: A 30-Minute Travel Time Standard. *Medical Care*, Vol. 14, No. 7 (Jul., 1976), pp. 616-624

JPKM (2008), Jamkesmas website, retrieved May 7, 2010. From <http://www.jpkm-online.net/>

Lowe, John M. and Ashish Sen (1995). Gravity model applications in health planning: Analysis of an urban hospital market. *Journal of regional science*, 36 (1996), 437-461

Master Programme of Management of Infrastructure and Community Development (n.d.) Universitas Gadjah Mada, Indonesia. Retrieved May 3, 2010. From <http://pipm.pasca.ugm.ac.id/>

MICD (2009). Management of Infrastructure and Community Development: Course Descriptions. Yogyakarta Indonesia, January 22, 2009

MICD UGM Notes (n.d.) Retrieved May 3, 2010. From <http://micdugm.wordpress.com/mic/>

Province of Yogyakarta (n.d.) Retrieved May 3, 2010. From <http://www.pemda-diy.go.id/>

Sen, Amartya (1999). Economics and health. *The Lancet*, 354 (1999) Page SIV20

Sen, Amartya (2008). Economics and health. *The Lancet*, 372 (2008)

Shrestha, Jeny (2010). Evaluation of Access to Primary Healthcare: A Case Study of Yogyakarta, Indonesia. Enschede, ITC. MSc.

Sunyoto Usman, Derajad S. Widhyharto, Amelia Amika (2010). Strategi Menciptakan Pelayanan Kesehatan Dasar \_English version. Yogyakarta, February 1, 2010.

World Health Organization, 1993. The urban health crisis: strategies for health for all in the face of rapid urbanisation. Geneva, World Health Organization.



## **Appendices**

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## A. Results first interview

Interviewed was prof Sunyoto, the dean of MICD study program at the Gadjah Mada University in Yogyakarta.

1. In block C, you discussed the accessibility of primary health care with the MICD students.

- a. Please tell me what you discussed?

*First of all, the socioeconomic analysis that we used was done by the Centre Bureau of Statistics and specified in the PODES dataset. It doesn't refer to individuals, but to villages, that are specified from poor to rich (5 levels).*

*We spoke about inequality due to bad access for people in Gunung Kidul. Accessibility for remote villages is really bad, because of bad roads, and high expenses to reach the health care facilities.*

2. How is the accessibility of primary health care in the province of Yogyakarta in general?

- a. Are there differences between the rural and urban area?

*Access in rural area is worse for the poor people.*

3. Are there differences in PHC between low, middle and high incomes?

- a. Do mayor inequalities exist?

- i. Capacity

*Yes, it is really hard to find doctors that want to work in the small health care facilities. There are not enough means to treat people sufficiently and the income of doctors is lower than in the big hospitals.*

*Therefore, in general the quality in cheap rural health care facilities is worse and there are not enough (good) doctors.*

- ii. Cost

*Yes. In general the cost of even puskesmas is not covered by Jamkesmas, the free health insurance in Indonesia. When the coverage of free health insurances have run out, poor people have to go to the head of their villages or the rich people in their villages to ask if they want to contribute.*

*Because of cultural conventions, family has to accompany the patient and stay with them (often in the waiting room) while they are in the facility. This has the consequence that he/she cannot earn money and has to pay for the stay. This limits the budget even more.*

*There is a problem with transportation cost to the health facility and payment for the treatment itself. Of course, wealthier people don't have these limitations.*

- iii. Transportation / access

*Yes. The puskesmas, that should be in every subdistrict, is generally located in the richest village. The distance to the remote and often poor villages is too large and the roads to these villages are in bad condition. The travel times are too high.*

*The rich people live nearby the puskesmas and have enough money to travel to the (easy to reach) bigger hospitals.*

- b. Do problems also arise from cultural issues?

*The research that he did was mainly statistical, so he did not have the opportunity to interview people.*

*The current tendency is that people go to medical facilities rather than traditional treatment. This is a result of good education.*

4. What kind of measures should the government undertake to improve unequal accessibility?

- a. Should the locations of health care be improved?

*This would be too expensive.*

- b. Should the number of PHC facilities be improved?

*No, the number of PHC is sufficient.*

- c. Should the cost of PHC be improved for those who cannot afford it?

