Maternal Health Inequality in West Java Province, Indonesia: A Macro and Micro Level Analysis

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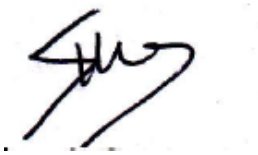
Declaration

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.



Teguh Sugiyarto 25 February 2016

Dedication

I dedicate this thesis to my father Achmad who passed away in my first year of candidature and my mother Gimah, my wife Erna Nurmawati and my children Dzakiyy Achmad Adikara and Danesh Syauqina Putri who have been always motivating me to finish my study.

Abstract

This study examines the levels and determinants of maternal health inequality in West Java, Indonesia. The data come mainly from the 2010 Indonesian Population Census and a household survey conducted in Bekasi and Indramayu districts from December 2012 to May 2013. The analysis is done at macro and micro levels. At the macro level, district is used as a unit analysis. A maternal health index is calculated by Factor Analysis of seven indicators of maternal health – maternal mortality ratio, female life expectancy at birth, total fertility rate, percentage of women marrying before age 17 years, percentage of women using effective contraception, percentage of births assisted by a doctor, and percentage of pregnancies receiving sufficient antenatal care. The Gini Ratio of maternal health index shows inequality across the districts of West Java. Education, urbanization and poverty have strong associations with the inequality. Further analysis, based on households as units of analysis shows that maternal death is clustered in the lower socio-economic status households. A decomposition of the concentration index reveals that education and age of the household head and household size account for 37.22% of the inequality in maternal health across households. At the micro level, this study analyses factors influencing the incidence of maternal deaths by comparing the characteristics of women surviving and dying from pregnancy and child birth. Five variables - women's involvement in decision making, education of the household head, women's health status prior to pregnancy and during delivery, and the number of children ever born are significantly associated with the incidence of maternal deaths. Until this stage, utilization of health care appears to have a weak association with maternal health. This anomaly is explainable by the low effectiveness of health seeking behaviour of the population in the research areas. By examining the process of candidacy to obtain health care, it is clear that the mere use of maternal health care services does not guarantee adequate care. The lack of adequacy of maternal healthcare stems from delays in deciding to seek care and getting the appropriate quality of care at the health facility. The lack of association of the healthcare utilisation with maternal health should not lead to the conclusion that healthcare is not important for women's health. Rather, it is more likely caused by the culture, health seeking behaviour and other local conditions which cannot ensure the provision of adequate care even when people are using health care facilities. This finding is supported by the low

availability and low quality of health care facilities which have adverse associations with maternal health status in Bekasi and Indramayu. An analysis of contextual factors shows the importance of the presence of health facilities in influencing appropriate health care behaviour and better maternal health status. Educational achievement of the population is associated with maternal health status. Women's education is linked to better reproductive and health status while education of household head influences better support for maternal healthcare and mediates the impact of women's involvement in decision making in influencing maternal health.

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Preface

It was in 30th of September 2009 when an earth quake hit West Sumatra Province with 7.6 magnitudes on the Richter scale and killed more than one thousand people. My wife and I belong to thousands of other people who could run away, avoiding a potential tsunami which might have come after the earth quake. When the earth quake occurred, my wife was admitted to a hospital due to problems with her pregnancy, but she and most of the patients and doctors left the hospital for fear of the possible tsunami. My biggest concern at that time was to ensure that my wife and the foetus in her womb were secure. However, after making sure that the tsunami was not going to come, we went back to the hospital. We got another surprise to find that only two doctors and a handful of patients had remained in the hospital, which by then was running without electricity. I talked to the doctors immediately about my wife's condition in detail and asked them to provide my wife with adequate care. I kept asking the health personnel to due attention to my wife and give her the right care. I did it because of our previous experience, when, during the first trimester of my wife's pregnancy a popular doctor asked my wife to have an abortion after only 5 minutes of examination. Her reason was that the foetus was not in a good condition and would not grow as a healthy baby. Since we are used to thinking critically, we went to two other doctors to obtain other opinions. From the second and third doctor we came to know the pregnancy did have complications. Then the doctors focused their treatment on curing my wife's complication. Thanks to God and the doctors who helped us to have a healthy baby and save the mother.

Thus, according to my own experience, I realise that accessing qualified care is not a simple thing. It is also apparent that utilising institutional health care is not a guarantee for obtaining the appropriate treatment, even when patient is in a well-known private hospital or is being assisted by a well-known doctor. Getting adequate care includes a patient's courage to inquire and ask for more detailed information on the care proposed by the medical staff. In addition, I am also concerned about the possible obstacles that other people face. These obstacles might stem from the fact that not all districts or regions have more than one specialist and it might not be

possible have a second opinion, not all people have the economic ability to do a required health check-up to determine their illness, not all districts having laboratories to perform the needed medical tests, or that some people still rely on traditional healthcare which might present harmful effects. In fact, the reality of healthcare is much below people's expectation, and people accept what is provided to them without asking any question because of their low education and economic constraints, which are major problems in Indonesia. Those people who have the ability for accessing the right medical care are rewarded with a better maternal health outcome. This has created enormous inequality in health and in maternal health in particular.

Another lesson I have learned is that ensuring women's health, especially during pregnancy needs the participation from, or involvement of people close to the women such as the husband, family members or others. During pregnancy and delivery, women have many constrains in mobility. Assistance from others is very crucial to ensure women's access the adequate care. The support is not only important to help women navigate the health system but also help them to have appropriate health behaviour.

Knowing the real situation, it is not surprising that Indonesia still has a high maternal mortality ratio (MMR) and has not achieved the millennium development goal on MMR reduction. Even the latest estimate of MMR from the Indonesian Demographic Health Survey 2012 indicates an increasing trend in MMR. Therefore, maternal health has remained a matter of attention for future development programs. This is the background had motivated me to conduct a research on inequalities in maternal health in West Java Province, Indonesia, for my PhD thesis.

Acronym

ANC	: Antenatal Care
BAPPENAS	: *Badan Perencanaan Pembangunan Nasional* (National Board for Development Planning)
BPS	: *Badan Pusat Statistik* (Central Board of Statistics/ Statistics Indonesia)
CHC	: Community health centre (*Puskesmas*)
CI	: Concentration Index
CSDH	: Commission on Social Determinants of Health
DALE	: Disability Adjusted Life Expectancy
EmOC	: Emergency of Obstetric Care
HDI	: Human Development Index
IDHS	: Indonesian Demographic Health Survey
IFLS	: Indonesian Family Life Survey
IUD	: Intrauterine Device (contraception)
IMR	: Infant Mortality Rate
MDG	: Millennium Development Goal
MoH	: Ministry of Health
MOP	: *Medis Operasi Pria* (Male Sterilization/Vasectomy)
MOW	: *Medis Operasi Wanita* (Female Sterilization/Tubectomy)
MMR	: Maternal Mortality Ratio
PRMR	: Pregnancy-Related Mortality Ratio
TBA	: Traditional Birth Attendant
TFR	: Total Fertility Rate
UNESCO	: United Nations Educational Scientific and Cultural Organization
UNFPA	: United Nations Population Fund
UNICEF	: United Nations Children's Fund
WHO	: World Health Organization

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CHAPTER ONE: Introduction

1.1 Background

Health equality has been a matter of international concern, discussed extensively over the last three decades. Health equity is defined as "the absence of unfair and avoidable or remediable differences in health among population groups defined socially, economically, demographically or geographically" (Solar & Irvin, 2010). The International Conference on Primary Healthcare, sponsored by WHO and UNICEF and held at Alma Ata in 1978, expressed "the need for urgent action by all governments, all health and development workers, and the world community to protect and promote the health of all the people of the world", made 10 declarations for the achievement of "Health for All by 2000". The second of these 10 declarations is notable for addressing inequities in health:

> The existing gross inequality in the health status of the people particularly between developed and developing countries as well as within countries is politically, socially and economically unacceptable and is, therefore, of common concern to all countries (WHO, 1978).

However, an article published in the Medical Journal of Australia by Hall and Taylor (Hall & Taylor, 2003), states several reasons for the failure to achieve "health for all by 2000" including the lack of political commitment to support the provision of primary health care and health sector reform resulting in the private sector taking responsibility to provide health care. Accordingly, access to health services which is stated as fundamental human right in the Alma-Ata declaration has not been enjoyed by all population groups.

Since 2000, health equity is still given a prominent place in the global development agenda. For example, in 2005, the WHO established the Commission on Social Determinants of Health (CSDH) to demonstrate its commitment to address health inequity and its implications for health outcomes of populations (Solar & Irvin, 2010). In their report, CSDH creates a conceptual framework to understand the pathway between socioeconomic status and health inequity. In the main, the framework shows that disadvantaged groups are more vulnerable and thus are exposed to undesirable health conditions through material circumstances, and

psychological, behavioural and biological factors (Baum & Fisher, 2011; Marmot & Wilkinson, 1999; Solar & Irvin, 2010).

Woodward and Kawachi (2000, pp. 924-9) argue for a total reduction of health inequity since it is unfair and affects everyone, while at the same time, it is avoidable via cost effective interventions giving priority or focus on the disadvantaged groups. Other scholars have also discussed this issue. For example, Sen (2002) states that health inequity should be the central concern in discussing social equity and justice. Poor health is seen as the human condition which most significantly affects human capabilities. Similarly, Anand (2002) mentions two reasons why health is so important, namely, that it is directly linked to a person's wellbeing and enables a person to pursue his/her objectives. Health is also regarded as a primary good which everyone must have an equal opportunity to possess under the principles of justice (Rawls, 1999).

However, economists are concerned about the price of implementing equity as a developmental approach (WHO, 2013). Woodward and Kawachi (2000) also mention two obstacles in judging the cost effectiveness of a policy to reduce socio-economic disparities in health. These obstacles arise from the rarity of evidence on cost effectiveness and an incomplete understanding of the mechanisms that cause health inequity resulting in insufficient information to decide on policies for appropriate interventions to reduce health inequity. From an economic perspective, the implementation of the equity approach must be supported by an assessment of the causal impact between determinants of health and health inequalities; the prioritisation of possible interventions and the appropriate role of government (Epstein et al., 2009).

Even though health equity has occupied an important place on the global development agenda, the inequalities in health continue to exist. In 2000, the year targeted at Alma Ata for the creation of Health for All, the WHO reported considerable disparities in health status across different countries of the world (WHO, 2000, pp. 176-82). The disability adjusted life expectancy (DALE) is an indicator that illustrates life expectancy without disability or in full health, and shows a large differentials gap between countries. Japan has the highest DALE at 74.5

years. In contrast, DALE is lower than this in many developing countries. For example, the DALE in Sierra Leone is only 25.9 years, the lowest among 191 member states of WHO. Indonesia's DALE is 59.7 years, which stands at the middle level of all WHO members.

Since health status differs significantly between countries, health inequality continues to be a matter for concern on the international stage. Health inequality figures prominently in several global development agendas, including the United Nations Millennium Development Goals (MDGs) (UN, 2000). One fundamental value in MDGs is that all people must be assured of benefitting from the development. This value is also concerned with eradicating unequal rights and providing opportunities across population groups.

As with disparities in general health across countries, differences exist in maternal health, both between countries and within countries. In 2013, more than 99% of maternal deaths were estimated to have occurred in developing countries and the maternal mortality ratio (MMR) was found to differ widely among countries and regions (WHO & UNICEF, 2014). While the developing region had an MMR of 230 maternal deaths per 100,000 live births, the developed regions had an MMR of only 16 maternal deaths per 100,000 live births, which is 14 times lower than that in the developing world. There are disparities in MMR within the developing region. For example, the highest MMR is found in Sub-Saharan Africa exhibiting an MMR of 510 maternal deaths per 100,000 live births, while in Eastern Asia, the MMR rate is 15 times lower than that of Sub-Saharan Africa (WHO & UNICEF, 2014). In Asia, disparity exists among countries or sub-regions. Southern Asia has the highest MMR (190 per 100,000 live births) and Eastern Asia has the lowest (33 per 100,000 live births). Similarly, inequality in MMR exists between countries. For example, in the South East Asian region, Singapore and Timor Leste have the lowest and highest figures at 9 and 270 per 100,000 live births, respectively. During the global campaign for the Millennium Development Goals in health, the Deputy Secretary-General of the United Nations stated that maternal mortality reflects the worst health inequality in the world (Migiro, 2009).

1.2 Health Inequality in Indonesia

Just as population health status varies between countries, there are also disparities in the rates of maternal mortality within countries. The same is true for Indonesia, which has 33 provinces, each consisting of several districts or municipal towns or cities. Furthermore, each district or municipal town/city consists of sub-districts or sub-municipalities respectively. Administratively, a district or a municipality represents the same level of government with the municipality being an administrative unit in the urban setting and the district an administrative unit in the rural setting. In a district, the lowest level of administration is a village. The Central Board of Statistics in Indonesia (BPS, 2010) divides a village into two categories, urban and rural. This division is based on a scoring system derived from information associated with a number of variables such as population size, percentage of the working age population engaged in agriculture and the number of public facilities. Rural areas present as less developed regions than urban areas.

Table 1. 1 Infant Mortality and Child Mortality by Place of Residence and Wealth Quintile, 2002/3 and 2007, Indonesia

Socio Economic background	Infant Mortality rate per 1,000 live births		Child Mortality Rate per 1,000 live births	
	2002/3	2007	2002/3	2007
Residence				
Rural	52	45	13	16
Urban	32	31	11	7
Wealth quintile				
Lowest	60	56	17	23
Second	51	47	15	12
Middle	44	33	12	12
Fourth	36	29	9	8
Highest	17	26	5	6

Source: (BPS & ORCMacro, 2003, 2008)

It is acknowledged that health inequality within a country can occur between regions such as provinces, districts, sub-districts and rural/urban areas or between different socio economic statuses in each region (Braveman & Tarimo, 2002; Fang et al.,

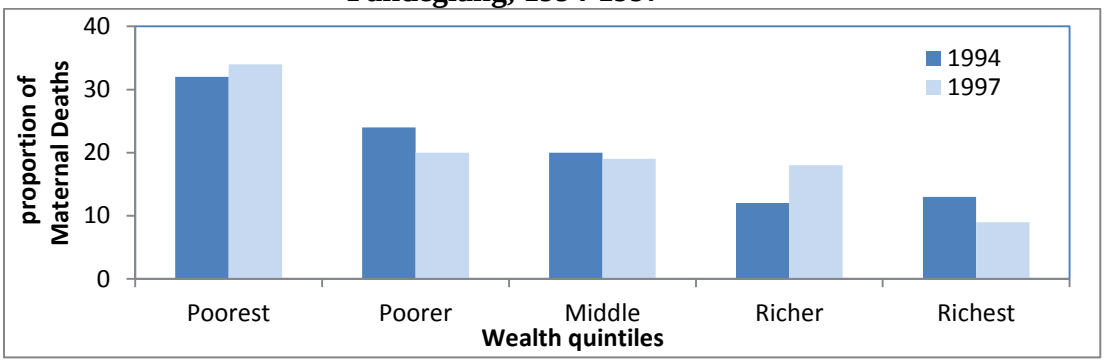
2010; Hosseinpoor et al., 2006; Marmot, 2007; Ng et al., 2010; Schellenberg et al., 2003; Suryadarma et al., 2006, p. 11; Tajik et al., 2011; Van de Poel, O'Donnell & Van Doorslaer, 2007). The presence of health inequality is revealed from the results of Indonesian Demographic Health Surveys. Table 1.1 below shows that population groups belonging to different types of locality and socio-economic classes have different health status with urban populations and higher wealth quintile groups exhibit better health status as indicated by their lower infant and child mortality rates.

Similar to other reported health outcomes between countries, maternal mortality ratios (MMR) differ at the sub-national level as well (Thomsen et al., 2011, pp. 178-9) and Indonesia is no exception to this. Therefore, while it might be true that the trend in national MMR indicates impressive progress in reducing maternal mortality in Indonesia, different population groups might not show the same extent of improvement and could be left behind in their endeavours to achieve better health for mothers. The latest data from the Ministry of Health in 2010 shows that the maternal mortality ratio (MMR) between provinces varies from slightly over 50 to more than 600 per 100,000 live births (Hernawati, 2011). Southeast Sulawesi has the highest level of MMR. Even though the statistics may be problematic in their accuracy since the input data comes from medical records in health facilities and thus prone to underreporting, this description shows that the gap of maternal mortality between provinces in Indonesia is considerable. The data also reveals that there were 11,534 maternal deaths in Indonesia in 2010. One half of these deaths are reported to have occurred in only five provinces, namely West Java, Central Java, East Nusa Tenggara, Banten and East Java. West Java has the largest proportion of maternal deaths compared with all provinces in Indonesia, amounting to nearly 20% which equates to 2,280 maternal deaths. However, the MMR in West Java is low compared to the majority of provinces in Indonesia.

Inequality in maternal mortality is also found to occur proportionately to economic status in Indonesia. Graham (2004, p. 25) found that the rate of maternal deaths was inversely related to socio-economic status. The poorest population had a higher number of maternal deaths constituting 32 % of total maternal deaths in 1994. This percentage was around 20 % higher than the wealthiest group. In 1997, the condition

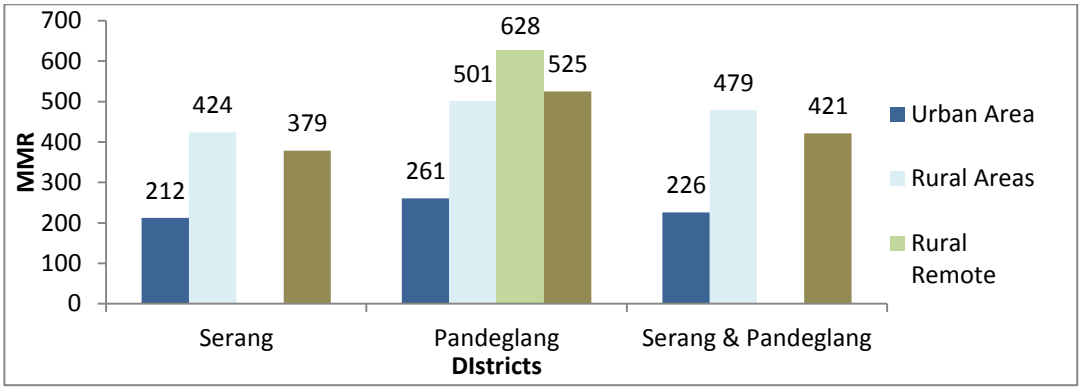
did not change. In terms of quantity, the number of reported maternal deaths decreased, however, the gaps between economic groups became bigger. The percentages of maternal deaths in the lowest and highest quintile of poverty in 1997 were 34 % and 9 %, respectively (Figure 1.1).