*Yes, the roads to remote villages should be improved but this is very expensive. Another option would be to provide 'flexible health care facilities'. These are vans or busses that travel trough a sub district to all the villages, so the threshold for poorly accessible villages could be overcome. In Australia, these are called the Flying doctors.*

## **B. Results second interview**

Interviewed was Sri Suharti, a doctor in Puskesmas Depok II in Sleman regency, at the north of Yogyakarta city.

### **1. About the patients**

#### **a. Where do people come from? From which areas?**

*They come from this district, the area around this Puskesmas.*

*All kinds of patients come here, poor and rich. There is no difference in how they are treated. For the poor this is the only affordable health facility, but the richer people also come here because it is cheaper. However, most of the people that come here are of low income class.*

#### **b. How do they travel here in general?**

*People usually walk because the Puskesmas is nearby. People that have to travel the furthest, have a 10-min ride by motorbike. The poor also travel by motorbike*

#### **c. Are they accompanied by family?**

*Yes, they often are. Of course the children and the elder are accompanied.*

*The hospital has two mayor functions, that is:*

- *Primary health care*
- *Medical check-up before going on a Haji (journey to Mekka)*

### **2. About capacity**

#### **a. What is the maximum number of people you can treat?**

*On average, 130 people are treated here every day.*

#### **b. How many beds do you have? Is this a common number for Puskesmas?**

*The Puskesmas has no bed capacity, an admission is not possible. When someone needs an admission, he is referred to a hospital. For example, Saryito Hospital or the International Hospital.*

*For poor this is slightly different, they get a recommendation letter and are referred only to state hospitals, where they will get a discount.*

#### **c. Does it sometimes happen that there are more people coming to the facility than you can treat?**

*On average, people have to wait for about 30 minutes. The capacity is only problematic when there is an epidemic, for example the flu epidemic last august. When this happens, the Puskesmas extends their opening hours until everybody is treated. This happens very seldom.*

### **3. Daily routine**

#### **a. Where do poor people get treated? And richer people? Different procedures?**

*As said, poor and richer people get the same treatment.*

#### **b. What kind of procedures exist in the facility?**

*When a patient comes in, he goes to registration, where he shows his ID and fills in paperwork. He also shows his insurance card, for the poor: PKH, Jamkesmas or KKM. The treatment then is free.*

*If the patient is uninsured, he has to pay. This happens before the treatment itself, while the patient is waiting.*

#### **c. What kind of treatment can you give to patients? (or cannot? Where does this depend on?)**

*I got a tour around the Puskesmas and saw the different departments:*

- Dentist
- Regular basic treatment
- Laboratory, basic laboratory treatment, for example a blood test
- Psychology
- Maternity
- Medicine supply

*This is regular health service for Puskesmas in Yogyakarta city and Sleman province.*

#### 4. Inequality issues

- a. Do you recognize the situation in which people only come to your facility when they get chronically or severely ill?

*Not at all, contrarily: Sometimes people come to the Puskesmas even when they are not really ill! They will just have a checkup to ensure that they are healthy, for a job interview or when they go to Mekka.*

*Therefore travel time is definitely not an obstacle here.*

- b. Are complicated procedures an obstacle for some people to go to the Puskesmas? (ie they prefer to go to a local/traditional doctor)

*The same.*

- c. What happens if poor people cannot pay?

*The payment is not an issue, because treatment is free for the poor. The costs are:*

- 3500 IDR for a regular treatment/checkup
- 3400 IDR for a dentist appointment

*This is cheap and people seldom cannot pay this.*

*Of course, for additional treatment there are additional costs. These are determined according to national regulation standards.*

- d. What kind of difficulties do you have, treating the poorer?

*There are some issues:*

*To request the Jamkesmas, you have to be registered. You need an ID card and some poor people don't have this. They are for example for another district. So the data about the poor is not complete.*

*When this happens, and people cannot pay, the Puskesmas will write a letter for them, stating that they are poor and claim the costs on Jamkesda (UKS for students).*

*The Jamkesmas is sometimes not sufficient to pay for the health care of the poor. Puskesmas is always struggling with her low budget, because they are funded by the government but their funding is (very) limited.*

*However, when I conclude Jamkesmas is not always sufficient then, she states that it is and that the Jamkesmas program is good and important.*

### C. Results third interview

Interviewed was Dr. Choirul Anwar, M.Kes, the head of Health Department of Kota Yogyakarta. He was interviewed about health care policies in kota Yogyakarta and standards. The questions are about PHC goals at this moment and the measures to reach them, and standards in health care accessibility.