Figure 1. 1 Proportion of Maternal Deaths by Poverty Quartile in Serang and Pandeglang, 1994-1997



Source: Sources: IDHS 1994 & 1997 (Graham et al., 2004)

Figure 1. 2 MMR in Serang and Pandeglang based on Type of Residence, 2004 - 2006



Sources: (Ronsmans, Scott, Adisasmita, et al., 2009, p. 88; Ronsmans, Scott, Qomariyah, et al., 2009, p. 418)

Ronsmans, Scott, Qomariyah, et al. (2009) have also calculated MMR in Serang and Pandeglang according to wealth quartile. Their results revealed a large disparity in MMR between the poor and the wealthy populations. In the poorest group, the MMR was 706 per 100,000 live births, and in contrast the wealthiest population had an MMR of 232 per 100,000 live births. Another example of inequality in maternal mortality can be observed in Serang and Pandeglang, two districts in Banten province of Indonesia. Figure 1.2 shows that MMR differs significantly between urban, rural and rural remote areas in these two districts, with a rural remote area

being defined as an area which is more than 33 km away from the closest hospital (Ronsmans, Scott, Adisasmita, et al., 2009; Ronsmans, Scott, Qomariyah, et al., 2009). The MMR in rural areas of Pandeglang and Serang is two times higher than MMR in urban areas.

Inequalities in maternal mortality are also found to exist within the West Java province. For example, a study in West Java shows that the MMR differs considerably between the eight districts of this province (Soemantri, 1992, p. 92), with the lowest MMR of 360 per 100,000 live births found in Kuningan district and the highest MMR of 670 per 100,000 live births found in Bekasi district. Even at a comparatively high level, the disparity in MMR between the districts is rather striking, with the lowest MMR being nearly one half of the highest MMR. Such a large disparity in MMR between the districts of West Java indicates the state of maternal health in the province, because even though West Java as a whole appears to have made a reasonably good progress in reducing maternal mortality, the same cannot be said for all parts of the province.

Table 1. 2 Maternal Mortality Ratios in West Java Based on Previous Studies

Level of estimation	MMR	Time Reference	Method	Source
West Java (8 Regencies)	490	1977	Sisterhood (Indirect)	Budiarso (1991, cited in Iskandar et al 1996 p. 11)
Sukabumi (rural areas)	470	1982-3	Prospective	Budiarso (1989, cited in Iskandar et al 1996 p. 11)
Tanjungsari (rural areas)	490	1988-9	Prospective	Ngantung (1990, cited in Iskandar et al 1996 p. 11)
Kuningan	360	1977	Sisterhood (Indirect)	Budiarso (1991, cited in Iskandar et al 1996 p. 11)
Bandung (Medical record of a teaching hospital)	409	1977-80	Direct estimation	Chi et al (1981 p263)

Source: (Chi, Agoestina & Harbin, 1981, p. 263; Iskandar et al., 1996, p. 11)

West Java is an appropriate setting for a maternal mortality study for several reasons. First, it is the most populous province of Indonesia. According to the 2010 Population Census of Indonesia, 18.1 % of Indonesia's population lives in West Java. The population census also reveals that 16% of recorded maternal deaths during January 2009 to May 2010 occurred in West Java. This percentage denotes the largest number of maternal deaths in any province of the country, and differs significantly from the recorded 10.8% of maternal deaths in the second ranked province, East Java. Furthermore, several studies conducted in the 1970s and 1980s have shown the existence of differentials in MMR in West Java (Table 1.2). Even though the data presented in table 1.2 has some issues in accuracy of estimation, the MMR estimation still provides evidence of maternal mortality inequality in West Java province.

1.3 Addressing the Problems of Health Inequality in Indonesia

The Government of Indonesia has recognised health inequality as a matter of priority in its agenda for development (MoH, 2010b, p. 25). In order to achieve the objective of the national development program, the Ministry of Health, Government of Indonesia (MoH) has selected five core values as standard markers of development. These core values are: pro-community, inclusive, responsive, effective and accountable. Two out of these five core values in the Strategic Plan of the MoH explicitly deal with health inequity. The first core value is "proactive and pro-community" (*Pro Rakyat*), which requires all sections of the population, regardless of race, religion, economic status or other characteristics receive the benefits of development and achieve a high level of health status. The second core value is "responsive" which states that the development program must fit the needs of all population groups and should consider different conditions of the various social, cultural and regional groups. In addition, the strategic plan of MoH 2010-2014 mentions eight targets of the development program. These targets aim:

1) to increase health and nutritional status of the population,
2) to reduce the morbidity rate of communicable diseases,
3) to reduce the disparities in health status and malnutrition between regions, social status and gender,
4) to encourage a hygienic and healthy life style at the household level,
5) to increase the health budget especially aimed at the poor,

6) to increase the proportion of the population with healthy life styles and to provide adequate health personnel for poor regions, remote areas, borderline areas and islands,
7) to control the incidence of non-communicable diseases at provincial level, and
8) to encourage the implementation of standardised services at the district level.

Two of these eight targets, the third and the sixth, are clearly aimed at reducing health inequity.

The General Elections of 2014 brought a new political party to power in Indonesia. The new president, Joko Widodo, announced nine priorities for the national development agenda for 2015-2019, known as "NAWACITA" or nine wishes or objectives for the development plan. Included in the *Nawacita* is at least one priority for achieving equality, although this is not stated explicitly. More specific objectives in different sectors are enunciated separately by every ministry, including the Ministry of Health which has two main objectives:

1) to improve population health status, and
2) to increase the responsiveness and protection from social risk and financial burden (MoH, 2015).

The second objective focuses on improving government vigilance and providing optimal security for the population around social risk and financial burden. This aim is indirectly beneficial in diminishing inequality. A positive impact of achieving the second objective is increasing the resilience of vulnerable populations to face social changes and economic obstacles.

The strategic planning document from the Ministry of Health also recognizes the disparities in health status across regions and population groups in Indonesia and is considered as a challenge to improving people's health status. An awareness of the need to diminish the disparities illustrates that the government considers equality as one crucial aspect in achieving its development agenda. In addition, maternal health is a strategic issue for health development and reducing the maternal mortality ratio is stated as one indicator of population health status (MoH, 2015). Therefore, to

achieve the first goal, the government's pledge to improving maternal health is recognized as essential to population health.

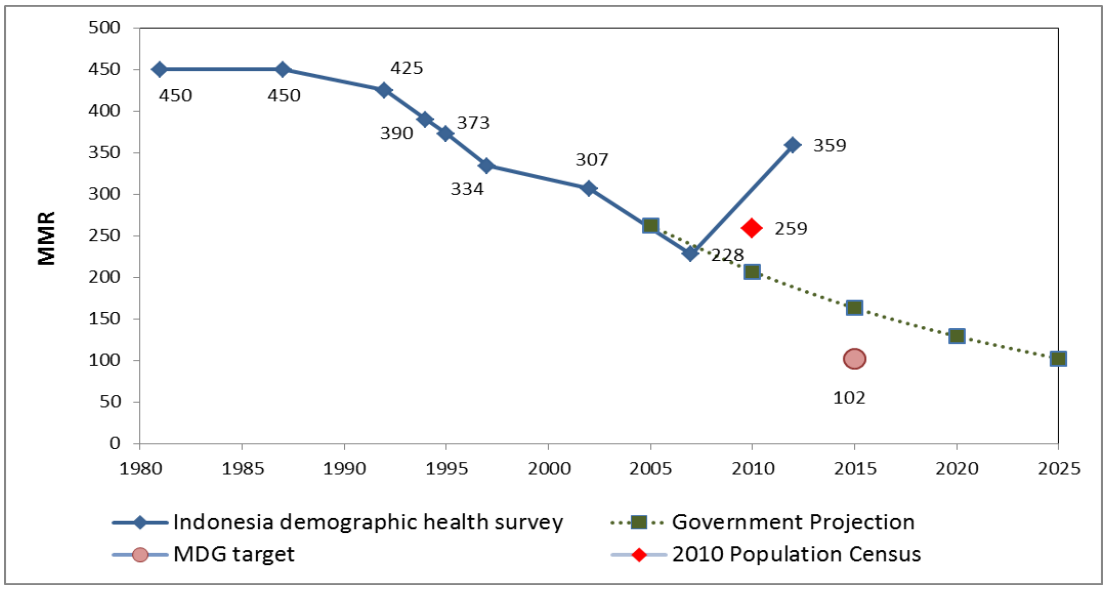
1.4 Research Problem

The Strategic Plan of the Ministry of Health, Government of Indonesia for 2010-2014 includes the reduction of maternal mortality as one indicator to improve the health status of the population (MoH, 2010b). The strategic plan for 2015-2019 also places reduction of maternal mortality as a target to be achieved (MoH, 2015). It shows that the government realizes the importance of improving maternal health. Decreasing maternal mortality rates would increase the wellbeing of not only women but also of children. Overall, this would lead to improved development outcomes for the community as well. Strategies that lead to improving maternal health have a direct link to other MDG goals such as poverty reduction, women's empowerment, child survival and a reduction in infectious diseases (Filippi et al., 2006). Improving maternal health reduces the devastating costs of emergency care associated with maternal death or loss of productivity of a household when women are incapacitated. Therefore, an emphasis on enhancing maternal health is beneficial in the eradication of poverty. Similarly, an improvement in women's health enables women to participate in productive activity and achieve higher education which is a good foundation for advancing women's empowerment.

The Strategic Plan of the Ministry of Health, Government of Indonesia 2010-2014, however, recognises that a potential problem may arise in achieving the maternal mortality reduction target (MoH, 2010b, p. 14). The problem lies in limited access to basic health care services in particular areas such as underdeveloped regions, outer islands of Indonesia, remote areas and border areas. A strong commitment would be needed to achieve the targeted reduction of the high level of maternal mortality in Indonesia. In 2000, the number of maternal deaths in Indonesia was estimated to be 10,000, making Indonesia one of the 13 countries which contributed to two-thirds of the total number of maternal deaths in the world (WHO, UNICEF & UNFPA, 2004). The situation had not changed much in eight years. Estimates for 2008 indicate that Indonesia is among the 11 countries which contribute to 65% of the total number of maternal deaths in the world (WHO et al., 2010). The maternal mortality ratio (MMR) in Indonesia has declined slowly since 1980 as can be seen in Figure 1.3,

even though the reduction from 450 to 307 per 100,000 live births between 1980 and 2003 can be considered to be quite significant. The slow reduction in maternal mortality implied by these ratios does not augur well for achieving Indonesia's Millennium Development Goal 5 by 2015 (Faizal, 2012). The projected MMR shows that the MDG target of 102 will be achieved only at the end of 2025, ten years after the targeted date.

Figure 1. 3 Maternal Mortality Ratio: Estimates and Projections 1980-2025, Indonesia



Source: (BAPPENAS, 2007, p. 8; Soemantri, 2014)

The Indonesia Demographic Health Survey of 2012 produced a new estimate of MMR for Indonesia, which is 359 maternal deaths per 100,000 live births in 2012 (BPS et al., 2013). This implies an increase in maternal mortality because the estimated MMR from the Indonesia Demographic and Health Survey of 2007 is 228 per 100,000 live births. This unexpected trend has attracted a great deal of attention from government and health practitioners and the apparent rise in the MMR has been hotly debated in the general community and in national newspapers. Some experts argue that the new estimate of MMR should not be compared with the previous estimates because of different approaches in data collection and method of estimation.

Another data source to calculate MMR is the 2010 Population Census. Statistic Indonesia estimated the MMR for Indonesia at 259 maternal deaths per 100,000 live births. However, a very detailed analysis of the data concluded that the MMR in Indonesia was most likely to be above 300 per 100,000 live births (Soemantri, 2014). This conclusion is based on a comparison of several estimates which vary from 316 to 366 per 100,000 live births. Hull (2014) mentions that "the outputs of numerous efforts to estimate MMR have been confusing for policy makers, embarrassing for statisticians and challenging for analysts". However, notwithstanding these variations, MMR is still high in Indonesia which indicates a poor state of maternal health in the country.

The foregoing discussions show that maternal health is one of the main health issues in Indonesia. Improvements in maternal health is a matter for concern for the government, but unfortunately governmental efforts to date have not facilitated the fast reduction of MMR required for meeting the Millennium Development Goal 5 (MDG 5) for Indonesia, due to the decline in MMR being slower than required. Additionally, national surveys and previous studies have indicated that large disparities in maternal health exist in Indonesia. Two main factors namely, economic status and place of residence are worthy of note. The economic gradient in the community is associated with maternal health inequality. Moreover, many health determinants, such as the availability of health facilities in terms of quantity, quality and accessibility of health services are embedded in the place of residence. In addition, different places may also have diverse social norms and cultures that may affect health status directly.

The factors discussed above affecting Indonesia are also true for the province of West Java. Previous studies (Chi, Agoestina & Harbin, 1981; Soemantri, 1992) cited above strongly indicate the presence of maternal health inequity between regions of the province. The level of MMR in some districts of West Java is higher than that in Indonesia. Therefore, although the MDGs do not have explicit goals for reducing inequalities in health and mortality, minimising the differentials in MMR would certainly help facilitate a reduction in the overall MMR of the province and would go a long way towards reaching the MDG 5 target of a 75% reduction in the MMR. Considering these points, this research aims to identify the extent of maternal

health inequality in West Java and identify the determinants of maternal health inequality across regions and socio economic status in West Java.

West Java province consists of 26 districts or municipalities. At the macro level analysis, the regional condition of those districts will be discussed to reveal determinants of regional disparity. At micro level analysis, it is difficult to cover all regions in the analysis. Therefore, this study only chooses two districts to analyse the impact of individual characteristic and regional conditions which influence maternal health inequality. Bekasi and Indramayu have been chosen as research areas. Bekasi, which has border with the Indonesian capital city, Jakarta, represents the developed region. Bekasi has high gross domestic regional revenue from modern sector like industries and services. In contrast, Indramayu depends on the agricultural sector. The gaps in economic development are proportionate to the population's health status and hence require more analysis.

1.5 Justification for this Study

Inequalities in maternal mortality ratio in Indonesia point to the fact that population in different regions or groups such as socio economic status do not receive equal benefits from developments in health. As noted above, the existence of differentials presents a major obstacle in the effort to reduce of maternal mortality rates quickly, and calls for the adoption of appropriate strategies to achieve this reduction. In order to find the best strategy, a comprehensive knowledge of the determinants of the maternal mortality ratio and maternal health outcomes is needed.

Little is known about inequalities in maternal health in Indonesia, as research presented so far covers only a fraction of what needs to be known in terms of the determinants of these differentials. A study on maternal health differentials has two advantages. Firstly, it can identify the disadvantaged groups within various geographical regions and socio economic status. This knowledge will be useful for setting health priorities (Graham et al., 2008). Secondly, this research can highlight the determinants of maternal health inequality. Information regarding the determinants of health inequalities is useful to understand the particular needs of the different groups (Asamoah et al., 2011)

1.6 Research Question

Based on the background discussion above, the proposed research has the following general research question:

What is the extent of maternal health inequality across the districts and socioeconomic groups in West Java and what are their determinants?

The specific research questions are as follows:

1. What is the extent of maternal health disparity between the districts of West Java?
2. What are the regional characteristics which influence maternal health inequality in West Java?
3. What is the extent of inequality in maternal mortality between the households of West Java according to socio-economic groups and which socio-economic characteristics of the households influence such inequality?
4. What is the mechanism by which the socio-economic characteristics identified above influence maternal health inequality in West Java?
5. What is the most effective strategy to reduce maternal health inequality in Indonesia?

1.7 Objectives of this Research

The main objective of this study is to find out the extent and determinants of maternal health inequality across the districts and socio economic groups of West Java. The specific objectives of the study are as follows:

1. To measure the extent of maternal health inequality in West Java. This objective will be fulfilled by calculating pregnancy-related mortality (PRMR) per district and municipality in West Java from data collected at the 2010 Population Census of Indonesia followed by the calculation of Gini index of maternal health status.
2. To find out the underlying factors which are responsible for maternal health inequality between districts/municipalities.
3. To calculate the concentration index of the incidence of maternal mortality based on economic status of households.
4. To identify the determinants of maternal mortality inequality at the household level by decomposing the concentration index.

5. To analyse factors such as material circumstances, health status and behavioural factors, which may be linked with maternal health.
6. To provide recommendations for policy and further research based on the above analysis.

1.8 Outline of the Study

This thesis consists of ten chapters. **The first chapter** deals with introduction and background of the research problem, the rationale of the study, research questions, research objectives and the outline of the study. **The second chapter** explains the methodology applied in this thesis to achieve the objectives of the research. This chapter describes the methods used in this research, such as the concepts and definitions of the variables, data sources, sampling design and the statistical technique applied in the research. **The third chapter** contains a review of relevant literature to provide a theoretical foundation for this research. An extensive range of literature is covered to ensure that the latest knowledge related to the topic has been considered. In this context, the material included covers previous maternal health studies, the concept of health inequality and the determinants of health. **Chapter Four** discusses maternal health in West Java at the district level. It describes the magnitude of maternal health inequality between districts and explains their determinants. **Chapter Five** discusses maternal mortality inequality across socioeconomic groups of households and identifies those household characteristics which influence these inequalities. **Chapter Six** discusses individual characteristics which influence maternal mortality. The discussion is focused on the results of case control studies of women who died from, and who survived their delivery. **Chapter Seven** discusses the provision of health services in Bekasi and Indramayu, the two districts selected for this research. This chapter also provides an analysis of the impact of health services to influence the determinants of maternal deaths. **Chapter Eight** contains a discussion of the results of a qualitative analysis to understand the underlying factors affecting health seeking behaviour in the research areas. This discussion is also important for understanding the determinants of maternal death. **Chapter Nine** focuses on the impact of regional conditions in shaping maternal health status. The last chapter, **Chapter Ten** contains a summary of the study and recommendations for policy and further research.

CHAPTER TWO: Methodology

2.1 Introduction

Both primary and secondary data have been used in this thesis. The secondary data have been used mainly to examine the differentials in maternal health according to administrative area and analyse their determinants. The indicators for maternal health used in this analysis include maternal mortality ratio, total fertility rate and contraceptive prevalence rate. The indicators are taken mostly from published official data, but maternal mortality ratio is calculated based from the database of the 2010 Indonesian Population Census. The primary data have been collected by interviewing selected respondents in the districts of Bekasi and Indramayu of West Java province to enrich the analysis, and consist of both quantitative and qualitative aspects of the subject that are not available in secondary data. A summary of the data sources is given in Table 2.6.

2.2 Secondary Data Analysis

2.2.1 Population Census 2010

The main data source for secondary data analysis is the Indonesia Population Census of 2010. In Indonesia, a population census is conducted in every ten years to provide basic data on population and related characteristics. It is becomes one of the most important data sources for many purposes until the next census. The Population Census 2010 is the sixth population census in Indonesia and covers the entire country and its 33 provinces, 497 districts, 6,651 sub-districts and 77,126 villages. The population census 2010 becomes the fifth population census which is able to provide data for the whole country because the population census 1961 only processed a few provinces. The census was conducted during 1-31 May 2010 including the census night on 15th May to count population who have not permanent settlement like homeless or ship's crew.

In the 2010 population census, several questionnaires were used to collect the required data. Two types of questioners were used as the main instruments to collect population data (i) SP2010-L1 which was used for listing the households in each census block. This questionnaire produced information about the number of

buildings/houses, the number of households and the total number of person comprising each household, and (ii) SP2010-C1, which produced detailed information about individual characteristics of the persons in each household. SP2010-C1 consists of four blocks, with each block producing information with specific focus such as identity and list of household members, their individual characteristics, mortality in the household and housing condition.

Compared to previous censuses, the 2010 Population Census had a richer content in that it collected data on maternal deaths in the household. Block III of SP2010-C1 focused on gathering information about the occurrence of deaths in the household. Every death occurring in the household during the reference period, 1 January 2009 to 31 May 2010 was recorded, and for every death that occurred in the reference period, information was collected about the sex of the deceased, month and year of death and age of the deceased at the death. If the death was that of a woman aged more than 10 years, the following additional questions were asked: "Did she die during pregnancy, delivery or within two months after delivery?". If the answer to this question was 'yes', then the respondent was asked to specify the timing of death such as: during pregnancy, during delivery or within two months after delivery. If the timing of the woman's death was any one of these three, then such a death was classified as maternal death.

In Indonesia, the population census is conducted by deploying enumerators whose main task to visit the households door to door. More than 100,000 enumerators are needed to conduct the population census. Statistics Indonesia (BPS) organises training to ensure the recruited enumerator has sufficient capability to perform his job. The enumerators have to fulfil some requirement like minimum age and education level to be recruited. However, some regions, usually in remote areas, do not have enough human resources and as a consequence the recruitment process does not follow standard procedure in some areas. This condition presents several potential problems for ensuring the data quality of population census. The problem may come from the lack ability to understand the concept and definition of variable collected in census and low quality of hand writing. The first problem can cause misclassification and underreporting data while the latter presents enormous errors during the process of capturing data in the questionnaire using scanner. BPS

understands the potential problems which may occur during data collection, therefore BPS also sets up a monitoring system during fieldwork and data processing such as regular supervision, editing and validation of data entry but these procedures cannot guaranty that the data are without errors.

In the initial tabulation of the data from the 2010 Population Census, it is indicated that maternal mortality data have two types of errors - inclusion errors and exclusion errors (BPS, 2012). Inclusion error refers to those deaths which are not due to maternal mortality but recorded as deaths due to maternal mortality. On the other hand, exclusion error refers to those maternal deaths that may not have been recorded in the census, but should have been included. In order to improve the quality of maternal mortality data, Statistics Indonesia, which is in charge of conducting the census, conducted a verification of maternal mortality data with the objective of reducing the inclusion and exclusion errors. The verification was run in December 2010, which is six or seven months after the enumeration.

The verification focused on four groups of households counted in the census, namely 1) households with maternal deaths, 2) households where a woman or women aged 10-49 years died during the reference period mentioned above, 3) households where a man aged 15-64 years was a widower, and 4) households where there are infants (aged less than one year) without a married woman as a household member. The first and second groups of households were verified to assess the previous classification of maternal deaths to reduce inclusion errors, while the third and the fourth group of households was verified to reduce the exclusion errors. The verification resulted in a considerable revision of the recorded number of maternal deaths. Thus, while the initial number of maternal deaths for the whole of Indonesia was recorded as 13,956 the revised figure was 8,437 cases. The reduction is mostly because of miss-classification and miss-identification of maternal deaths (BPS, 2012). This study used data which had been verified.

2.2.2 Pregnancy Related Mortality as a Measure of Maternal Health

Maternal mortality can be categorized as maternal death or pregnancy-related death. This research uses pregnancy-related deaths to indicate the maternal mortality. A pregnancy-related death is defined as “the death of a woman while pregnant or

within 42 days of termination of pregnancy, irrespective of cause", while a maternal death is defined as "the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes" (WHO, 1993, p. 99). Garenne (2011, p 238) mentions pregnancy related mortality as a demographic definition of maternal mortality. This measurement is also widely applied to indicate the maternal health (Hill, Stanton & Gupta, 2001, p. 3; Stanton, Abderrahim & Hill, 1997, p. 1). It is also the concept used by the Demographic and Health Surveys (DHS) to estimate MMR. This thesis aims to obtain pregnancy-related mortality ratio (PRMR) in each district of West Java then use the results to examine the inequalities in maternal health across the districts of West Java. PRMR has been estimated by using the method developed by Hill (BPS, 2012; Hill, Stanton & Gupta, 2001). Data needed for estimating PRMR by this method are as follows:

a. Population by sex and age group from two consecutive censuses
b. Number of deaths by sex and age group from the newest census
c. Number of live births during the last 12 months by mother's age from two consecutive censuses
d. Number of women's death during pregnancy, delivery and postpartum period by age group
e. Number of children ever born classified by mother's age group from two consecutive censuses

Table 2. 1 UN Index for West Java 2010

				Analysis Sex ratio		Age Ratio			
						Male		Female	
Age group	Male	Female	Total	Sex ratio	Deviation	Ratio	Deviation	Ratio	Deviation
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
0 - 4	2,119,969	2,004,666	4,124,635	105.75					
5 - 9	2,207,317	2,083,318	4,290,635	105.95	-0.20	103.47	3.47	103.09	3.09
10 - 14	2,146,506	2,037,114	4,183,620	105.37	0.58	102.88	2.88	102.68	2.68
15 - 19	1,965,450	1,884,478	3,849,928	104.30	1.07	98.93	-1.07	98.57	-1.43
20 - 24	1,826,776	1,786,560	3,613,336	102.25	2.05	92.40	-7.60	93.41	-6.59
25 - 29	1,988,660	1,940,773	3,929,433	102.47	-0.22	108.16	8.16	107.98	7.98
30 - 34	1,850,314	1,808,273	3,658,587	102.32	0.14	98.75	-1.25	99.95	-0.05
35 - 39	1,758,987	1,677,663	3,436,650	104.85	-2.52	104.26	4.26	103.03	3.03
40 - 44	1,523,829	1,448,269	2,972,098	105.22	-0.37	100.75	0.75	100.26	0.26
45 - 49	1,266,133	1,211,306	2,477,439	104.53	0.69	99.03	-0.97	100.01	0.01
50 - 54	1,033,134	974,059	2,007,193	106.06	-1.54	100.86	0.86	102.20	2.20
55 - 59	782,426	694,815	1,477,241	112.61	-6.54	100.87	0.87	92.08	-7.92
60 - 64	518,274	535,028	1,053,302	96.87	15.74	88.00	-12.00	96.63	-3.37
65 - 69	395,450	412,577	808,027	95.85	1.02	101.69	1.69	98.06	-1.94
70 - 74	259,459	306,450	565,909	84.67	11.18				
Absolute total	21,642,684	20,805,349	42,448,033		43.87		45.84		40.56
Average					3.13		3.53		3.12
Indek UN	16.05								

Source: raw data SP2010

To calculate PRMR, the input data (a to e above), recorded at the census are first adjusted. Data on deaths are adjusted by using General Growth Balanced Method (GGB), Synthetic Extinct Generation (SEG) and Adjusted SEG and data on births are evaluated and adjusted by using Brass Parity Ratio method (BPS, 2012; Hill, Stanton & Gupta, 2001)The adjusted data on births and deaths are used as inputs for PRMR calculation. The details of these methods are given in Appendix 1.

Both GGB and SEG methods applied require certain assumptions such as there is no influence of migration, there is homogenous coverage of the population and death by age and there is a high quality of age reporting (Hill, You & Choi, 2009). One measurement to know the quality of age and sex data report is UN index (Siegel, Swanson & Shryock, 2004). This index uses the deviation of sex ratio between two consecutive of age group and the deviation from 100 of age ratio to determine the accuracy of data. The result can be categorized as accurate data if the value of UN index is less than 20. For index between 20 t0 40 and more than 40 called as inaccurate and highly inaccurate. Since the calculation of UN index for West Java province is 16.05 or less than 20 so the age reporting from 2010 population census in West Java categorized as accurate.

Hill et all (2009b) also mention the other assumptions applied for SEG methods. The SEG method considers that the coverage of the population is the same over time. To avoid any emerging problem in case this assumption is not met, Hill et all (2009b) suggest to combine GGB and SEG to evaluate the data on deaths. The process includes deploying GGB to estimate the coverage changes and adjust the data, then use SEG to evaluate the completeness of death data. The present study uses the average of three methods to adjust data on deaths.

The Brass Pi/Fi ratio method is used for estimating the adjusted number of births (Hill, Stanton & Gupta, 2001). Pi is average parity in age group i. Fi is lifetime fertility rate equivalent for age groups i. It can be calculated by using equation (1). The data input is fi, age specific fertility rate. Then the adjustment factor for birth data is in equation (2).

$$F_i = (5 \sum f_j) + 3{,}392\, f_i - 0.392\, f_{i+1} \quad (1)$$

$$P/F^{current} = P_2/F_2 - (P_3/F_3 - P_2/F_2) \quad (2)$$

The adjustment factor is obtained from the average of P/F ratio from women age 20 to 44. An example of the adjustment is given in Appendix 2.

Finally, all data that have been evaluated and adjusted are used for calculating PRMR. The adjustment of the data on deaths considers these three different methods. The average of these three methods will be used as data input to calculate maternal mortality.

$$PRMR = (\text{Adj. pregnancy related death/adj. live births}) * 100{,}000 \quad (3)$$

2.2.3 Calculation of Gini Index

The Gini index deals with the concept of inequality, and although it is most often used in measuring inequalities in income, it is used for measuring inequalities in health or spatial distribution of the population (Rowland, 2003)In the present study the Gini index has been used for measuring the inequality in maternal health among the districts of West Java province. This method is a replication of a previous study of health inequality in China (Arokiasamy & Pradhan, 2011; Fang et al., 2010). Maternal health status is represented by a few selected variables. The input data consist of: a) Pregnancy related mortality ratio; b) Female life expectancy at birth; c) Total fertility rate per woman; d) Percentage of women married before age 17 years; e) percentage of women using effective contraception, namely intra-uterine device (IUD), Implants and female sterilisation known in Indonesia as *medis operasi wanita* (MOW); f) percentage births assisted by a doctor and g) percentage pregnancies getting sufficient antenatal care, i.e., the percentage of pregnant women who had an ante-natal check at least four times during their pregnancy.

To calculate the Gini Index, firstly a composite index of health (F) is created from the seven variables mentioned above, with weights assigned to each variable. The determination of the weights is done by principal component analysis (PCA), which is a statistical tool for obtaining factor score coefficients (weights) for each variable (Fang et al., 2010).

The composite index is calculated as follow. There are i components as result of PCA; i = 1, …, n. This component is built from 7 variables, j = 1, 2, …,7. Factor

score for every component, Fi, is a summation of multiplication between factor score coefficient (C) and value of health indicator (H). Then the composite index is total factor score which is weighted by percentage of explained variability.

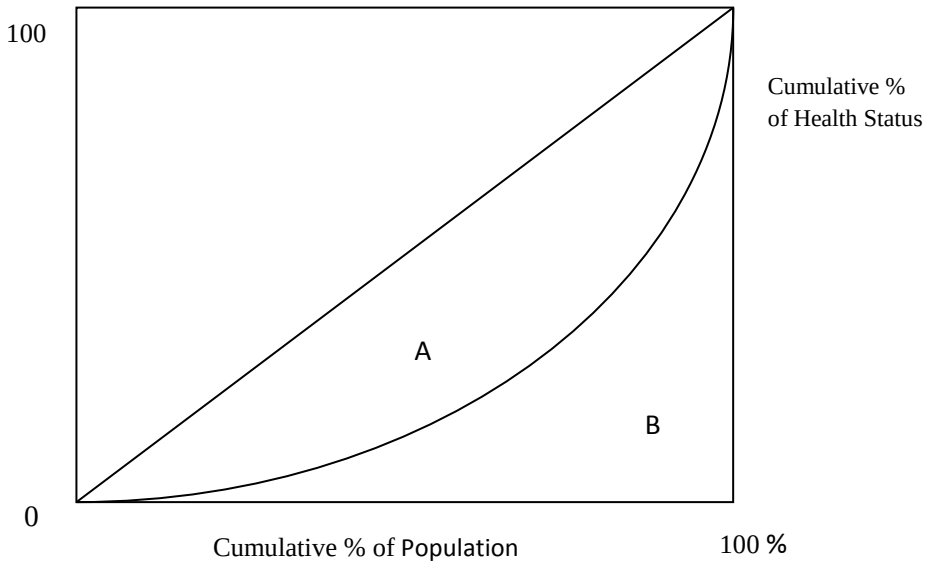
$$F_i = \sum C_{ij} H_j \quad (4)$$

$$F = \sum V_i F_i \quad (5)$$

$$Gini = [\ 1 + \sum FnPn - 2 \sum (\sum Pn)'Fn\ ] \quad (6)$$

To estimate the degree of maternal health inequality, the value of F is used as input data in the calculation of the Gini coefficient. The Gini coefficient assesses the distribution of population based on the index of maternal health status (F), and makes it possible to find out whether the population is clustered in one level of F or distributed evenly over the different levels. Graphically, this distribution is represented by the Lorenz curve (Figure 2.1). If there was a perfectly uniform distribution of the population according to health status, then the Lorenz graph would be situated along the diagonal shown in Figure 2.1. But in the present case, the graph would more likely be situated on the curved line shown in the figure. The extent of inequality is given by the proportion of the area under the Lorenz curve. If the area under the Lorenz curve is given by A and the area under perfect equality is given by B, then the Gini coefficient is equal to A/(A+B). The equation to calculate Gini index can be seen above. Fn is the percentage of the factor score in the sum of all regional score. Pn is the percentage of the regional population in the total population and (Pn)' is the cumulative Pn.

Figure 2. 1 Lorenz Curve



2.2.4 Determinants of Maternal Health Inequality across the Districts

After establishing the existence of inequalities in maternal health among the districts of West Java, it would be pertinent to find out why these inequalities occur. This is done by conducting a multivariate statistical analysis of the determinants of maternal health inequality across the districts of West Java. The regional (macro) characteristics which may determine maternal health status are socioeconomic status of the households, health resources and utilisation of health services (Fang et al., 2010). Each characteristic comprises several variables. Since the aim is to find out the correlation between two sets of variables, i.e. maternal health status (Y) and regional condition (X), canonical correlation analysis (CCA) is the appropriate tool to be applied (Tabachnick & Fidell, 2007). This study uses a set variable to indicate maternal health status at the district level, while the regional characteristics that may be related to maternal health status are represented by two sets variables which comprise the socio economic characteristics and health resources at the district level. The details of the variables can be seen in the Table 2.2.

Canonical correlation analysis (CCA) examines the canonical relationship of maternal health status variables (Y) with socioeconomic status variables (X1) and health resources variables (X2). The general equation of canonical correlation matrix is given by:

$$R = (R_{yy})^{-1}R_{yx}\,(R_{xx})^{-1}R_{xy} \qquad (7)$$

where, Ryy is the correlation matrix of the dependent variables, Rxx is the correlation matrix of the independent variables, and Ryx and Rxy are the correlation matrices comprising the dependent and independent variables (Rxy and Ryx) (Tabachnick & Fidell, 2007).

CCA may provide more than one pair (dimension) of significant canonical variate. The first pair gives the highest canonical correlation. The possible number of pair provided by CCA between two set variables is as many as the number variables in a smaller set. A rule of thumb to consider one dimension is included in analysis is that the canonical correlation is 0.30 or higher which is equivalent to 0.10 variant (Garson, 2012a)

Table 2. 2 Selected variables for Canonical Correlation Analysis

	Variables	Source	Year
Maternal Health Status (Y)	Maternal Mortality Ratio	SP	2010
	Female life expectancy at birth	SP	2010
	Total Fertility Rate	SP	2010
	Percentage women married before 17 years old	SSN	2010
	Percentage women using effective contraception	SSN	2010
	Percentage birth assisted by doctor	SSN	2010
	Percentage pregnancy get sufficient antenatal care	JBDA	2010
Socio economic status (X1)	Percentage of rural population	SP	2010
	Percentage of labour force in agriculture	SAK	2010
	Unemployment rate	SAK	2010
	GDP per capita at constant price	PDRB	2010
	Percentage of poor people	SSN	2010
	GDP growth	PDRB	2010
	Literacy rate for population >= 15 year	SSN	2010
	Mean year schooling	IPM	2010
Health resources (X2)	Percentage of desa/kelurahan having hospital	Podes	2011
	Percentage of desa/kelurahan having birth clinic	Podes	2011
	Percentage of desa/kelurahan having private midwife	Podes	2011
	Number midwife per 100,000 population	Podes	2011
	Number doctor per 100,000 population	Podes	2011
	Percentage of household expenditure for health	SSN	2010
	Percentage of regional budged for health sector	DJPK	2010
	Budged for health sector per capita	DJPK	2010

Note:

SSN(Susenas) = National Socio Economic Survey SP = Population Census
PDRB = Regional Domestic Product SAK = Labour Force Survey
IPM = Human development Index JBDA = West Java in Figures
Podes = Village Potential Survey
DJPK = Direktorat Jendral Perimbangan Keuangan

Wilk's lambda statistical test is the most common test to evaluate the significant of model in general or overall (Garson, 2012a), while univariate F test is used to assess the significance of individual variable in the model. Garson (2012a) also mentions another measure, the percentage of variant in dependent variables explained by one canonical variate, can be deployed to exam the goodness of fit canonical variate. In addition, the percent of covariance in the dependent variables explained in each

independent variable, which is commonly called as redundancy coefficient, indicates the ability of independent canonical variate to predict the value of the dependent variables.

2.2.4 Inequalities in Maternal Health at the Household Level

For this analysis, the 2010 Population Census data are used as input. The calculations involve three steps as follows:

1. The first step is to build the wealth index and classify the households into five groups namely, poorest, poor, middle class, rich and richest by using Principal Components Analysis or PCA (Vyas & Kumaranayake, 2006). The wealth index is represented by housing condition and the economic sector of work of the head of the household[1]. The housing condition is indicated by source of drinking water, floor material, and the availability of toilet and electricity. The economic sector of work of the head of the household indicates whether the household head is unemployed or works in agriculture, manufacturing/industries, hotel/trade, transportation/communication or services. The general principle of PCA is to reduce the number of variables by grouping them into a smaller number of factors comprising variables with similar dimension, without loss of information (Vyas & Kumaranayake, 2006). Each factor is a weighted linear combination of the given variables. If *n* is the number of variables namely x1, x2, x3, ...,xn, then PCA would group these variables into *m* uncorrelated components. The number of *m* can be decided by eigenvalues or described percentage variability (Garson, 2012d). The first component is assumed to depict the economic status of households (Houweling, Kunst & Mackenbach, 2003; Vyas & Kumaranayake, 2006). The wealth index is measured by using factor score from the first component as weight for each variable. A negative score of the index denotes low economic status and a positive value denotes high economic status. Every household will have a wealth index based on the factor score of each variable. Then it will be used to categorize the households into five different wealth index groups.