#### 1. What are private health care accessibility goals at this moment?

##### a. Is the amount of hospitals an issue? (not enough hospitals)

*No, is not really an issue. There is even overcapacity, as people from other regions also visit Yogyakarta Hospitals.*

##### b. Is the universal health insurance an issue? (PHC is too expensive)

*For the poor there is a gap in health care insurance provision. There are 90.000 people that are poor in this regency, but only 46.000 receive Jamkesmas according to the bureau of statistic.*

*When this happens, the mayor will take his responsibility and provide for the additional needs. The local government has autonomy to complete Jamkesmas.*

*The main problem might be for the people that are not poor, but not rich either. They do not receive Jamkesmas but have to pay for health care by themselves. This is sometimes too expensive for them. To fill this gap, the government has decided to launch a universal health insurance system, where everybody should have insurance. The middle-incomes will receive subsidized insurance, they have to pay but not everything.*

*There will be a pilot for this project in 5 sub districts of kota Yogyakarta.*

##### c. Is physical accessibility an issue? (travel times to PHC are insufficient)

*In kota Yogyakarta this is not an issue*

##### d. Is inequality in health care an issue?

*For the poor, only the state hospitals are affordable. This creates a gap in service coverage.*

*He thinks that in Gudung Kidul for example there will be a lot of inequality, because for specific treatment the poor people cannot go to the RSUD hospital, they have to come to Yogyakarta. This is too expensive for the poor people, especially to visit their family when they are in the hospital.*

#### 2. Do there exist norms and standards in health care accessibility?

##### a. What is the norm or standard in the amount of PHC per number of population?

*Yogyakarta city easily matches the standards. There should be one hospital in 240.000 people*

##### b. Number of beds / doctors

##### i. How many beds should be available / number of population?

*You may find this in data located on the 2<sup>nd</sup> floor.*

*In 2010, all hospitals are categorized as A, B, C or D class hospitals. A D class hospital has less service and beds, e.g. 10-25 while a C class hospital has 75-100 beds.*

##### c. Maximum / desired travel time to PHC

*For emergency cases, a 20 minutes standard should be max.*

*In non-emergency cases, the max travel time to the hospital should be 30 minutes. This will definitely prove to be a problem in rural areas.*

#### **D. Results fourth interview**

Interviewed was bapak Agus Joko Pitoyo, from PSKK, the center of populations and policy studies. The questions are about the population distribution in the province of Yogyakarta and the socioeconomic indicators that separate different classes.

##### **3. How is the population of DIY distributed across regencies?**

*There are five districts with about the same population. The rural area's can be considered poorer than the urban. From poor to rich Gudung Kidul Kulon Progo Bantul Sleman Kota Yogyakarta.*

*The reason that GK is poor is not only the low income, but also for example the fact that the area is mountainous. This causes the land to be less fertile and the land is also relatively dry. The water quality is bad.*

##### **4. How can socioeconomic classes be defined?**

*It is really hard to determine SEP and there are several ways to do this. Well known ones are the HDI (human development index) or HPI (human poverty index).*

*The three main components of these indexes are Economic, Education and Health.*

*The Indonesian government also deals with assessment of SEP, for they give out letters of the poor. At first, when the health care program for the poor was introduced, there was a lot of protest from richer people, claiming that they contributed in society just as much as poorer people, and therefore everybody should receive this subsidy. Later, after government propaganda, the subsidies were declared only to help the poor. The instrument used was the so called 'letter of the poor'.*

*The exact determination of who is poor, is really difficult. People that are not poor anymore will still pretend to be poor to receive the insurance.*

*Sometimes the rich get letters of the poor as well, because they have good contacts with authorities, or because they have bad illnesses that are unaffordable for them as well, like kidney disease or leukemia.*

*Assessment of poverty also happens based on rice consumption, because in Indonesia this is one of the most important consumptions, and everybody buys rice.*