[1] Occupation of the household head would perhaps be a better indicator of household wealth index, but data on occupation were not collected at the census. Therefore, information on economic sector is used.

2. The second step is to estimate the degree of maternal health inequality at the household level by calculating the concentration index. The concentration index is measured by twice the area between the concentration curve and the diagonal line of equality (Wagstaff, van Doorslaer & Watanabe, 2003; Zere et al., 2011). Mathematically, it can be represented by equation (8) below. The concentration index, C, varies from -1 to +1. A negative value of the concentration index refers to an inequality which is bad for the poor since this group has the higher incidence of mortality or morbidity. In this study, y_i is pregnancy related mortality in a household. The mean of y_i is represented by μ. R_i is the rank of households i based on wealth index.
3. The third step involves the decomposition of the concentration index based on the determinants of inequality in maternal deaths in households (Wagstaff, van Doorslaer & Watanabe, 2003; Zere et al., 2011). This research uses the characteristics of the head of the household as determinants to decompose the concentration index. The characteristics of the head of the household are sex, age and educational attainment. The rational process to decompose the concentration index is as follows. It starts by building a linear regression model which uses y as the dependent variable and a set of determinants as independent variables, k. The model is given in equation (9). Here on the assumption is that every household, regardless of its characteristics will have the same coefficient β_k from the x_k determinants. Therefore, the concentration index is the same as summation of weighted C in each determinant. The detail formulation is in equation (10).

$$C = 2/n\mu\sum y_i R_i - 1 \quad (8)$$

$$Yi = \alpha + \sum\beta_k x_{ki} + \varepsilon_i \quad (9)$$

$$C = \sum (\beta_k X_k/\mu)C_k + (GC_{i\varepsilon}/\mu) \quad (10)$$

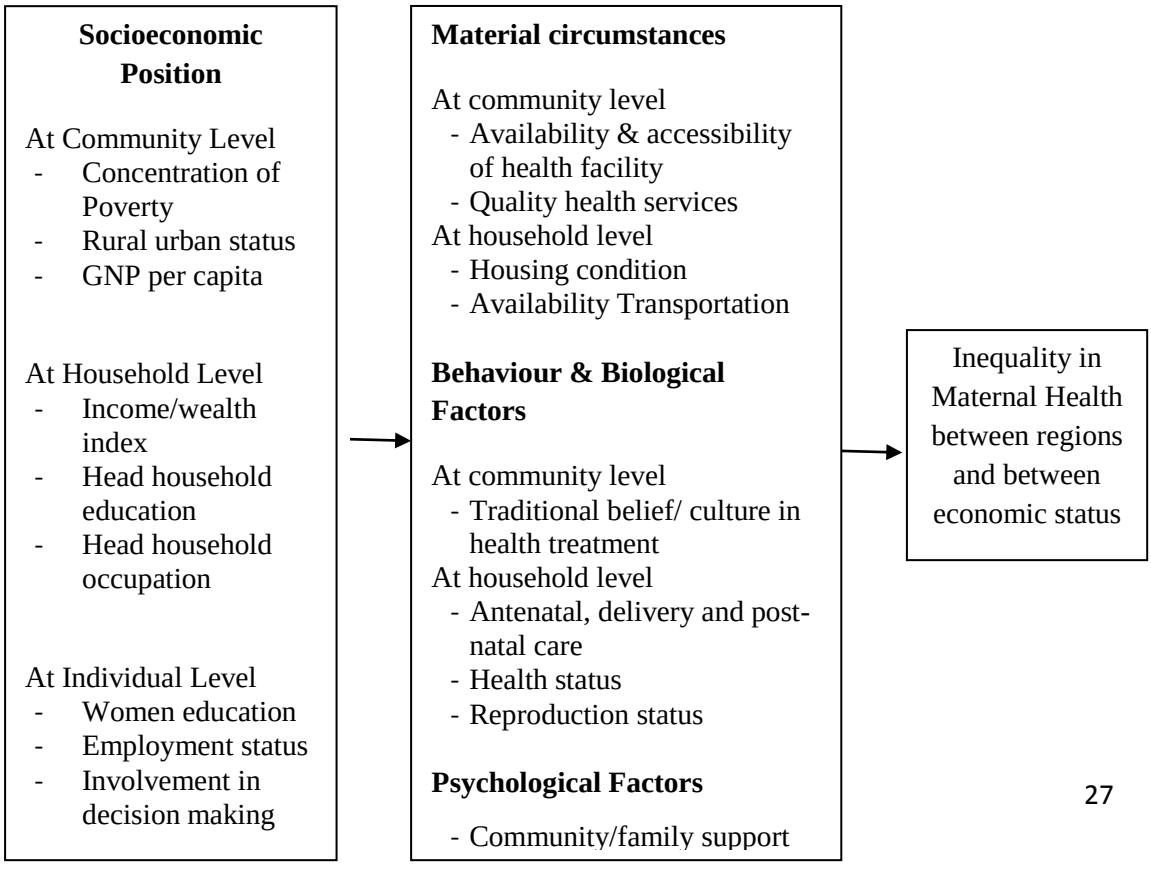
2.3 Primary Data Analysis

The previous discussions deal with the analysis of the extent of maternal health inequality at district and household levels. To some extent, the determinants of maternal health inequality would also have been revealed from statistical inferential analysis. However, many aspects of the determinants of maternal mortality are not included in the analysis since the information is not available from the 2010

population census data. Therefore, new data have been collected to obtain a more comprehensive analysis of the inequalities in maternal mortality.

The conceptual framework explaining maternal health inequality adopted in this research is based on a comprehensive framework given by the World Health Organisation's Commission on Social Determinants of Health (CSDH 2007). The adapted framework is given in Figure 2.2. In general the framework contain structural and intermediary determinant of health inequality. The structural determinant is very broad aspect including the socio political context such as macroeconomic policies, social policies and political policies. However, the discussion of this study is only focused on social economic position of community, household and individual level. The impact of structural determinant to influence health inequality works through intermediary determinant like material circumstances, behaviour/biological factor and psychological factors. The framework from CSDH is wide-ranging and can be applied for various health indicators. Since my study focuses on maternal mortality, This study use framework of maternal mortality determinant provided by McCarthy and Maine (1992) and also use the variable of MMR determinant and incorporated in the CSDH framework.

Figure 2. 2 Frameworks for Analysing Maternal Health Inequality



Sources: Adapted from (CSDH, 2007; McCarthy & Maine, 1992)

Primary data are collected on all aspects related to socioeconomic status and intermediate determinants in this framework. Socioeconomic status is represented by several variables at household and regional levels. The intermediate determinants are represented by material circumstance, biological and behaviour factors. The analysis will be done for two different levels. Firstly, this study conducts descriptive analysis on availability and quality of health facility in the two selected districts. Secondly, this research also aims to find out some individual characteristics which influence the incident of maternal mortality. The primary data collection can be conducted after obtained approval from Social and Behavioural Research Ethic Committee (SBREC) Flinders University of South Australia. The approval is granted at 20 November 2012 with the project number 5854 (see appendix 3). The permission to conduct data collection is also granted from Ministry of Home Affair, Board of National Unity, Politics and the Protection of Local Community in West Java, Bekasi and Indramayu (see appendix 3).

2.3.1 Health Facility Survey

A health facility survey (HFS) is carried out to examine the quality of health services. This survey is conducted in the two selected districts Bekasi and Indramayu which show significantly different levels of maternal mortality. The main objective of this survey is to assess the effect of the quality of health facilities on maternal health. The survey instrument consists of a questionnaire to elicit information about procedures of prenatal care, delivery care and the availability of essential drugs, equipment and infrastructure. The content of the questionnaire is based on a summary of WHO tools and a previous study (Hanson et al., 2009; WHO, 2009a). The details of the questionnaire are given in Appendix 4. The primary data collected through the survey are supplemented by secondary data obtained from district health offices.

The sample size of the HFS is determined by considering type of health facility such as hospital, community health centre, sub-community health centre or private

midwife. A Chi-square test is applied to find out the association between the quality of health facility and the location of health facility (district). The sample size is determined by the formula for Chi-square (Garson, 2012c). The procedure to determine the sample size is as follows:

a. It is assumed that the test will be significant at the five percent level (p = 0.05) with a difference of 10 % in quality between the two districts.
b. The expected distribution of respondents can be seen in the table below. It illustrates the ideal condition that between two selected districts, there is no difference in the quality of health facilities, i.e., the population in the two districts receives the same quality of services (see Table 2.3). The figure 0.41 or 41 % is a proxy for the recent condition in research areas. This figure is used based on Indonesia Family Life survey 2007 (Rokx et al., 2010). There are three variables which can be used to identify the quality of infrastructure and equipment, such as internal water sources, beds for inpatients and functioning microscope. According to these variables, 41 % of community health centre, sub-community health centre, private midwives and private physician has adequate facility. The least-difference table is created based assumption that the different between two districts is 10 % (see Table 2.4).

Table 2. 3 Specifying expected table

	Adequate Infrastructure & equipment	Inadequate Infrastructure & equipment	Total
District A	0.20 n	0.30 n	0.5n
District B	0.20 n	0.30 n	0.5n
Total	0.40 n	0.60 n	n

n is the sample size.

Table 2. 4 Least-difference table

	Adequate Infrastructure & equipment	Inadequate Infrastructure & equipment	Total
District A	0.25 n	0.25 n	0.5n
District B	0.15 n	0.35 n	0.5n
Total	0.40 n	0.60 n	n

c. The value of Chi square table for degree of freedom 1 and significant level 5 % is 3.841. Then *n* can be estimated using formulas provided by Garson (2012c) as follows:

$$3.841 = ((0.25n - 0.20n)^2/0.20n) + ((0.15n - 0.20n)^2/0.20n) + ((0.25n - 0.30n)^2/0.30n) + ((0.35n - 0.30n)^2/0.30n)$$
$$3.841 = 0.041n$$
$$n = 92.8$$

d. The total number of health facilities needed for analysis is 93. To determine the sample size one must consider the design effect (Turner et al., 2001; WHO, 2003).The suggested design effect is 1.2. Therefore, the sample must be adjusted become 111 (1.2 x 92.8) health facilities.

e. The sample is distributed proportionately in different types of health facilities in the two selected districts. For this, information about numbers of these health facilities in each district is needed. There are several data sources which provide information on the number of health facilities, such as health offices and statistics office (BPS). However, the data published data by the BPS have been used for this research, because they are considered to be more reliable. Specifically, these data come from the Village Potential Survey 2011, which provides information on the number villages having a health facility. This information is used as a proxy variable to distribute the sample size. The detailed distribution of sample size can be seen in Table 2.5 given below.

Table 2. 5 Sample Distribution of Health Facility Survey

Type of health facility	Indramayu		Bekasi		Total	
	N	n	N	n	N	n
Hospital	8 *(0.011)*	1	24 *(0.033)*	4	32 *(0.044)*	5
Maternity Hospital	15 *(0.021)*	2	48 *(0.066)*	7	63 *(0.087)*	10
Community health center	49 *(0.068)*	8	39 *(0.054)*	6	88 *(0.152)*	13
Sub-community health center	68 *(0.094)*	10	42 *(0.058)*	6	110 *(0.595)*	17
Private Midwife	267 *(0.369)*	41	164 *(0.227)*	25	431 *(0.595)*	66
Total	407 *(0.562)*	62	317 *(0.438)*	49	724 *(1.000)*	111

Note: N is the population; n is the sample; the figure in the bracket is proportion of the population in the sample

f. This study endeavours to cover the selected health facilities in order to spread the sample size to different villages or sub-districts.

2.3.2 Case Control Study

The case-control study consists of a household survey with women dying from pregnancy related causes during the reference period as “cases” and women who give birth and surviving their pregnancy during the reference period as “controls”. The reference period is 1 January 2009 to 31 May 2010, which is also the reference period for the 2010 Population Census.

Case control studies are used in clinical research to compare a group which has a disease with another group which does not (Hulley et al., 2007). Case control studies are basically retrospective studies. There are several examples of case-control studies in maternal health research (Ganatra, Coyaji & Rao, 1998; Gupta et al., 2010; Saucedo, Deneux-Tharaux & Bouvier-Colle, 2012). In such research, the cases and controls come from the same population and they are studied with respect to the same time reference. In the present research, every maternal death and live birth occurring from January 2009 to May 2010 in the samples of households in the districts Bekasi and Indramayu (as recorded at the 2010 Census) is used as a potential sample.

In order to find out the individual characteristics which influence maternal mortality, the quantitative data analysis focuses on examining the following hypotheses which can reveal that individual characteristics have an important role to play in determining maternal mortality levels:

a. Women who have survived their pregnancy (surviving women) have better reproductive status than women who died during their pregnancy (deceased women).
b. Surviving women have better health seeking behaviour than deceased women.
c. Surviving women have better health status than deceased women.

d. Surviving women have better support form family/community than deceased women.
e. Surviving women have better empowerment than deceased women.

These hypotheses (a to e) are tested with data collected during the household survey, which comprise data on individual and family characteristics in the two districts selected on the basis of differences in their (the districts') socio economic characteristics. The sample in each district has been selected to ensure that it contains households with surviving women and households with deceased women. A household with surviving women is a household in which there is a woman who has given birth in the census reference period (1 January 2009 – 31 May 2010) and is alive. A household with a deceased woman is a household in which a woman has died from pregnancy related causes during the reference period mentioned above. This sample is designed to allow a comparative study between women who die and women who survive their reproductive process. The socioeconomic conditions of the district and the household are used as control variables in order to find out the influence of the other determinants to explain the pregnancy related deaths.

The details of sample size determination, selection of study participants and the questionnaire are given below.

a. Sample Size

The formula to calculate Sample size (n) is based on the formula given by (Hulley et al., 2007, pp. 84-7). A previous study in Surabaya (Taguchi et al., 2003) reveals that deceased women and surviving women have different characteristics. One of the most important aspects which may determine maternal health is antenatal care. Taguchi et al., cited above have found that 46% of the deceased women had less than the recommended four antenatal care visits. The corresponding figure for surviving women was 20 %. This information is used to determine sample size as size effect.

$$n = \frac{[z_{\propto}\sqrt{P(1-P)\left(\frac{1}{q_1}+\frac{1}{q_2}\right)} + z_{\beta}\sqrt{P_1(1-P_1)\left(\frac{1}{q_1}\right)+P_2(1-P_2)\left(\frac{1}{q_2}\right)}]^2}{(P_1-P_2)^2}$$

$P = q_1 P_1 + q_2 P_2$
P_1 = 0.46 (Proportion of expected outcome for deceased women)
P_2 = 0.20 (Proportion of expected outcome for surviving women)
Z_α = 1.96 (Confidence interval 95 %; $\alpha = 0.05$)
Z_β = 1.28 (Power 80 %; $\beta = 0.20$)
q_1 = 0.33 (proportion sample for deceased women)
q_2 = 0.67 (proportion sample for surviving women)

Since maternal death is a rare event, this case control study has set q_1, proportion of cases (i.e., the proportion of deceased women), less than q_2, proportion of controls (i.e., the proportion of surviving women), with values of 0.33 and 0.67 respectively. The proportion is determined to have optimal balance number of cases and control after considering the availability sample. The best sample for case-control study is the same number of cases and controls. However, if the case and control is set as 1 case compared to 1 control (i.e., if the q values are set at 0.50 each), then the sample size will be too large and impossible to achieve because there are not enough recorded maternal deaths (cases) to match the controls. Therefore, this study compares 1 case with 2 controls, similar to what has been done in a previous research in India (Ganatra, Coyaji & Rao, 1998). Based on the above assumptions the total sample size for each district comes out to be 147 consisting of one third i.e., 49 deceased women and 98 surviving women. The survey is conducted in two districts with equal numbers of cases and controls selected from each district. Therefore, the total sample size for the two districts combined is 294.

b. Selection of Study Participants

Before selecting the samples of surviving and deceased women, two districts of West Java are selected to represent high and low maternal mortality and associated socio-economic status. Based on these criteria, the district of Bekasi has been selected to represent low maternal mortality and the district of Indramayu to represent high maternal mortality.

The 2010 Population Census provides data on surviving and deceased women at the household level. From this information, a list of surviving and deceased women has been compiled for the districts of Bekasi and Indramayu, which is

used as the sampling frame. The procedure to select sample of surviving and deceased women is as follows:

- Create the list of surviving and deceased women for these two districts and arrange the households in each group of each district in sequential order according to the wealth index of the household. Let there be N1 households with surviving women and N2 households with deceased women. From the list of surviving women, select 98 women and from the list of deceased women select 49 women by systematic sampling with a random start. The sampling interval is N1/49 for the group of surviving women and N2/98 for the group of deceased women. In Bekasi, the sampling intervals are 1.57 and 368.58 for deceased and surviving women, respectively. While the sampling intervals in Indramayu are 1.20 to select deceased women and 742.71 to select surviving women.
- In the sample of surviving women, the respondent is the surviving woman herself, but in the sample of deceased women, the respondent is the member of that household who has the best information about the deceased woman's pregnancy and her pregnancy care. In many cases this person was the deceased woman's husband (often the head of the household) or the deceased woman's mother-in-law/mother.

c. Questionnaires

The household survey is done with two questionnaires – one for surviving women and the other for deceased women. Information collected through these questionnaires consists of the reproductive status, health status and health seeking behaviour of the women. In general these two questionaries have the same content but the wordings are a little different because, for the surviving women (control) the questions are asked of the women themselves but for the deceased women (cases), the questions are asked of a member of the deceased women's households. The detail questionnaires are given in Appendix 5 and 6. The survey is completed in six months.

The primary data are used in analysis as follows:

- Descriptive statistical analysis

  The primary data are used for producing cross tabulations of the proportions of deceased and surviving women against each of the selected determinants

of maternal mortality. This is done to obtain an indication of the association of these determinants with maternal survival. Then the significance of the differences is examined by applying the Chi square test.

- Multivariate statistical analysis

  The descriptive analysis is followed by a multivariate statistical analysis to identify the factors that most strongly influence maternal health. The multivariate analysis used in this research is the inferential statistical technique - logistic regression, since the dependent variable (surviving or deceased) is binomial.

2.3.3 Focus Group Discussion

This research has collected qualitative data to complement the findings from the analysis of quantitative data. More specifically, the qualitative data collected in this study aims to explore the explanation of the differences in maternal health between the two selected districts. In particular, qualitative data in this study have been collected by conducting Focus Group Discussions (FGD). The main objective of FGD is to obtain information on culture/social values, opinions or conditions in communities which influence people's decision to use health facilities, community support for maternal health or the other aspects which may cause the delays in seeking maternal healthcare. The details of how the focus group discussions were conducted are as follows:

a. Information from the FGD is collected from two different perspectives, (i) health providers' perspective and (ii) clients' perspective by conducting separate FGDs for each group. Each group is formed by keeping in mind that it is homogeneous with respect to socio-economic background of the group members. This is done to ensure uninhibited productive discussion in the FGD (Krueger & Casey, 2000, p. 66). At the same time, however, appropriate variation among the focus group participants has been kept in order to obtain sufficient contrast in the opinions of the participants, while allowing the discussions to flow smoothly.
b. The first set of FGDs is conducted with traditional and professional health personnel. It consisted of two focus group discussions - one with professional medical personnel and the other with traditional healers. Each of these groups is homogeneous in terms of profession or occupation. However, the

participants have variation in their experience which allowed diversity in opinion while allowing the discussions to flow smoothly and without any inhibition. The discussions are aimed at identifying the reasons for delays in obtaining adequate treatment. The topics of discussion are:

- The patient's health condition when she was first seen by the health personnel. This gives an idea of the duration of the patient's ill-health from which an inference is made of the delay in seeking health care.
- Identification of the delay for the patient to be seen by the health personnel, either by the patient to go to the health worker or by the health worker to come to the patient. These delays are affected by the time taken to find appropriate transportation
- Identification of delay to obtain adequate care such as common problem during pregnancy and delivery, referral system, adequacy of drug and equipment, the main difficulties to treat the patients, and other factors such as the patient's ability to afford the treatment.

c. The second set of FGD is conducted with clients. The participants are women who have experiences giving birth. The homogeneity of this group is represented from experiences of giving birth. Moreover the different socio demographic background such as age, gender, occupation, education and economic status may cause the participants expose for different experiences. The discussions focussed on:

   - Identification of delay to seek care consists of constraints to seek care, preference of health treatment, opinion about modern health care, knowledge about complications.
   - Identification of delay to reach health facility including distance and cost to health facility
   - Identification of delay to obtain adequate care, such as those identified from opinions about quality of maternal care and experiences of long queues or waiting time.

   The above mentioned factors are very similar to those mentioned in the Three Phases of Delay (Thaddeus & Maine, 1994), but they have been used in this research to explore the process of candidacy (Dixon-Woods et al., 2006).

d. The number of participants in the FGD for professional health personnel or traditional healers is 6-8 each while the number of participants for the FGD

with clients is 10. As stated by Kruger and Casey (2000, pp. 67-8), the ideal size of an FGD participant is 5-8 and should not exceed 10 persons to create a controllable groups and give enough opportunity for every participant to speak. The FGD for clients has more participants since the population variation is greater than that of the first group. FGDs are conducted separately in each selected district. The total participant for FGD in the two districts is 64 persons.

2.4 Summary

The methodology followed in this thesis is summarised in Table 2.5.

Table 2. 6 Summary of Methodology

No	Objective	Data Input	Data Sources	Analysis method
1	To calculate Pregnancy related mortality (PRMR) in every district and use it to measure differences in maternal health between districts of West Java.	Maternal health status: PRMR, e_0,TFR, CPR, age at marriage, antenatal care and type of assistance at birth	Secondary data from 2010 Population Census and National Socio Economic Survey 2010.	a. Hill's method to calculate PRMR. b. Principal component analysis (PCA) and Gini Index to measure differences in maternal health.
2	To find out the determinants of the differences in maternal health between districts in West Java.	Maternal health status, health resources and socio economic status.	Secondary data from 2010 Population Census, National Socio Economic Survey 2010. Labor Force Survey 2010, HDI 2010and PODES 2011.	Canonical Correlation Analysis to find out the correlation between a set variable of maternal health status with two sets of independent variables.
3	To measure differences maternal health at household level and identify their determinants in West Java.	The incidence of maternal mortality in household, household assets and housing conditions (wealth index) and characteristics of the head the household.	Secondary data from Population census 2010	a. PCA to create wealth score index. b. Concentration index to measure the maternal health inequality c. Decomposed concentration index to identify the determinants

4	To analyse factors such as material circumstances, health status and behavioural factors, which may be linked with maternal health.	Socio economic position, material circumstance, behavioural factors at individual and household level	Primary data collection through: a. Survey at deceased and non-deceased household. b. Health facility survey c. Focus groups discussion.	a. Quantitative analysis: Multi layered cross tabulation, Chi square test based on the survey data and logistic regression. b. Qualitative analysis based on FGD.

CHAPTER THREE: Maternal Health: A Literature Review on its Importance and Determinants

3.1. Introduction

Strategies for improving human health are not free from conceptual approaches on how health is defined and determined. Initially, the focus of research on health determinants was dominated by biological factors. In this approach, the mechanism of how social condition affects illness was seen as implausible (Heymann & Hertzman, 2006). As such, the main instruments to improve public health were developed by epidemiologists through research in laboratories. Such an approach viewed population health only in terms of aggregation of individuals (Babones, 2009). However, focusing only on biological factors in dealing with human health makes it difficult to launch broad-based intervention programs aimed at the population (Heymann & Hertzman, 2006). In relatively recent times, the focus on health research has been broadened. Social factors are gaining more attention as determinants of human health. The reason is that there are "webs of causation" influencing human health at the population level (McMahon & Pugh 1970 cited in Heymann & Hertzman, 2006). Human health cannot be explained by biological factor solely such as genetic endowment. Health status is a product of interaction between biological factors and the surrounding environment comprising social, economic and political factors. This can also be evidenced in the analytical frameworks of the determinants of child survival, formulated by (Mosley & Chen, 1984) and maternal mortality, developed by (McCarthy & Maine, 1992).

3.2 Women, Health and Development

3.2.1 Health and Development

The association between health and development has attracted the attention of researchers' and has become one of the main topics of discussion among them. The on the relationship between health and development discussion is focused not only on the micro or macro levels but also on the direction or causal link of the relationship. Initially, researches were concern with the impact of development on health of humans. In the overall discussions of these relationships, economic development is indicated by income or GNP per capita while health status is

indicated by several indicators such as life expectancy at birth or infant /child mortality rate. A cross national analysis of data reveals that national income per capita has a positive relationship with life expectancy at birth (Preston, 1975), which is apparent from the fitted curve of scatter diagram between income per capita and life expectancy at birth. However, further analysis by Preston (1975) showed that that income accounts for only 10-25 precent of changes in health status with other, exogenous factors having a major effect. Imported health technology from developed countries such as vaccines, antibiotics and public health programs like insect control, sanitation, health education and health services enabled the less developed countries to improve their health status, with no necessary improvement in socio-economic conditions. However, Preston did not include the exogenous factors into his statistical analysis; therefore the valid contribution of these factors remains uncertain.

A more recent study in England and Wales clearly observed that growth in gross domestic product (GDP) correlates negatively with life expectancy at birth (Granados, 2012). Granados suggests that a possible explanation for this negative correlation is that long term growth in GDP is associated with social changes supporting health improvement. GDP growth influences increases in literacy rate, improvements in nutritional intake and accessible clean drinking water, and leads to less crowed households and fewer births per woman. This condition is not affected by economic depletion in short term. According to Sen (1998), life expectancy and GDP growth have a lagged relationship. An increase in GDP per capita in one decade is followed by an increase in life expectancy in the next decade. As a consequence, the slowing down of economic growth does not present an immediate impact on population health status. Thus, it is possible that economic depletion in one year may be accompanied by no deterioration in health status in the same year, because of the lagged relationship between GDP growth and life expectancy.

A history of mortality in England and Wales shows that mortality reduction from 1901 to 1971 has been influenced improved nutrition, better sanitation/hygiene and immunization/therapy (McKeown, Record & Turner, 1975). These aspect contributes to nearly half, one-sixth and one-tenth of mortality reduction respectively. This analysis indicates that medical innovation has a smaller effect on health status, but improved diet intake and better sanitation which reduced exposure to infection

provided a larger impact on health improvement. These aspects relate to the progress of living standard and economic growth. A similar finding was revealed for the United States in the 20th Century (McKinlay & McKinlay, 1977).

Another view to look at the relationship between health and development is that the former affects the latter. Bloom and Canning (2000) mention four mechanisms which link health with economic development. The first is productivity; a healthy population has better productivity which is supportive of high economic growth. Secondly, a healthier population tends to have better education or human capital investment. In the long term it reaps great benefits such as higher income. Thirdly, a longer life creates a greater need to secure retirement. This leads to increased savings and advanced physical investment. Lastly, health improvement helps in shaping the population age distribution, creating a low dependency ratio and presenting a large proportion of the productive age population. This is the so-called demographic dividend. An empirical data analysis for several countries of East Asia confirms the importance of health status to influence economic development via the impact of human capital endowment to economic growth (Li & Liang, 2010). Human capital is indicated by mean years schooling of the population aged 15 years and over, student-teacher ratio for primary schools and two variables representing health status, namely life expectancy and adult mortality rate. The results reveal that health and education significantly affect economic growth, but the impact of health on economic development is stronger than that of education on economic development.

Instead of remaining concerned on the one way causal relationship between health and development, Hamoudi and Sach (1999) discuss the two way relationships between the two. Their study is based on existing evidence. There are some ways in which health status and economic performance are interconnected. Firstly, it relates to the treatment cost and lost labour productivity. Illness directly presents an economic burden for the individual and the household. A study based on panel survey data shows that ill health reduces non-food consumption by 6.6 percent for rural households in Indonesia (Sparrow et al., 2012). Non-food consumption is used as indicator for economic burden since it is more sensitive to adaptation with seasonal situation of the household's budget allocation. Moreover, the impact of ill health to reduce non-food consumption is significant only for the lowest quintile. In

addition, this study also reveals that borrowing becomes the most common coping mechanism in times of distress. Therefore, ill health may present long term economic burden through incurring debt. A research concerned with estimation of wasting time as a result of child mortality shows that a considerable amount of time is wasted for every child mortality before the fifth birthday, varying between 1,294.1 hours in Prussia and 1,857.9 hours in Senegal (Reher, 1995). The figure for Indonesia is 1,651.2 hours. This illustrates that mortality affects a household economy through a substantial reduction of labour productive hours. The other mechanism operates through intergenerational transmission from parent to the children. Parents from lower socio economic status may provide insufficient nutrition for their children and, as a consequence the children's health may be affected badly. In the long term this condition of poor child nutrition would have an effect in determining the level of future human capital.

As mentioned before, the relation between health and development is also apparent at the macro level. Health influences community development through demographic factors by providing conducive conditions for human capital investment and for reducing dependency ratio (Hamoudi & Sachs, 1999). Longer life expectancy provides a lesser risk for investment in human capital development like education. Longer life expectancy may lead to better rate of return on investment because of lower potential loss of life. Healthier populations also have lower levels of disability, injury or chronic illness, which is beneficial for productivity by ensuring the survival of more and healthier people in the working ages. The other explanation for the relationship between health and development is applied in international trade. A community which is attributed with having an endemic disease would suffer from trade isolation, because its potential trading partners would protect their population health by avoiding products from a communicable disease affected country. Thus, it would affect regional economic development. In their conclusion, Hamoudi and Sachs (1999) state that health and economic status have a mutually beneficial relationships so that a richer population has a better health status and vice versa.

The link between health and development is multifaceted and does not a single explanation (Cutler, Deaton & Lleras-Muney, 2006). Sen (1998) emphasises the importance of including mortality statistics as one of the concerns for economic

policy decision making over a broader field which should covers outcome as well as their distributional aspects among class, gender and race. Mortality data are also sensitive for economic and social shifts, thus providing rich information to guide policy making. Sen also mentions that "mortality data can throw light on the nature of social inequality, including gender bias and racial disparities". That is why health and mortality have become a centre of discussion in international development models (Borowy, 2013).

3.2.2 Women's Health

The importance of women health for development had been highlighted by Kofi Annan, the former Secretary General of the United Nations, who stated that "*When women are healthy, educated and free to take the opportunities life affords them, children thrive and countries flourish, reaping a double dividend for women and children*" (Shankar et al., 2008; UNICEF, 2006). This statement emphasises the importance of improving women's health, which is beneficial in a wider context, especially for children, since women have a specifically important function in reproduction. Therefore, women's health can be regarded as having an important role in shaping regional development.

At the World Conference on Women in Beijing, women's health is defined as:

> "Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. Women's health involves their emotional, social and physical well-being and is determined by the social, political and economic context of their lives, as well as by biology" (Weisman, 1997).

The definition presents a broad concept of health which does not only regard the non-existence of illnesses among women but also considers their emotional, social and physical welfare. This definition also highlights the importance of social, political and economic contexts which influence women's health. The definition covers the importance of understanding the influence of work, relations and society which may be different for women compared to men, as well as the biological difference between men and women (Michaud, 2008).

The above definition indicates that women's health covers more than their reproductive health. According to the Encyclopaedia of Global Health, reproductive health covers health issues related to ovarian cycle, pregnancy, delivery and abortion

(Michaud, 2008). Reproductive health is a part of women's health in general. The WHO report on women and health (2009b) clearly describes that women's health covers different stages of women's lives such as girls, adolescent girls, adult women in reproductive years, adult women in general and older women. However, it is confirmed that sexuality and reproductive health are at the centre of women's health (WHO, 2009b). The reason for this is that reproductive health is relevant not only to women but it also influences the next generation.

Women's reproductive functions put their health in an important position in the community. However, it also makes women vulnerable to morbidity and mortality. This is accorded priority in the development agenda of different countries. The International Conference on Population and Development 1994 (ICPD 1994) used eleven principles to set up the objective and action program to enhance the quality of life of the people of the world (UN, 1995). One of these principles, gender equality, equity and women's empowerment: is explicit about women's empowerment which has a broader significance for all aspects of women's life, including their health. This principle is also the basis of one of the objectives to promote women's health, reduce maternal mortality substantially and narrow the gap between and within countries with respect to these health indicators (UN, 1995, p. 57) . Based on the millennium declaration which aims to support human dignity, equality and equity at the global level, the United Nations created the Millennium Development Goals (MDG) to be achieved by 2015 based on the situation at 1990 (Ghai & Cottrell, 2011). The MDGs contain eight goals and 21 measurable targets. The MDG 5 is specifically directed at maternal health, which has two basic targets, namely MDG5A: Reduce by three quarters the maternal mortality ratio between 1990 and 2015, and MDG5B: Achieve universal access of reproductive health by 2015 (UN, 2013). This indicates the international awareness about the importance of maternal health in development.

The attention on maternal mortality is not new. It was already recognised as a matter of concern even around one hundred years ago. In accordance with the effort to reduce infant mortality, Allan (1915) mentioned the importance of caring about the mother during her pregnancy and give her proper attention during the puerperium. In addition, Joseph (1916) emphasised important issues for maternity and child welfare

such as the necessity of antenatal care, medical assistance for births and immediate and adequate treatment for any case showing sign of sepsis. In 1920, maternal mortality ratio in the United States and England was as high as 689 and 433 per 100,000 live births respectively (Loudon, 1992). The situation was better in the Netherlands at that time, where maternal mortality ratio was only 242 per 100,000 live births. In 1960, these countries had similar levels of maternal mortality ratio at a level slightly lower than 40. This achievement is considered to have been achieved as a result of medical innovation and improvements in health care. However, the situation was not similar across regions.

Currently, estimates reveal that there were 358,000 maternal deaths worldwide in 2008 (WHO, UNICEF & UNFPA, 2004, p. 20). However, this estimate actually indicates a 2.3 % reduction annually in the number of maternal deaths between 1990 and 2008. But this improvement is still much less compared to improvements in infant or child mortality. Based on a WHO report, the recent progress of maternal health in most countries is not sufficient for achieving the MDG 5 on maternal mortality reduction (WHO & UNICEF, 2010). On the other hand, this report shows that 19 out of 68 countries are on the right track to achieve MDG 4 on child mortality reduction. Therefore, stronger efforts must be made to achieve the goals on mortality reduction, particularly those for reducing maternal mortality. Knowing the magnitude and trend in maternal mortality is important but one has to look beyond the number in order to achieve the specified targets (WHO, 2004, pp. 1-2). Efforts to "look beyond the number" must include the gathering of comprehensive information about the underlying factors causing maternal deaths.

3.2.3 Maternal Health Care in Indonesia

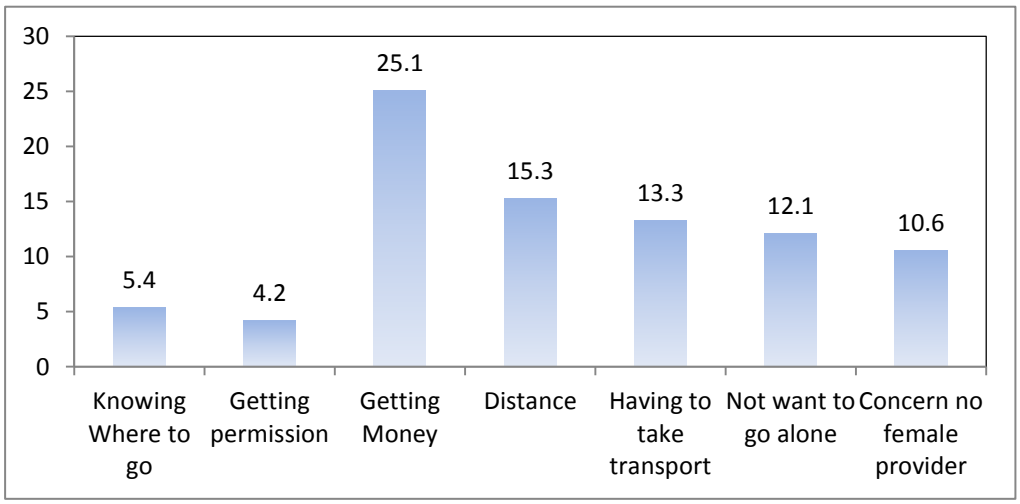
Maternal health has been a matter for concern for the Government of Indonesia for a long time. Initiated in the 1950s, the maternal and child health (MCH) program is run by establishing clinics specialising on in health care for mothers and children (MoH et al., 2005, p. 17). The clinic is known in Indonesia as *Balai Kesehatan Ibu dan Anak* (BKIA), which literally means house for the health of mothers and children. Then MCH services are integrated in the services of community health centres, known locally by the Indonesian acronym Puskesmas. It is also acknowledged by many that the most important intervention to reduce maternal mortality is the village

midwife program, known in Indonesia as *Bidan di Desa* program, which has put a qualified midwife in every village of the country (Shankar et al., 2008, p. 1227; Shiffman, 2003, p. 1200). The program started in 1989 and by 1996, 54,000 midwives had been trained and placed in 96 % of the villages of Indonesia. A different approach was used in 1996 by launching a movement known as "*Gerakan Sayang Ibu*" or a movement to care for the mother. This program encourages the husband, the family and the community to take a positive role in efforts to reduce maternal mortality (MoH et al., 2005). This is important to ensure that pregnant women receive adequate medical care and attention. The intervention to improve the quality of health care is also continuing. In the year 2000, the Government launched a program for making pregnancy safer, which has three main objectives; (i) ensure that every delivery gets skilled birth attendance, (ii) ensure that there is adequate care for every obstetric and neonatal complication and (iii) avoid unwanted pregnancy for every woman of reproductive age and provide adequate treatment after abortion if an unwanted pregnancy is aborted (MoH et al., 2005).