*Because the determination of letter of the poor has a similar and extensive way of assessing poverty, Agus thinks that it is the best indicator to determine poverty at a village level!*

From the PODES08-DESA:

- % of agrarian families
- Number of slums (number of families living in slums)
- Number of people with malnutrition
- Number of families with ASKESKIN
- Number of poor letters
- Poverty alleviation program

##### **5. Has the center of population and policy studies done research on this subject?**

**Could you please tell me something about it?**

*Actually, PSSK did some research on determination of poverty, it was done by Umi.*

#### E. Results fifth interview

For this interview I interviewed miss Auda Lienawati, a manager and doctor at Sarjito Hospital. The questions were about the type of hospital, the hospital cost and the inequality issues that are of relevance.

##### 1. What type of hospital is this?

*Sarjito Hospital is an A class hospital since 2005 and one of the largest in South-East Asia. It is a 'umum' hospital with many subspecialists: 138.*

*This is really special for a hospital. Because this hospital is also a public hospital, expenses are fully covered for the really poor.*

*Private hospitals can also be accessible for the poor, but only if they have MOU.*

*People that come here are mostly from the neighborhood of the hospital, ie the surrounding sub districts. Other people will go to a regional hospital in their own region, for example the RSUD in Sleman. For specific service, people can be referred to Sarjito hospital.*

*For all, poor and rich, the procedure is the same. First someone goes to Puskesmas, then to the hospital, only with a letter of referral. Otherwise the hospital would be just a big Puskesmas!*

*In emergencies people can go directly to the hospital.*

##### 2. Is this hospital considered expensive?

*The hospital is not considered to be expensive, for the prices of the third class are fixed by the central government.*

##### a. Is the hospital affordable to uninsured people? To what extent?

*Jamkesmas provides for a certain package of services that are completely free for the poor. Other services are also free for the poor, because the hospital cannot deny people any kind of service.*

*These treatments are paid by the hospital itself.*

##### b. What kind of treatment does the Jamkesmas cover?

*This is not clear*

##### c. How many poor people come here? How do they pay?

*About 30-35% of the patients is poor. Sometimes the Bed Occupancy Ratio is 100+ %! This means that all the 3<sup>rd</sup> class beds are taken and poor people stay in 2<sup>nd</sup> class.*

*The BOR for the poor is about 98%*

##### d. What is the procedure for poor people that use Jamkesmas?

*People go to Puskesmas for their referral letter and show their Jamkesmas card when they enter and register at the hospital. Then they get treated.*

##### 3. About the patients

##### a. Where do people generally come from? From which areas?

*70% of the people are from Yogyakarta province, 30% from other provinces, like Central Java.*



*They come to Sarjito because they are referred here. The hospital has many kind of specialist services that other hospitals cannot offer. The hospital in Semarang is also an option but maybe further away.*

b. How do they travel here in general?

*People travel here by bus or motorbike. Sometimes they are brought by an ambulance, from RSUD.*

c. Are they accompanied by family?

*It is Indonesian culture that people that are hospitalized always have to be accompanied by their family. Sometimes there is only one patient and a big family. The families of poor people just stay at the hospital, sometimes they even sleep next to the bed on the floor.*

4. About capacity

a. What kind of capacity restraints do you have?

i. How many beds/doctors?

*There are 750 beds, 278 for the poor. Also there are 300 specialists and 900 doctors educated to be a specialist.*

b. Does it sometimes happen that there are more people coming to the hospital than you can treat?

*Yes, then poor people stay in 2<sup>nd</sup> class. After the 2006 earthquake, there were 3000 people being hospitalized at Sarjito Hospital, a lot from Bantul. They used all means possible to treat the people.*

5. Inequality issues

a. Do you recognize the situation in which people only come to your hospital when they get chronically or severely ill?

*Ask the people*

b. Are the procedures for poor people an obstacle for some people to go to your hospital? (i.e. they prefer to go to a local / traditional doctor)

*Ask the people*

c. What happens if poor people cannot pay?

*We still treat them. If they have no Jamkesmas card we send a letter to the government asking the refund on the treatment expenses.*

d. What kind of treatment can you give to patients (or cannot?) What does this depend on?

*Not clear, she is vague about this*

e. What kind of difficulties do you have, treating the poorer?