The interventions mentioned above do not ensure universal access to healthcare, particularly for pregnant women. This can be seen from data collected at Indonesian Demographic Health Surveys (IDHS) 2007 which reveal that the majority of deliveries take place at home and a significant proportion of deliveries is assisted by non-medical personnel. The IDHS 2007 shows that accessibility to health facilities is a problem for some ever-married women in Indonesia (Figure 3.1). Financial difficulty emerges as a problem for more than a quarter of ever-married women for whom it is the main obstacle to accessing health care. The geographical distribution of health facilities is an important factor in the non-accessibility to healthcare, since many women (a total of 28.6%) consider distance and transportation as barriers to accessing a health facility. Barriers also come from individual characteristics such as lack of knowledge of where the health facility is located, reluctance to see male doctors and a lack of chaperone (not wanting to go alone). A small proportion of the women (4.2%) appeared to be lacking in empowerment in that they have to get permission from their husbands or elderly members of the household to access healthcare. In general, creating universal access to healthcare must consider economic conditions, geographical distribution of health facilities, transportation

problems, women's empowerment and family/community support and cultural factors making women reluctant to be examined by male doctors.

Figure 3. 1 Percentage ever married women who reported various problems in accessing health care, 2007



Source: IDHS 2007

The data from IDHS 2012 reveals that accessibility to maternal care improved. However, significant proportions of pregnant women still obtained inadequate care such as 36 % and 15 % of delivery are not in health facility and assisted by medical personnel, respectively (BPS et al., 2013). This data also shows that Government interventions have not reached all population groups. Shankar et al (2008, p. 1227) mention that the implementation of health intervention had been affected by several factors such as low quality of midwives, lack of supervision and mentoring of midwives, low accessibility of emergency obstetric care and limited health budget. Women economic status is mentioned in several studies as an important factor which influences the utilization maternal healthcare, because cost is perceived as the main consideration in seeking and using medical care. To overcome this problem, the government has introduced health insurance aimed at ensuring the availability of health care for poor people. Health insurance can help cover catastrophic expenses for obstetric care (Quayyum et al., 2010, pp. 242-3). But again, the implementation of health insurance has not been running as expected. There is a loophole in the health insurance scheme by which the non-poor can also use the insurance (Utomo, Sucahya & Utami, 2011, p. 11). Evidence from Serang and Pandeglang show that wealthier people receive more benefit from public funding than the poor (Ensor et al., 2008, pp. 388-91).

Table 3. 1 Underlying factors for accessing maternal health care in Indonesia: A summary of findings from previous studies

Study	Underlying factors for accessing maternal health care
Quayum et al (2009)	Health insurance for the poor has positive effect to avoid catastrophic expenditure on obstetric care.
Kristiansen & Santoso (2006)	Decentralization causes some drawback for public health such as, lack of budget for public services, limited drugs and high cost for health treatment.
Utomo, Sucahya & Utami (2011)	1) Budget allocation does not facilitate maternal health services. 2) Equity is not a priority; therefore poor people do not obtain adequate access. 3) Some programs intended for universal access face ineffectiveness such as uneven distribution of midwife and 50 % of health insurance is used by the wealthier people.
Ensor et al (2008)	1) Poor people still have unequal access to medical care. Health insurance for the poor o covers only 40% cost of delivery. The remaining 60 %, becomes the client's responsibility. This cost still overburdens the poor. 2) Midwife may neglect poor clients based on their ability to pay. 3) The richer quintiles receive more benefit from public funding than poor people.
D'Ambruoso et al (2009)	1) One midwife may be responsible for up to 5 villages. Midwife need long time to reach patients (up to 17 hours). 2) Transportation can be an obstacle for referred patients. 3) Sometimes the midwives are unacceptable to patients because they are perceived to be too young, too expensive and not capable of assisting with a delivery.
Titaley et al (2010)	1) Physical distance and poverty impede usage midwife and having institutional delivery. 2) In remote areas, midwife does not live at the village and often travel out of the village. 3) Perception that medical care only to cure complication. 4) TBA is closer to community and physiological more trusted than midwife.
Makowiecka et al (2008)	Imbalance midwife density across areas. More than 60 % of villages in rural and remote areas in Serang and Pandeglang have no midwife.
Hatt et al (2007)	1) Professional attendance during delivery increase for lower economic group and the gap between groups narrower. 2) In contrast, the poor access for caesarean section remains stable at less than 1 % and the gap between the wealth widen.
Titaley, Dibley & Roberts (2010)	Socio economic backgrounds of women affect usage of antenatal care. Being educated and wealth enable women to seek antenatal care.
Thind & Banerjee (2004)	Skilled assistance delivery at home is determined by maternal education, religion, asset index and number of antenatal care.
Erlyana, Damrongplasit & Melnick (2011)	1) Urban populations are sensitive to medical cost to access health care. 2) On the opposite, rural dwellers are sensitive to distance of facility.

Source: Compiled by the author based on the studies cited in the table

Physical distance and time to travel also emerge as important factors in the use of maternal health care. These barriers stem from individual/household factors and regional conditions. Poverty and lack of transport worsen the situation. Uneven geographical distribution of midwives exacerbates the problem of physical distance in some places, especially in rural and remote areas. Village midwives often stay outside their assigned villages, because the assigned village may be too far, in remote areas and without adequate public facilities. The result is that there may be no midwife in many villages. For example, more than 60% of the villages in rural and remote areas of Serang and Pandeglang have no midwife (Makowiecka et al., 2008, p. 73). Social distance between a health provider and the community is another factor hindering access to maternal health care. In many places, the midwife is seen to be too young and not to be relied upon to assist with a delivery (D'Ambruoso et al., 2009, p. 534). A traditional birth attendant (TBA) who is usually a local person is regarded as being closer to the community and more acceptable than a midwife (Titaley, 2010, p. 7). People's behaviour in maternal care is affected by social norms, culture and educational. In some studies education emerges as an important background factor to shape people's health care seeking behaviour. More educated women tend to use antenatal services and skilled births assistance more than less educated women (Thind & Banerjee, 2004; Titaley, Dibley & Roberts, 2010).

The quality of health provider is another barrier to improving maternal health. As a consequence of the decentralization policy of Indonesia, public health facilities may be turned into profit making institutions to earn revenue for the local government. Even a hospital or a midwife can reject clients if they are unable to pay the cost of health care (Ensor et al., 2008; Kristiansen & Santoso, 2006, p. 257). The village midwife program is a major intervention to reduce maternal mortality, but it also has problems of quality care (Makowiecka et al., 2008). A midwife is capable of accurate diagnosis; recognising danger signs and rapid referral to reduce delays in health care. However, evidence shows that a midwife is incapable of good clinical management (D'Ambruoso et al., 2009, p. 535). In addition, a midwife does not have enough authority or skills to perform emergency care and does not have essential equipment such as blood transfusion facilities and haemoglobin/urine test. A study indicates that in some areas, midwives cannot maintain their skills since they only assist with around 40 deliveries in a year (Makowiecka et al., 2008, p. 73).

3.3 Determinants of Maternal Mortality

An understanding of the determinants of maternal mortality can be obtained from existing literature, available theoretical framework and success stories in several countries. An analytical framework proposed by McCarthy and Maine (1992, pp. 24-6) states that in order to reduce maternal mortality one has to consider a sequence of three possible outcomes: pregnancy, pregnancy-related complications and death or disability due these complications. Therefore, efforts to reduce maternal mortality must (i) reduce the likelihood that a woman will become pregnant, (ii) but if the woman does become pregnant, efforts must be made to reduce the likelihood that she will develop serious complications of pregnancy or childbirth, (iii) but if does develop such complications, then efforts must be made to ensure that they do not result in death or disability. These three possible outcomes are influenced by four sets of determinants such as women's health status, their reproductive status, their access to health services and their health care behaviour and use of health services. These four sets of determinants are known as proximate determinants of maternal mortality. McCarthy and Maine recognise that a small proportion of pregnancy-related complications may also occur due to unknown or unpredicted factors outside the four proximate determinants mentioned above.

A woman's health status before and during pregnancy can influence her chances of developing complications. The leading pre-existing health conditions, that are exacerbated during pregnancy and which account for a quarter of maternal deaths in developing countries, are malaria, hepatitis, anaemia and malnutrition. Based on established knowledge, this framework notes the classic J-shaped relationship between two characteristics of women's reproductive status, namely age and pregnancy order with the maternal mortality ratio. Risks of maternal death are high for very young women, older women, women with no children, and women with many children. Very young age is also associated with disability that results from pregnancy and childbirth. On the other hand, high parity is associated with a major maternal disability, namely, uterine prolapse. The wantedness of a pregnancy and birth spacing, which can be controlled by contraceptive use, is also related to maternal morbidity and mortality. Therefore, efforts to reduce maternal mortality must consider all factors that influence fertility such as age at marriage and age at child birth, birth spacing, parity and contraceptive use.

Once a woman is pregnant, she is exposed to the risk of developing complications during pregnancy, child birth or the post-natal period. Women's health status before and during pregnancy determines their propensity for developing complications. Pre-existing chronic diseases or inappropriate physical fitness prior to pregnancy may lead to serious complications during pregnancy and delivery. To avoid an adverse effect of such complications, adequate health treatment is a must. To assure this condition, health facility must be accessible and must be utilized properly. In the McCarthy and Maine framework these aspects belong to intermediate determinant of maternal mortality, which is influenced by distant determinants such as socioeconomic background of women, their family and community.

Shiffman (2000) mentions three perspectives from which to view the determinants of maternal mortality. These perspectives are wealth, health and women's empowerment which dominate the literature on maternal health. To some extent these perspectives are not independent; rather they are interconnected, though in a complex way. These perspectives have been covered in the framework of maternal mortality analysis discussed above. The wealth and empowerment perspectives are incorporated in the distant determinants, while the health perspective covers most of the factors in the intermediate determinants.

Another relevant framework worth discussing is that which focuses on health seeking behaviour, proposed by Thaddeus & Maine (1994, pp. 1091-111). This framework discusses the underlying factors of delay in seeking healthcare for pregnancy complications. In this framework, three sequential phases of delays are discussed. In Phase 1, the delay occurs in deciding to seek care, in Phase 2, the delay happens in reaching a health facility (after the first phase delay has been overcome) and in Phase 3, there are delays in obtaining adequate treatment once the pregnant woman has reached a health facility. These delays stem from individual characteristics of women, their families and economic factors such as cost (or perceived cost) of transport and treatment, spatial and logistical characteristics such as condition of roads, distance, transport and actual or perceived quality of treatment. The decision to seek health care is influenced by knowledge and culture about health system. Women's education is an important variable but its role is entwined with financial

matters of the woman's family, regional infrastructure such as road and transportation, and availability of health facility. These variables also influence the delay to reach a health facility. Moreover, the quality of the facility, as determined by adequacy of staff, equipment and management affect the occurrence of last delay (Thaddeus & Maine, 1994).

A similar theory has been suggested by Campbell and Graham (2006, pp. 1284-97), according to whom a reduction in maternal mortality strongly determined by the management of intra-partum care. It implies that interventions on maternal mortality should focus on pregnant women regardless of whether they have or do not have a complication. Intervention in intra-partum care is considered to be an effective way to reduce maternal mortality since in general maternal deaths occur during delivery as a consequence of unexpected complications. However, it will not work if the distance, cost, culture and low quality of health care are still barriers to adequate treatment at the heath facility. The available intra-partum care would be useless if targeted populations cannot access it. That is why this intervention must be accompanied by other programs which ensure the availability of qualified care close to the community.

A study of cost effective interventions to reduce maternal mortality provides a different conclusion (Goldie et al., 2010). Considering that cost is an important aspect of health intervention, family planning, accompanied by safe abortion is the most effective program to reduce maternal mortality. This strategy deals with reducing the incidence of unsafe pregnancy or delivery. Other, widely accepted interventions such as skilled birth attendance or emergency obstetric care (EmOC) for reducing the fatality rate of pregnancy complications are no doubt important for saving women's lives, but family planning can prevent high risk pregnancies and help avoid costly interventions like EmOC. One study estimated that during 1990-2005, about1.2 million maternal deaths were saved worldwide due to family planning (Stover & Ross, 2010).

The important role of family planning in influencing the level of maternal mortality has been highlighted by several authors (Fortney, 1987; Trussell & Pebley, 1984). Proper use of family planning methods can reduce the incidence of pregnancy at

young and old ages, reduce women's parity and lengthen birth spacing. Simulations with various combinations of maternal age and parity distribution of births indicate that maternal mortality can be reduced 11 % and 4 % respectively by limiting child bearing between the ages of 20 and 39 years and parity to a maximum of 4, respectively (Trussell & Pebley, 1984, p. 267). However, family planning may also be ineffective in reducing maternal mortality if prevalence of use is low, if there are insufficient numbers of participants, if there is low continuation rate, if there is health risk for the user and if family planning is difficult to access from remote areas (Winikoff & Sullivan, 1987, p. 139). Winikoff and Sullivan (1987) mention that approximately 25 % of maternal deaths can be avoided by family planning but the largest proportionate reduction is achievable by providing safer conditions for pregnancy.

Another empirical analysis using Demographic Health Survey data shows that family planning plays an important role in reducing maternal mortality both directly and indirectly (Stover & Ross, 2010, pp. 687-95). The direct effect of family planning operates by reducing women's exposure to maternal mortality as result of fertility reduction. The indirect effect relates to the ability of family planning to prevent high risk pregnancies such as those for too young or too old women and for short birth intervals. The above-mentioned research shows fertility reduction from 1990 to 2005 has reduced the number of maternal deaths by 1.2 million or 15 % lower than without fertility decline.

The dramatic reduction in maternal mortality in several developed countries has been possible because of political and technical factors (De Brouwere, Tonglet & Van Lerberghe, 1998). Availability of sufficient information about maternal deaths led to a comprehensive understanding of the magnitude and spatial distribution of maternal mortality. This in turn increased public awareness of the problem and created political pressure to address the same. In terms of the technical factor, mortality reduction was supported by qualified obstetric care and accessible skilled attendance and emergency obstetrical care. Developing countries mostly do not have sufficient data on maternal death (De Brouwere, Tonglet & Van Lerberghe, 1998). This has created a lower political support for improving maternal health. In addition, some interventions in developing countries are also less effective to reduce maternal

mortality. Antenatal care (ANC), which is aimed to identify possible complications of pregnancy, is not carried out according to the recommended timing and frequency[2]. Thus, the ability of ANC to predict obstetric complications is low. Another intervention, i.e., trained traditional birth attendance, is also problematic due to lack of trained birth attendants and lack of supervision, which, in some cases leads to delays in referral for complications. Therefore, the level of maternal mortality in developing countries is still comparable to that of developed countries in the early 20th century.

An analysis of the trends in maternal mortality in developed countries shows similar results, i.e., the dramatic reduction has been mostly due to the provision of high quality maternal care (Loudon, 2000, pp. 241S-6S). Standard of living has been found to have had a very little influence on this achievement. In general the analysis indicates that standard maternal care is an effective way to reduce mortality.

A few developing countries including Malaysia and Sri Lanka have been successful in reducing maternal mortality rapidly. The success has been achieved by removing the barriers to accessing health care and by increasing the utilization of health facilities (Pathmanathan et al., 2003). Governments in these countries focused on providing healthcare to disadvantaged groups so that the poor could obtain the benefits of health interventions. This intervention also resulted in a narrowing of disparities between provinces. Ensuring access to health facilities is done by providing free of cost, reachable health services for rural and remote areas, by eliminating cultural barriers and by mobilising communities. Increasing the usage of health facilities goes hand in hand with improving the quality of health services, supported by adequate budget. These countries also responded to local needs, which means that different priorities can be applied in different regions (Pathmanathan et al., 2003, p. 309). Therefore, it is important to do sub-national analysis to select pragmatic interventions which are effective to reduce maternal mortality at sub-national levels.

[2] The WHO recommends at least one antenatal care (ANC) in each trimester of pregnancy and a total of four ANC.

A cohort study in Bangladesh is aimed at identifying the underlying factors of maternal mortality reduction from 1976 to 2005 (Chowdhury et al., 2007). The study covered two areas, one served by International Centre for Diarrhoeal Disease Research, Bangladesh (ICDDR, B) and the other by the government. The study found that maternal mortality varied by educational background and pregnancy characteristics of the women, with high maternal mortality for women with less than 8 years of education, and high maternal mortality for women with their first pregnancy and pregnancy at very young or old ages. The other, important findings of this study are that the reduction in maternal mortality during 1976-2005 was mainly due to a decline in the number of abortion-related deaths and an increase in emergency obstetric care. The reduction in abortion-related deaths is also attributed to the accessibility of family planning, which reduced the incidence of unwanted/unplanned pregnancies that could end up in (unsafe) abortion. The authors of this article claim that the safe motherhood program to increase the number of skilled birth attendance and shift the place of birth from home to health facilities only played a minor role in this maternal mortality reduction.

Some case control studies have been conducted to understand the causes of maternal deaths. A nested case control study about maternal deaths and surviving women in Pakistan used multilevel analysis to identify the influence of district-level and individual-level variables on maternal mortality (Midhet, Becker & Berendes, 1998). The result of the study shows that reductions in maternal death can be achieved by better staffing at peripheral facilities and through better access to emergency obstetric care (EmOC) for high risk women.

A similar result emerges from study in India in which maternal deaths were found to be associated with longer delays in seeking health care and receiving treatment than the surviving women. The maternal deaths also had longer distances to travel to obtain appropriate treatment and to travel to more places for obtaining referrals (Ganatra, Coyaji & Rao, 1998). Another research in India reveals maternal deaths arose from several conditions such as less knowledge about the risks of maternal death and financial constrains to access health care (Jeffery & Jeffery, 2010). Low utilization of health care also stems from improper conduct of health personnel.

This research strongly urged that the government must improve the quality and accessibility of health facilities to reduce mortality.

A study in China reveals that the disparity in maternal mortality between regions is influenced by women's knowledge about pregnancy and the quality of health personnel (Liang et al., 2011). This study grouped the explanatory variables of knowledge/skills, attitude, resource and management in three different domain namely; individual, health institution and social departments which consist of government institution such as department of transportation, family planning board or working committee on women and child health. The result shows that preventable maternal mortality in remote areas is mostly attributable to improper knowledge of individual/family and medical staff. Women's economic condition also emerges as an underlying factor of preventable maternal mortality in this region. At the level of health institutions, low quality of medical staff is the main reason of maternal deaths in coastal and inland regions of China. This finding indicates that improving knowledge/skills of both individual/family and health personnel can narrow the gap of maternal mortality between regions.

In France, geographic gaps in maternal mortality are found to be caused by disparities in the provision of maternal healthcare. This conclusion comes from a study to explain the causes of avoidable maternal deaths (Saucedo, Deneux-Tharaux & Bouvier-Colle, 2012). The analysis is presented for three different regions namely, Ill-de-France, Overseas districts and the rest of continental France. Delay in obtaining treatment is the major cause of postpartum mortality in Ill-de-France. In contrast, the leading cause of maternal mortality in the other regions is insufficient treatment. This result may lead to different interventions between regions to improve maternal health. In this study individual characteristics of women were not found to explain the mortality differentials across regions. However, this lack of explanation may be caused by incomplete details of women's characteristics.