*Service level is not a problem.*

*The two mayor problems are the capacity restraint and having to put people in 2<sup>nd</sup> class, and the Jamkesmas package that does not cover everything so the hospital has to pay for some services by herself.*

*She has also said that costs are not really a problem for the poor, but for the people that are not poor, but also not rich. For them expenses can be really high.*

*After that, I got a tour around the hospital. There were 16 wards in IRNA I and 402 beds. I saw a few of these wards, for example oncology and internal treatment.*

*I interviewed a few patients.*

*The first patient had uterus cancer and was from Magelang (near Borobudur). She traveled 4 hours by a simple bus for 40.000 rp. Her husband was also here. Although the health service is free, the travel expenses were expensive for her. She was referred to Sarjito by RSUD Wonogiri.*

*The next patient had lung cancer and was from Kulon Progo. She traveled 3-4 hours by bus.*

*Another patient was so sick he couldn't talk but I spoke with his son, who flew in from Malaysia to visit his father. He was admitted two weeks ago and ever since he had been there. He slept on the ground next to his father's bed. The trip was very expensive for him, because he hadn't saved up for a something like this.*

*The last patient I interviewed was from Boyolali, a 3h travel by bus. He was referred by a private hospital, that also covered poor people expenses.*

#### **F. More results on the fifth interview**

Interview with Mrs. Allida, Finance and Administration Deputy of RSUP dr. Sardjito

Day/Date : Thursday, June 3<sup>rd</sup>, 2010

Time : 10 – finish

1. Time needed to go to the hospital is too long (3-4 hours) because of limited transportation access and bad road condition, for example: Gunung Kidul and Kulon Progo Regencies
2. 35 % of the patients of RSUP dr. Sardjito are in Class III
3. 70% of the patients come from Yogyakarta Province, the rest come from Central Java, west parts of East Java Province (Pacitan, Madiun), east part of West Java Province.
4. Why the patients don't go to the nearest hospitals:
  - The hospital has limited health care tools
  - Emergency condition and has to be handled by sub-specialist
  - RSUD only has specialists, not sub-specialists like RSUP Sardjito
  - RSUD has limited capacity
5. Transportation access from patient's house to the hospital:
  - Free facility from Jamkesmas/Askeskin
  - Free ambulance for emergency patients
  - Limited number of ambulance often become a serious problem when there are a lot of patients who need it
6. In 2006, there were overload number of patients (6000-7000 people) because of the earthquake. The hospital had a difficulty in handling them, so there were some additional medics and volunteer. The same condition also happened in private hospitals. They had to take care a lot of patients, including those with Jamkesmas/Askeskin. To overcome the problem, the local government gave cross subsidy for them through the public hospitals.
7. Why do people choose alternative/traditional medicine rather than visit the hospital?

- Because the doctor can't handle the patient/the disease anymore
  - Some of the patients' condition got worse after he/she had an alternative medicine.  
That's why his family take him the hospital
8. The poor still face a lot of problems in dealing with the administration/procedure of ASKESKIN although they have the letter
  9. Recently, The hospital implements stricter administration procedure for ASKESKIN/JAMKESMAS for there are a lot of divergences such as many moderate class or rich patients use this facility.
  10. There is no special or cheap transportation facility for the poor to go to the hospital
  11. There is an MOU between public hospital and the Department of Health to give service for the patients who have JAMKESMAS/ASKESKIN. Private hospitals should also take care of JAMKESMAS/ASKESKIN patients although they will refer them to public hospitals.
  12. Facilities of JAMKESMAS: Patients will get free health care service in the form of packages such as insurance products. The government will pay for the health care fee of poor patients to the hospital.
  13. Claims and financial management of JAMKESMAS/ASKESKIN program are performed under the supervision of Auction and State Inventory Office (KPKNL).
  14. Problems which generally occur in RSUP Sardjito:
    - Financial ability
    - Bed capacity
  15. JAMKESMAS/ASKESKIN patients will be placed in Class III of RSUP Sardjito.

## **G. Results sixth interview**

I interviewed ibu Diah Ayu Puspandari, management of the center for health financing, policy and health insurance, UGM. The questions were about the health care organization in the special region of Yogyakarta, the payment for primary health care and problems that occur in HC accessibility.

### **1. How is the Health Care organized in DIY?**

#### **a. What kind of facilities are present? (type of facility, type of treatment)**

Hospitals, Puskesmas, Puskesmas Pembantu, Puskesmas Keliling, Posyandu.

Puskesmas have the function of gatekeepers for the hospitals. People need a letter of referral before they can go to the hospital (unless in case of emergency). Referral exists in two types:

- The first type is referral to a hospital type B, C or D
- The second type is referral to a high class hospital A

Hospitals exist in different types: Umum (general) and Khusus (special): KIA, Bedah, Mata, Jiwa, THT etc. The hospitals also have different classes: A/B/C/D.

The four different classes are based on level of service. A has the highest level of service and Sarjito hospital is the only class A type hospital in DIY.

Standard facilities for all types are surgery, KIA, pediatric care and internal care. The level of severity that can be treated depends on the class of the hospital. Complicated surgery can only be performed in class B or even in class A hospitals.

Puskesmas pembantu is like a satellite of the Puskesmas, to increase physical accessibility. The facility is only open on a few days.

Puskesmas keliling consists of a movable facility, for example a car, wherein volunteers move to remote villages to do screening.

Posyandu is a community initiated information service on health care and prevention. Screening is part of it, but difficult for the often inexperienced nurses or midwives.

Poor people can only go to public hospitals, if they want to use Jamkesmas (or Jamkesos or Jamkesda). Sometimes a private hospital has a PPP and also gives service to the poor. (examples are Panti Rapih, Bethesda or Happyland)

### **2. Financial aspects of primary health care accessibility**

#### **a. What are the differences in costs for different kind of facilities? (status? Other criteria? Nonpoor/non rich: Average middle income. Which hospital?**

Poor people can use Jamkesmas, Jamkesos or Jamkesda. The different types have a purpose of safety net, when the poor people aren't covered by other insurances because of difficulties in the bureaucratic system.

Still, about 50% of the population is uninsured. They have to pay Out Of Pocket (OOP). Civil servants or other employees enjoy insurances by their employer.

Public hospitals are cheaper than private hospitals. The cost of private hospitals differs, often dependent on class.

3. Capacity

- a. International standards are 2 beds / 1000 people. Is this the same for Indonesia? Are these standards met?

These standards can also be used in Indonesia, although it is rare that this standard would be met. 1/1000 would be a better number.

- b. International standards indicate a 30-minute travel time to the hospital. How about this?

Should be met in Yogya, as the average distance to nearest hospital is 1-5 km.

- c. 1 Puskesmas in 120.000 people, Indonesian standard?

Yes.

4. In your opinion, what kind of problems occur in health care accessibility in DIY?

i. Capacity

Health workers, a HR problem. Midwives and nurses sometimes carry too much responsibility.

Also sometimes people are not referred because the local health care worker wants to be paid himself.

ii. Cost

Travel cost is not covered by any insurance, but it is quite important in the decision for the poor to go to the hospital.

iii. Transportation / access

Maybe in Gunung Kidul or Kulon Progo the access is not sufficient.

Another problem in her opinion is the awareness of health care seeking. Often people don't realize how important it is to be early to discover that you are ill. Accessibility and cost then are important factors not to go.

#### H. Indonesian assessment of social economic position

To determine who is poor, following criteria are used. Generally Indonesia divides her people into five socioeconomic classes.