Disparities in maternal mortality are also found to occur between races. A study in the USA to explain the disparity in maternal mortality between white and black populations confirms that high risk pregnancy is an important determinant of maternal death. The disparity in maternal mortality between the two population

groups is low for high risk pregnancies but the opposite is true for low risk pregnancies (Saftlas, Koonin & Atrash, 2000). Among women having high parity and low-birth-weight babies, the maternal death is high and there is no significant gap between white and black populations in this regard. This result concludes that reducing maternal deaths must be done by avoiding high risk pregnancies since this factor causes more maternal deaths for both the population groups. The study recommends that other factors such as medical care and socio economic background must be taken into consideration in the analysis to understand the gap between the white and black populations, especially for women with low risk pregnancies.

Further literature on mortality differentials shows that wealth is related to better health status. However, statistics show that regional economic indicators do not always go hand in hand with health status indicators. By using GNP per capita to represent economic condition and infant mortality rate to indicate health status, (Caldwell, 1986) compares two groups of countries which have superior and poor health achievement. The data show that some countries with low GNP per capita, such as Sri Lanka, China, Costa Rica, Jamaica, India and Thailand have lower infant mortality than many countries in the Middle East who have much higher GNP per capita. A similar analysis using more up to date information (Kuhn, 2010) provides a result consistent with that of Caldwell. This shows that economic growth is not the only means of lowering mortality.

The above explanation by Caldwell may also be applied to maternal mortality analysis. Many studies have shown the importance of economic status, both at regional and individual levels to affect the level of maternal health (D'Ambruoso, Byass & Qomariyah, 2010; Hay, 1999; Ronsmans, Scott, Qomariyah, et al., 2009; Supratikto et al., 2002). In Nairobi, Kenya, the reason for the poor to have worse maternal outcomes has been linked to economic burden related to physical workload during pregnancy (Izugbara & Ngilangwa 2010). The poor women have to work hard to earn money during pregnancy. Financial hardships also stimulate domestic violence since the husbands have been said to be more vulnerable to extreme frustration and depression. In addition, discrimination from health providers for the poor stems from their inability to pay for health care. However, these studies cited

above also reveal that maternal mortality is determined by many other factors in besides economic factors.

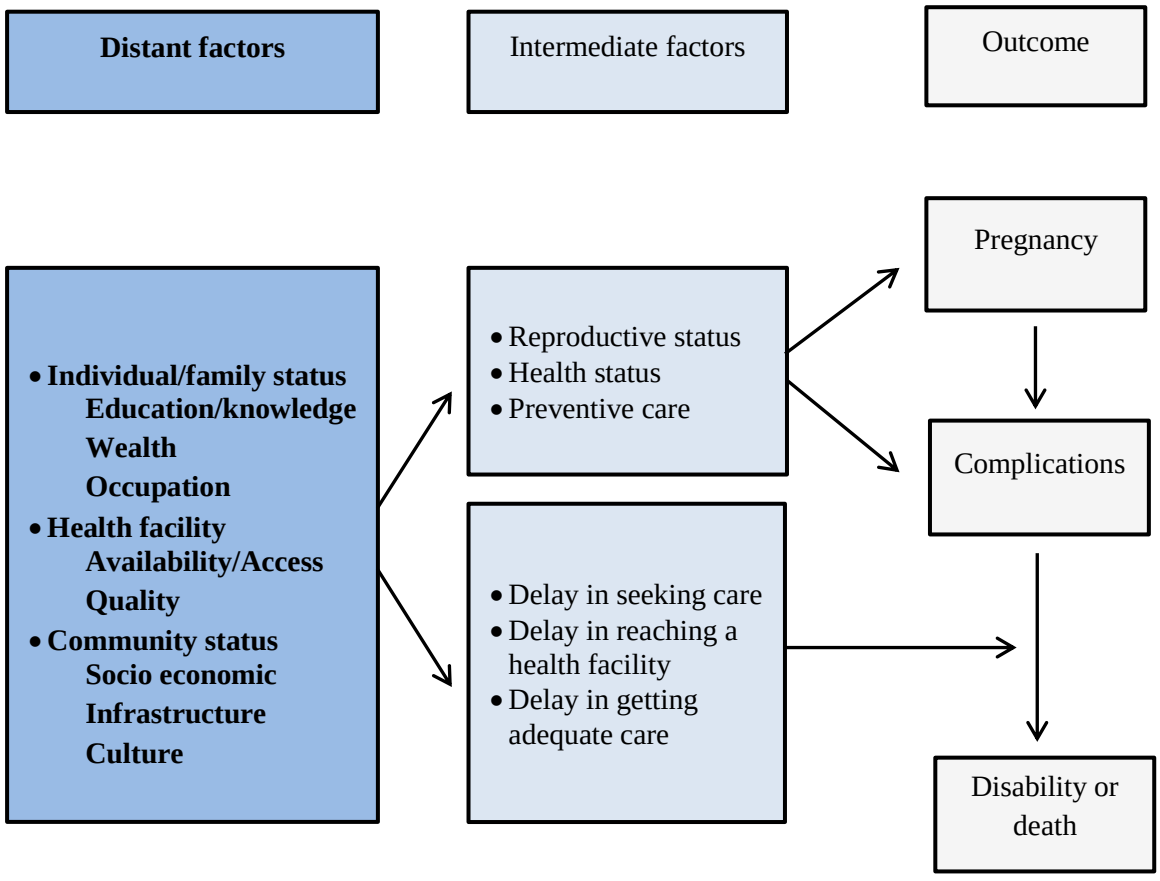
Since maternal health is a component of women's health, the individual characteristics of women such as women's empowerment also attract substantial attention. Women's empowerment is defined as: 'the capacity of individual women or of women as a group to resist the arbitrary imposition of controls on their behaviour or the denial of their rights, to challenge the power of others if it is deemed illegitimate, and to resolve a situation in their favour' (Dixon-Mueller, 1998). Empowerment contains two components, agency and resources (Lee-Rife, 2010, p. 635). Agency indicates women's ability to act for achieving certain goals and resource is a precondition or an enabling factor which supports agency. In the many studies, women's empowerment is frequently indicated by such dimensions as self-esteem, decision making, control of resources and mobility (Mahmud, Shah & Becker, 2012; Malhotra, Schuler & Boender, 2002).

Many studies have shown that women's empowerment plays an important role in determining maternal health (Bloom, Wypij & Gupta, 2001; Furuta & Salway, 2006; Marcie & Anyanwu, 2009; Obermeyer, 1993; Pembe et al., 2008; Sharma, Sawangdee & Sirirassamee, 2007). These studies reveal that low empowerment leads to a lower ability to access adequate health care. This is true also for Indonesia (Sugiyarto, 2005). Data collected at Indonesian Demographic and Health Surveys show that women's empowerment variables are powerful determinants of the use of modern health services by women with pregnancy complications. The effect of these variables is consistently significant even after controlling for socio economic variables. This result indicates that household wealth acts as an enabling economic condition for women to access modern health care but this must be accompanied by women's capability to use the economic resources.

To sum up, a reduction in maternal mortality is influenced by women's reproductive status, health status and medical care. Age at pregnancy, birth spacing and parity are some of the variables of reproductive status which indicate the risk of pregnancy related mortality. Women with lower risk also have lower propensity for maternal deaths. On the other hand, medical treatment such as antenatal, delivery and

postnatal care are very important to reduce health problems and treat unexpected complications. Since the majority of maternal deaths are caused by preventable complications, adequate medical treatment effectively avoids maternal mortality. Women's reproductive status, health status and medical care are in turn affected by several factors acting at individual, familial and regional levels. Economic condition, culture or social norm and knowledge are intertwined with one another to affect women's reproductive status. Similar is the case for medical care. In addition to these, the availability, accessibility and quality of health facilities impact the effectiveness of medical care to reduce maternal mortality. This condition is determined not only by individual/familial characteristics such as economic level, education, knowledge/attitude toward modern health care but also by regional conditions such as distance, transportation, range and quality of treatment provided in health facilities.

Figure 3. 2 Determinants of maternal mortality in West Java, Indonesia: summary based on the three-delays model, the proximate determinants framework and evidence based study on maternal mortality



Sources: : Adapted from (McCarthy & Maine, 1992; Thaddeus & Maine, 1994)

3.4. Maternal Mortality in Indonesia

3.4.1 Causes of Maternal mortality

Maternal mortality can be caused by direct or indirect obstetric complications. Direct obstetric death is defined as "those resulting from obstetric complications of the pregnant state, from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above" (WHO, 1993, p. 99). The indirect obstetric deaths are stimulated by pre-existing diseases previous to a pregnancy or diseases developed during a pregnancy as result of physiological effects of pregnancy.

Based on available studies, direct obstetric causes are the main causes of maternal deaths in Indonesia (Chi, Agoestina & Harbin, 1981; Fortney et al., 1988; Supratikto et al., 2002; Taguchi et al., 2003). Haemorrhage, sepsis and hypertensive diseases (eclampsia and preeclampsia) account for the largest proportion of maternal deaths ranging from around 40% to 70% (see Table 3.2). Therefore, in order to reduce maternal mortality in Indonesia, interventions must be focussed on handling these causes of death. Reducing the fatality rates of haemorrhage, sepsis and hypertensive disease would accelerate decline in maternal mortality. Since these causes of death are preventable, obtaining adequate treatment at the right time must be guaranteed. Achieving this outcome would depend on two approaches. The first approach is the supply side approach which deals with providing accessible and qualified health treatment. Accessibility is a complex concept since it must consider financial aspects like cost, physical aspects like distance, timeframe aspects like waiting time whenever needed and social aspects like discrimination or different treatment between groups. The quality of a health facility is determined by the availability of equipment, drugs and staff, all of which are interdependent on one another to provide the needed treatment. The second approach is the demand approach to use medical care. Demand is influenced by many factors such as knowledge and attitude about modern health treatment, individual characteristic such as education, economic condition, and authority intertwined with regional conditions like culture or social values, all of which determine demand. Therefore, reducing maternal mortality is not solely influenced by medical care but also a wider context of factors for which an understanding of social and cultural background is needed.

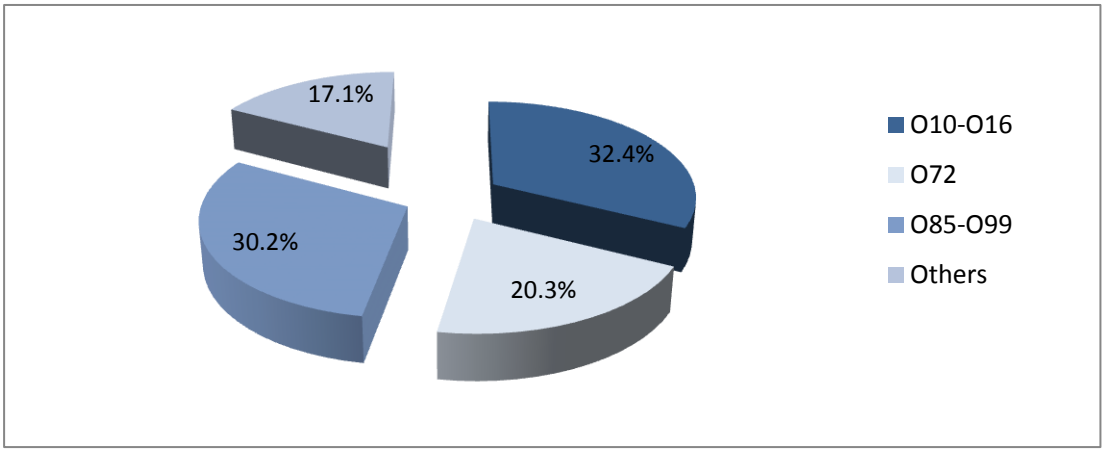
Table 3. 2 Major Causes of maternal mortality in Indonesia

Region	Year	Major causes	Source
Surabaya	1996 -1999	**Direct:** Eclampsia (35 %); Hemorrhage (20.6 %); Puerperal Sepsis (9.3 %); Ruptured Uterus (5.2 %) **Indirect:** Cardiac dysfunction (9.3 %); Tuberculosis (3.1 %).	Taguchi et al. (2003)
Bali	1980-1982	**Direct:** Hemorrhage (49 %); Sepsis (14 %); preeclampsia (5 %) **Indirect:** Infection such as chest infection, hepatitis, intestinal infection (9 %); diseases of circulatory system (6 %)	Fortney et al. (1988)
12 Teaching hospitals in 11 Provinces	1977-1980	**Direct:** Hemorrhage (30.4 %); infection (22.2 %); preeclampsia (16.3 %) **Indirect:** Cardiovascular disease (2,2 %)	Chi, Agoestina and Harbin (1981)
Serang & Pandeglang	2005-2006	**Direct:** Sepsis (28.1 %); Hemorrhage (12.5 %); pregnancy induced hypertension (3.8 %) **Indirect:** Malaria (7.5 %); Cardiovascular disease (5.9 %); diabetes (5.9 %)	D'Ambruoso et al. (2010)
Banjar, Barito Kuala & Hulu Sungai Selatan	1995 - 1999	**Direct:** Hemorrhage (40.8 %); Hypertensive diseases (32.3 %); Sepsis (5.7 %) **Indirect** -	Supratikto et al. (2002)

The most recent data on causes of maternal mortality published by the National Institute of Health Research and Development (NIHRD) (AIPI & NRC, 2013) provide similar information about causes of maternal deaths as that obtained from previous studies.. These data investigate the causes of maternal deaths recorded at the 2010 Population Census of Indonesia. These causes of death are based on the 10th Revision of International Classification of Diseases (ICD-10). According to these data the leading causes of maternal death in Indonesia in 2010 were: hypertensive disorders of pregnancy and postpartum haemorrhage (AIPI & NRC, 2013). Nearly a third of the maternal deaths was caused by diseases classified in ICD code O10-O16, which consists of complications stimulated by pre-existing hypertension or gestational oedema and proteinuria without hypertension. Eclampsia and pre-eclampsia also belong to this group. Bleeding or postpartum haemorrhage (ICD-O72) caused more than 20% of maternal deaths in 2010. This means that hypertension related complications and bleeding were responsible for more than a half of maternal

deaths in Indonesia in 2010. Puerperal sepsis (ICD-O85) and puerperal infection (ICD-O86) which were commonly found as major problems in previous studies also appear as major causes of maternal deaths recorded at the 2010 Population Census of Indonesia.. The four leading causes of maternal deaths in Indonesia 2010 are shown in Figure 3.3. Overall, the data reveal that 77.2% of maternal deaths were attributable to direct obstetric causes of death (AIPI & NRC, 2013).

Figure 3. 3 Major Causes of Maternal Mortality in Indonesia according to international Classification of Diseases, 10th Revision (ICD-10)



Source: (AIPI & NRC, 2013)

3.4.2 Determinants of maternal mortality in Indonesia

A study on maternal mortality in West Nusa Tenggara shows that a maternal death is preceded by a set of complex factors. Many characteristics of the woman including her socio-cultural background are interconnected and present an unfavourable condition for adequate care during delivery (Hay, 1999, pp. 267-72). This analysis is based on two cases of maternal deaths which have different settings in the research areas. In the first case, medical care is inaccessible. The distance and lack of transportation to reach a health facility impeded skilled birth attendance. Moreover, the reachable facility cannot guarantee use the of medical care. Pregnant women still prefer to be assisted by traditional birth attendants and give birth at home. There are several reasons why pregnant women did not receive adequate treatment at the right time. Firstly, there is a complex mechanism in the community to find the right treatment. People discuss many possible problems and solutions based on their culture and traditional belief. People's voices during these discussions are important, even midwives need this legitimation to give treatment. Secondly, cost becomes a

main consideration in accessing medical care. Third, people's preference is influenced by trust regarding professional maternal care. A traditional birth attendant (TBA) is considered more capable and experienced to manage a delivery. People also find it difficult to adjust to the modern care because they are not so familiar with a modern health facility and they feel uncomfortable to give birth in a health facility. In the second case of the above-mentioned study, low quality of health personnel and inadequate equipment contributed for maternal deaths. The needed medicines were not available and to some extent the midwife was not fully confident to provide the needed medical treatment. In a wider context, both these maternal deaths had some similarity in that they happened to older women with high parities.

A similar situation prevails in the provinces of Banten and South Kalimantan. By using three delays framework (Thaddeus & Maine, 1994), the study in Banten province shows that 45 %, 66 % and 44 % of respondents reported delays in seeking care; to reach heath facility and to receive adequate treatment respectively (D'Ambruoso et al., 2010, p. 1732). Economic status was the main reason for these delays since around 20 % of the respondent reported that cost caused the Phases I and Phase II delays. For Phase III delay, nearly 60 % of the respondent reported that lack of money led to the delay. The availability of insurance for the poor does not increase their access to medical care since the stigma of being poor to use the insurance was not acceptable to these respondents. Some respondents also believed that the use of health insurance would reduce the quality of provided care. In addition, transportation, distance and quality of health facility are also important factors in accessing medical care.

In this province (Banten), social and culture backgrounds play an important role in influencing maternal deaths (D'Ambruoso, Byass & Qomariyah, 2010, p. 228). People's perception of preventable diseases as fate, or God's Will leads to low demand for health care. The social construction about women's responsibility to do domestic jobs and to look after the children at home also emerges as a reason for home delivery. In South Kalimantan province, the delay in decision making and obtaining adequate care emerges as a crucial factor in maternal death. The underlying factor for the delays relate to lack of knowledge on danger sign, economic constraint, refusal to seek medical care and quality of health facility (Supratikto et al., 2002, p.

231). Moreover, unavailability of health staff, inadequate care and inappropriate protocols also emerged as important factors in the delays. In general, the studies in Banten and South Kalimantan show that even though the medical causes of maternal mortality are preventable, solving this problem must involve a wider context including economic, social and cultural aspects, and not only providing medical care.

The condition in West Java Provinces is not much different. A study to find out the underlying factor on 53 maternal deaths was done by applying Rashomon technique to interview the witnesses (Iskandar et al., 1996, pp. 55-85). The majority of deaths are caused by haemorrhage, sepsis and hypertensive disease. These preventable causes lead to fatality since pregnant women do not obtain appropriate care. In case of haemorrhage, women are often late to be referred to a health facility since they are unsure about the amount of blood lost which may lead reluctance to seek care. Moreover, once the woman is already in a health facility, it is not guaranteed to save her life since sometimes blood is not available for transfusion. For infection or sepsis, the cases mostly stem from harmful traditional practices. Women get exposed to unhygienic care since the majority of the deliveries are assisted by traditional birth attendants. In addition, the study also shows that some infections come from unsafe abortions, especially to terminate unwanted pregnancies. For hypertensive diseases, the fatality rate is strongly determined by lack of women's knowledge about the danger signs. Serious dizziness, headaches, swollen body or low vision during pregnancy is not seen as dangerous symptoms and are considered to become right by themselves. It is common to rely on traditional herbal medicine to relieve such symptoms. This study also shows that nearly 10% of maternal deaths are attributable to unsafe abortion. Since abortion is illegal in Indonesia, it is usually performed by traditional healers or by drinking traditional herbal abortifacient. This harmful practice can put pregnant women in danger. But such women do not seek proper medical care since they feel ashamed or guilty. In a wider context, the occurrence of maternal death is reinforced by poverty which leads to reluctance to seek care and makes it difficult to overcome the barriers of distance or transportation.