- a. Pre-Prosperous Household (very poor), which is not able to meet one or more indicators that include:
    - 1) Economic Indicators: eat twice or more a day, have a different outfit for activities (e.g. at home, work / school and travel), the largest floor of the house is not ground.
    - 2) Non-Economic Indicators: practice their religion, if the child was sick, he/she is taken to health facilities.
  - b. 1<sup>st</sup> Welfare Household (poor). It is a household which, for economic reasons, can not meet one or more indicators include:
    - 1) Economic Indicators: at least once a week the family ate meat or fish or eggs, Last year the whole family get at least one new sets of clothes, house floor area at least 8 m<sup>2</sup> for each family member.
    - 2) Non-Economic Indicators: Doing their religion activities regularly, in healthy condition in the last three months, had a steady income, at the age 10 - 60 years they can read and write letters, at the age 6-15 years they go to school, having more than two children joined Family Planning (KB)
  - c. 2<sup>nd</sup> Welfare Household. It is the family, for economic reasons, can not meet one or more indicators include: a family savings, eating together and communicating, following society activities, taking a recreation together (every 6 months), increasing religious knowledge, getting news from newspapers , radio, TV, and magazines; using transportation.
  - d. 3<sup>rd</sup> Welfare Household. It was able to meet several indicators, including: a savings family, eating together and communicating, following society activities, taking a recreation together (every 6 months), increasing religious knowledge, getting news from newspapers, radio, television, and magazines; using the means of transportation. Not able to meet several indicators, including: Participate actively in giving material donation regularly; participate actively as a board of community organization.
- 3<sup>rd</sup> Welfare Household Plus. It was able to meet some indicators include: Participate actively in giving material donation regularly; participate actively as a board of community organization.

## **I. List of hospitals**

On the next few pages a complete overview of the hospital data is given.

nr	name	kabupaten	village	village_ID	type	pub_priv	beds	class
1	RSUD Kota Yogyakarta	Kota Yogyakarta	Sorosutan	3471040002	Umum	Public	140	B
2	RS Bethesda	Kota Yogyakarta	<a href="#">Kotabaru</a>	<a href="#">3471060004</a>	Umum	Private	360	B
3	RS Panti Rapih	Kota Yogyakarta	<a href="#">Terban</a>	<a href="#">3471060005</a>	Umum	Private	372	B
4	RS PKU Muhammadiyah	Kota Yogyakarta	Ngupasan	3471090002	Umum	Private	207	C
5	RSI Hidayatullah	Kota Yogyakarta	Pandeyan	3471040003	Umum	Private	91	D
6	RS Ludira Husada Tama	Kota Yogyakarta	Tegalrejo	3471140001	Umum	Private	31	D
7	RS DKT/RS Dr. Soetarto	Kota Yogyakarta	<a href="#">Kotabaru</a>	<a href="#">3471060004</a>	Umum	Public	65	C
8	Happy Land Medical Centre	Kota Yogyakarta	<a href="#">Muja muju</a>	<a href="#">3471040006</a>	Umum	Private	50	D
					Khusus			
9	RS Soedirman	Kota Yogyakarta	<a href="#">Muja muju</a>	<a href="#">3471040006</a>	Bedah	Private	12	C
10	RS DR. Yap	Kota Yogyakarta	<a href="#">Terban</a>	<a href="#">3471060005</a>	Khusus Mata	Private	54	C
11	RS Puri Nirmala	Kota Yogyakarta	Gunung ketur	3471080002	Khusus Jiwa	Private	40	D
	RS 45 (empat lima) prof.							
12	Ismangoen	Kota Yogyakarta	Patangpuluhan	3471110001	Khusus Anak	Private	50	D
13	RS Bhakti Ibu	Kota Yogyakarta	Wirogunan	3471030003	Khusus KIA	Private	36	D
14	RS Permata Bunda	Kota Yogyakarta	Prenggan	3471050001	Khusus KIA	Private	25	D
15	RS Sari Asih	Kota Yogyakarta	Brontokusuman	3471030001	Khusus THT	Private	45	D
16	RS PKU Kotagede	Kota Yogyakarta	Purbayan	3471050002	Khusus KIA	Private	25	D
17	RS Bethesda Lempuyangwangi	Kota Yogyakarta	Bausasran	3471070003	Khusus KIA	Private	65	D
1	RSUD Wonosari	Gunung Kidul	Wonosari	3403090010	Umum	Public	150	C
2	RS Pelita Husada	Gunung Kidul	Semanu	3403060005	Umum	Private	50	D
3	RS Nur Rohmah	Gunung Kidul	Bandung	3403100009	Umum	Private	50	D
	RSUD Panembahan Senopati							
1	Bantul	Bantul	<a href="#">Bantul</a>	<a href="#">3402070003</a>	Umum	Public	150	B
2	RS PKU Muhammadiyah Bantul	Bantul	<a href="#">Bantul</a>	<a href="#">3402070003</a>	Umum	Private	102	C
3	RS Patmasuri	Bantul	<a href="#">Panggung harjo</a>	<a href="#">3402140004</a>	Umum	Private	37	D
4	RS Santa Elisabeth	Bantul	Sumbermulyo	3402050003	Umum	Private	50	D
5	RS Dr. S Harjolutomo	Bantul	Banguntapan	3402130008	Umum	Private	32	D
6	RS Rajawali Citra	Bantul	Potorono	3402130006	Umum	Private	50	D



7	RS Rachma Husada	Bantul	Patalan	3402080001	Umum	Private	50	D
8	RSU Permata Husada	Bantul	Pleret	3402110002	Umum	Private	50	D
9	RSKIA Ummi Khasanah	Bantul	Bantul	3402070003	Khusus KIA Khusus	Private	25	D
10	RSKB Nur Hidayah	Bantul	Trimulyo	3402080004	Bedah Khusus	Private	12	C
11	RSKB Ringroad Selatan	Bantul	Panggung harjo	3402140004	Bedah	Private	12	C
1	RSUD Wates	Kulon Progo	Wates	3401020008	Umum	Public	200	C
2	RSU St Yusuf Boro RS PKU Muhammadiyah	Kulon Progo	Banjarasri	3401110002	Umum	Private	50	D
3	Nanggulan	Kulon Progo	Kembang	3401100006	Umum	Private	50	D
4	RS Rizki Amallia	Kulon Progo	Kali dengan	3401010005	Umum	Private	50	D
5	RS PKU Muhammadiyah Wates	Kulon Progo	Wates	3401020008	Umum	Private	50	D
6	RS Kharisma Paramedika	Kulon Progo	Wates	3401020008	Umum Khusus	Private	50	D
7	RSKB Rizki Amalia Medika	Kulon Progo	Bumirejo	3401050002	Bedah	Private	12	C
1	RSUP Dr. Sarjito	Sleman	Sinduadi	3404060005	Umum	Public	750	A
2	RSUD Prambanan	Sleman	Boko harjo	3404090006	Umum	Public	51	D
3	RSUD Sleman	Sleman	Sendangadi	3404060004	Umum	Public	146	B
4	RSU Lokapala	Sleman	Sinduadi	3404060005	Umum	Private	36	D
5	RSU Panti Baktiningsih	Sleman	Sendang mulyo	3404020001	Umum	Private	50	D
6	RS Panti Rini	Sleman	Taman martani	3404100003	Umum	Private	37	D
7	RS Panti Nugroho	Sleman	Purwo binangun	3404160001	Umum	Private	50	D
8	RS Bhayangkara	Sleman	Purwo martani	3404100001	Umum	Private	50	D
9	RS Jogja International Hospital	Sleman	Condong catur	3404070003	Umum	Private	96	B
10	RS At-Turots Al-Islamy	Sleman	Margoluwih	3404030001	Umum	Private	50	D
11	RS Islam Yogyakarta PDHI	Sleman	Purwo martani	3404100001	Umum	Private	50	D
12	RS Dharma	Sleman	Sendang tirta	3404080001	Umum	Private	50	D
13	RS Mitra Paramedika	Sleman	Wedomartani	3404110001	Umum	Private	50	D
14	RS Condong Catur	Sleman	Condong catur	3404070003	Umum	Private	50	D

15	RS Puri Husada	Sleman	Sari harjo	3404120001	Umum Khusus	Private	34	D
16	RSKB Annur	Sleman	Caturtunggal	3402060001	Bedah	Private	16	C
17	RS Gigi dan Mulut Prof.Dr.Sudomo	Sleman	Sinduadi	3404060005	Khusus Gigi	Private	10	D
18	RSKIA Sakina Idaman	Sleman	Sinduadi	3404060005	Khusus KIA	Private	25	C
19	RSKIA Sadewa	Sleman	Caturtunggal	3402060001	Khusus KIA	Private	25	B
20	RS Ghrasia	Sleman	Hargo binangun	3404160005	Khusus Jiwa	Public	300	A

sources:

- dines kesehatan kota yogyakarta
- health department kulon progo
- <http://geomedik.dephan.go.id/Geomedik/>
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<http://dinkes.jogjaprovo.go.id/index.php/cinforumahsakit/datarumahsakit/3.html>

Orange = missing data, so assumption

Blue = more than one hospital in one village