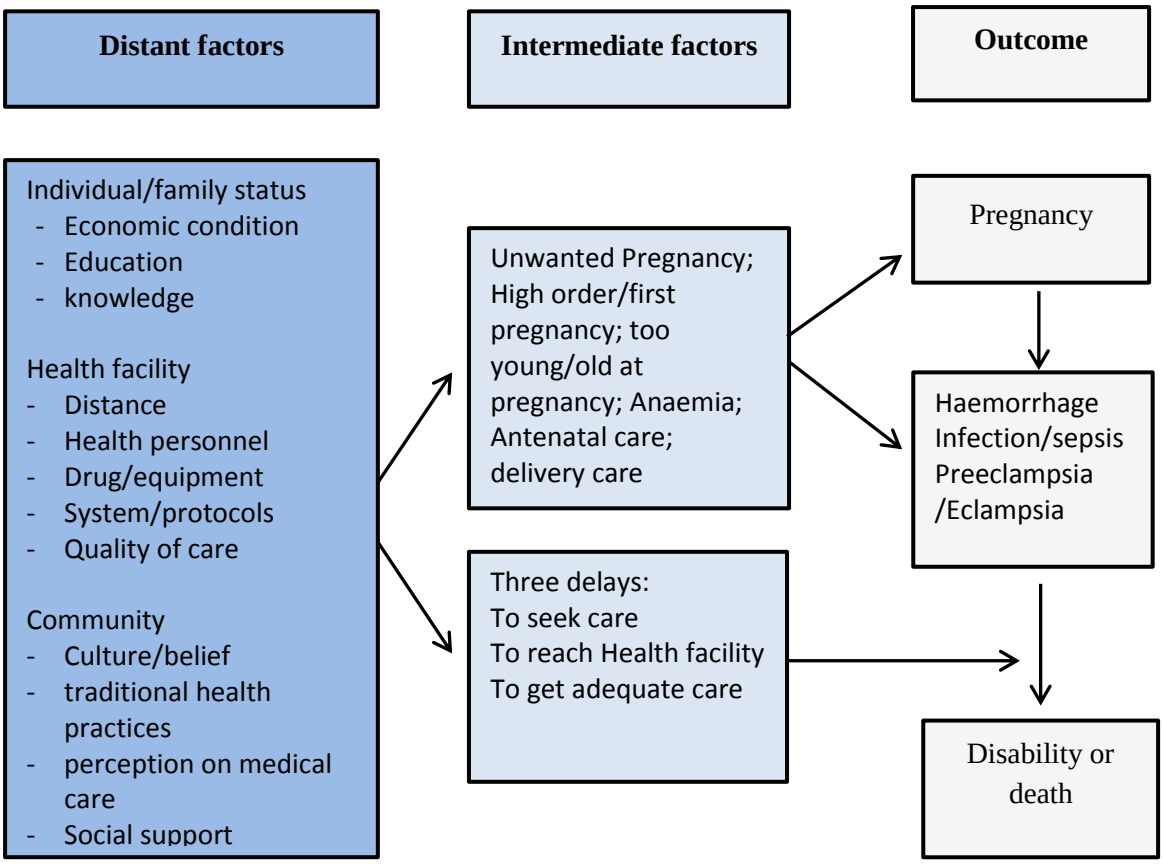
The study in West Java constructed the factors causing maternal deaths (Iskandar et al., 1996, pp. 86-92). The first factor comes from the provider. In other words, the inability of the midwife and paramedic personnel to provide essential emergency

obstetric care, the inability of hospital personnel to perform live saving care and the unavailability of basic medicine for emergency obstetric care are responsible for maternal deaths. The second factor comprises community and clients. Poverty is the main reason for relying on traditional treatment. In addition, lack of knowledge about safe motherhood issues is also important to affect health seeking behaviour.

Table 3. 3 Determinant of Maternal Mortality in Indonesia based on available studies

Studies	Distant Determinants	Proximate Determinant
Chi, Agoestina & Harbin (1981)	- Rural areas have higher MMR	- High for women younger than 20 and older than 35 year old. - Slightly higher for parity one and increase hand in hand with the number parity. - High mortality for women suffers from anaemia. - Lower mortality for women made antenatal care. - Higher mortality for women referred to GP.
Fortney et al. (1988)	- Higher for areas furthest from the hospital	- Risk factor relate to age and parity
Taguchi et al. (2003)	- The cases of maternal death have residence further to hospital and lower education level than the controls. - The cases also tend to be unemployed.	- The cases have less frequent visit of antenatal care.
Ronsmans et al (2009)	- Maternal mortality high for the poor, low education and rural or remote areas residence.	- Mortality high for women gets assistance from health professional**.**
Hernawati (2010)		- Maternal mortality has strong correlation with assistance at birth and place of delivery.
Supratikto et al (2002)	- Economic condition, knowledge, perception about health care and distance to health facility contribute to maternal deaths	- The low quality of health services and unavailability of health personnel lead to maternal deaths
D'ambrouso et al (2010)	- Perception about preventable disease - Economic condition - Transportation and distance	- Quality of health facility
Hay (1999)	- Poverty - Transportation and distance - Traditional belief	- Health personnel qualification and inadequate drug/equipment
Iskandar et al (1996)	- Poverty - Distance and transportation - Lack of preparation - Harmful Traditional practices - Lack of knowledge on reproductive health	- Unwanted pregnancy - Relying on TBA - Low quality of medical care - Inability of health personnel

Figure 3. 4 Framework of Maternal Mortality in Indonesia: A summary based on previous studies



A study was conducted in 2011 to analyse the factors of inequalities in maternal mortality in Indonesia (Hernawati, 2011). This study is based on an empirical data analysis with province as the unit of analysis. The results show that the inequalities in maternal mortality between provinces in Indonesia can be explained by inequalities in skilled birth attendance, place delivery and percentage of caesarean section deliveries. However, these variables only explain about 48 % of the variability in maternal mortality. It means that more than a half of data variability is still unexplainable. In addition, the coverage of obstetric care fails to explain the variability of maternal mortality. Theoretically, it should be an important variable. It may also indicate that the quality of provided obstetric care is inadequate.

3.5 Health Inequality

In research, the terms inequality and inequity are used interchangeably. These terms have similar meanings, which show the existence of disparity. However, some

scholars differentiate it (Arokiasamy & Pradhan, 2011; Deaton, 2002). Inequality and equality more likely refer to the magnitude or degree of disparity. It simply represents a measurement dimension. On the other hand inequity and equity are more complex concepts because it refers to a commitment to social justice or fairness. The present uses both terminologies because in the initial stages, it deals with the measurement of disparity. Measurement is important to understand the magnitude of the problem and identify the differential or determinants (Asamoah et al., 2011). However, the main aim of this research is to reduce the health disparity under the concept health for all. In that context, it is appropriate to use the term inequity when dealing with fairness.

(Whitehead, 1992) defines the term inequity as being embedded with moral and ethical dimensions. Therefore inequity may be taken to represent unnecessary and avoidable disparity. According to this concept differences rooted in natural or biological variations, voluntarily chosen harmful behaviour, and temporary health advancement of one group over another after adopting a health-promoting behaviour are categorized as inevitable disparities. On the other hand, the disparities because due to health-damaging behaviour as a consequence of limited choices, unhealthy environment and insufficient access to essential health care are grouped as avoidable disparities.

Justice and fairness provide the basis for reducing/eliminating health inequities. John Rawls' theory of justice provides the most influential approach to review the importance of equity. This theory focuses on the basic structure of society to accommodate equality and freedom (Robeyns, 2009). The basic structure of society refers to the manner in which the main political and social institutions work to achieve social cooperation, basic human rights and duties, and allocate advantages emanating from social cooperation (Robeyns, 2009). Thus, equality and freedom are provided through a fair, basic structure of society. This can facilitate a fair distribution of primary goods required to create justice (Ruger, 2004a). "Primary goods, consisting of basic rights and liberty, freedom of movement and choice of occupation, power and responsibility, income and wealth, and the social bases of self-respect, are distributed on the basis of fair equality of opportunity" (Robeyns, 2009; Ruger, 2004a).

The theory of justice is also concerned with minimising socioeconomic inequalities to address health inequities. This is one focus of the Commission on Social Determinants of Health (CSDH) to create health for all. In one of the reports published by CSDH, the World Health Organisation emphasised the reduction of health inequities by closing the gap across regions and across social gradients (Solar & Irvin, 2010). There are three recommendations as guideline to create health equity. The first is to improve daily living to reduce the existing gap between groups that gets accumulated during life (Solar & Irvin, 2010). The second recommendation is to address unbalanced access to power, money and resources across the social gradient, which may lead to inequity. The third recommendation is the crucial recommendation to measure the degree of unbalanced access and understand the determinants of health inequity prevailing in the population. This knowledge is useful for understanding the problem and for evaluating the implementation of programs aimed at reducing inequity. The CSDH mentions that "countries without basic data on mortality and morbidity by socioeconomic indicators have difficulties moving forward on the health equity agenda" (CSDH, 2008).

Amartya Sen has proposed a different approach to tackle health inequity. He calls it the capabilities approach which is defined as *"a set of vectors of functionings, reflecting the person's freedom to lead one type of life or another"(Sen, 1992).* This concept introduces individual agency, which means the ability to make important decisions about health habits and risks, lifestyle, individual priorities, and treatments options (Ruger, 2004b). Ruger (2004b) also mentions that the provision of health care is not the only determinant of health equity. Even though the influence of health care on health improvement cannot be denied, the availability of healthcare should not be assumed as the only factor affecting health status. Addressing health inequity needs further information about the root causes of inequities, such as socio-economic factors, individual characteristics, health seeking behaviour.

The importance of health equity can be assessed from its negative effect. At a macro level, health inequality can hamper economic growth (Grimm, 2011). This inference comes from robust statistical analysis. The rationale is that health influences people's productivity and income. The aggregate effect at population level

impacts economic development and growth. Therefore, Grimm also suggests that inequalities in accessing health care should be reduced. However, another study has found that health inequality increases hand in hand with economic growth and the widening of the gap in wealth distribution in China (Fang et al., 2010). It shows overall that health inequality might not affect economic growth but that inequalities in income might explain the health inequality. Regional health inequality is seen to stem from several factors such as health resources and health services delivery and not solely from economic disparity (Arokiasamy & Pradhan, 2011; Fang et al., 2010).

One popular indicator which is used frequently in studies on health inequity is socio-economic status. Stratification of households or regions based on socio-economic status represents different levels of exposure and vulnerability to illness or disease. Previous studies have shown that populations in low economic status also have worse health status compared to the other groups (Anwar et al., 2008; Humphries & van Doorslaer, 2000; Mahmud Khan et al., 2006; Schellenberg et al., 2003; Van de Poel, O'Donnell & Van Doorslaer, 2007). This condition stems from the low capability of the disadvantaged group to access health services. For example in Namibia, the affluent groups and urban dwellers have better access to skilled birth attendance than poorer population groups (Zere et al., 2011).

On the other hand, some scholars have doubts about the importance of income to impact health status. A study in Latin America indicates that income inequity and poverty did not have significant effects on health (Biggs et al., 2010). Therefore, the context of study should be widened. This suggestion is in line with another study that income has a role in determining health inequality but it does not assume the central causal status to determine the same (Coburn, 2004). Thus, it is important to address the question about what is the mechanism to bridge the gap between wealth and health through some intervening variables (Biggs et al., 2010).

3.5.1 Health Inequality in Indonesia

According to previous research, health inequality is also apparent in Indonesia, where socio-economic status of a person emerges as an important determinant of health inequality. Economic capability is useful to facilitate utilization of adequate

care. This has been shown in previous studies such as accessing health facility in general (Pardosi, Parr & Muhidin, 2014), qualified or modern care (Seeberg et al., 2014), preventive care for children (Aryastami, 2002), modern contraceptive (Hotchkiss, Godha & Do, 2011) or in more specific cases like dental treatment (Maharani & Rahardjo, 2012) and cardiovascular care (Maharani & Tampubolon, 2014). In addition, socio economic status has been found to influence the process of physical development and nutritional deficiency (Mani, 2014) or child cognitive functions (Maika et al., 2013). Because economic status plays a crucial role in impacting health seeking behaviour and the process of human growth, health inequalities in many indicators of health outcome such as infant mortality rate, neonatal mortality rate, under-5 mortality rate, health index and self-rated health are also stimulated from the socio economic gradient of a population, household or individual (Hotchkiss, Godha & Do, 2011; Maharani & Tampubolon, 2014; Maika et al., 2013; Nguyen et al., 2011). There are several variables which are used to illustrate the socio-economic condition of a population such as wealth index, income, expenditure per capita and household assets. Education, especially maternal education also appears as a socio-economic variable that plays a crucial role to affect health inequity (Chung, 2004; Jusot, Mage-bertomeu & Menendez, 2014). In brief, socio-economic status affects health status in many stages of the human life cycles and the gradient of economic status affects the existence of health inequity.

Another factor which determines the occurrence of health inequity is place of residence. People who live in urban areas are more likely to have healthier lives than rural people (Hodge et al., 2014a; WHO, 2007). Since Indonesia consists of thousands of islands, health inequality in Indonesia is also obvious across islands. The people of Java and Bali, which are more developed than other islands, have better health status than people living outside Java and Bali (Houweling et al., 2006; Jusot, Mage-bertomeu & Menendez, 2014). The underlying reason for this inequality is that urban areas of Indonesia and the islands of Java and Bali have more advanced health facilities than rural areas and the other islands. However, the availability of health services is not always a guarantee for adequate healthcare. For example, it has been shown that accessing cardiovascular care is not much influenced by the density of healthcare facilities and physicians (Maharani & Tampubolon, 2014). Rather, the propensity of getting cardiovascular care is affected by income and possession of

health insurance. People living in urban areas have better access to cardiovascular care, but that is not due to the availability of facilities or doctors. It is more likely triggered by the ability to deal with the costs of cardiovascular care.

At a micro level, housing condition or housing facility also plays an important role in determining health inequality in Indonesia. For example, it is revealed that availability toys and quality of the household are associated with early child development and early age mortality (Fernald et al., 2012). This finding indicates the importance of material circumstances to achieve better health status.

The importance of behavioural and biological factors to determine health inequality in Indonesia has also been identified in some studies. Smoking is shown to have a negative impact for self-rated health status (Chung, 2004). The opposite is true for behaviour about drinking boiled water. Similarly, some behaviours related to women's reproductive functions such as breast feeding, birth interval and parity have also been found to be associated with the incidence of child mortality (Nguyen et al., 2011). Similar is the case for utilization of modern treatment like antenatal care and facility-based delivery which are beneficial for reducing child mortality (Pardosi, Parr & Muhidin, 2014). On the other hand, people's behaviour of relying on traditional care may prove detrimental to child health and associated with the occurrence of child mortality (Assan et al., 2009). While there is much evidence about the role of behaviour as a factor in health, the literature showing the impact of biological factor is rare in Indonesian studies. However, there is a study showing that parental height is an explanatory variable of height for age (Mani, 2014). This finding illustrates the role of inherited genetic disposition to determine a child's height development.

Another factor which belongs to social determinants of health inequity is the psychological factor or social environments which consist of psychosocial stressor like negative life event, stressful living circumstance such as in debt and lack of social support. A research reveals the importance of family care index or parental support for early child development (Fernald et al., 2012), which shows that the provision of parental stimulation and care is significant for explaining the inequality in child development. Family care index (which consists of engaging in stimulating

activities with adults), having children's book and playing with toys have positive impacts on children's development. This provides a less stressful environment for children and stimulates the brain and physical activities all of which are beneficial for child development. A summary of the findings of various socio-economic factors influencing health inequality is presented in Table 3.4.

3.6 Conclusion

The time-frame for MDGs has closed in 2015. However, the global attention on maternal health has not ended. This is evident from the inclusion of reducing maternal mortality ratio to less than 70 per 100,000 live births by 2030 as one of the targets of the new Sustainable Development Goal (SDG) to ensure healthy lives and promote the well-being of all at all ages (UN, 2015). The recognition of the importance of maternal health for future development can also be illustrated from the SDG objective to ensure universal access to reproductive health and reproductive rights (UN, 2015), which is to be accomplished under goal number 5 to achieving gender equality and empowering all women and girls.

The inclusion of maternal health in future development agenda is not without reason. As described above, maternal health is crucial for assuring the accomplishment of development goal in general. Maternal health can act as catalyst to boast economic growth. Whereas, the fact remains that recent indicators of maternal health still illustrate the deprivation of good health to women in many regions of the world. An obvious problem of maternal health is the great inequality existing across regions or socio economic groups. Indonesia is no exception to this.

Based on the trend in MMR and its most recent estimate, Indonesia is found not to have achieved the MDG target of reducing its MMR by two-thirds between 1990 and 2015. This lack of success must not be repeated for SDG. In this connection, knowledge about the determinants of maternal health inequality would be important to provide the most effective programs which would assist with the achievement of SDG.

The above literature review contained in this chapter provides a summary of established frameworks to analyse maternal mortality and health inequality. In

addition, some previous research in Indonesia is presented to build a good foundation for further research.

To sum up, the maternal mortality in Indonesia is affected by some distant determinants such as individual characteristics, availability and quality of health provision, and social construction in the community which influence health care practice and health seeking behaviours. Those distant determinants affect maternal health through intermediate factors such as maternal care, reproductive health and occurrence of delays which halt the women to receive adequate and needed care.

Furthermore, the health inequality in Indonesia is mostly sourced from the disparity of socio economic position which can be illustrated by income, wealth (assets possession) or educational level. The gradient in socio economic position impacts the material circumstances, behavioural and biological factors and psychological factors. This premise has been used to analyse maternal health inequality in the research areas chosen for the present study.

Table 3. 4 Previous Research on Socio Determinant of Heath Inequality in Indonesia

Author	Method and Data Source	Health Inequity	Socio determinant of health			
			Socio economic factors	Material circumstances	Behavioural and Biological factors	Psychological factors
Pardosi, Parr and Muhidin (2014)	Qualitative analysis based on interview.	Early age mortality; Infant Mortality, Neo-natal mortality and under-5 mortality	Financial difficulty to access health services	Poor housing condition; geographic inequities of health facilities; free public health insurance	Utilization of traditional care	-
Houweling et al. (2006)	Quantitative analysis of IDHS 1987-1997	Under-5 Mortality	Maternal education; Household wealth	Island division; Java/Bali vs the other islands	-	-
WHO (2007)	Quantitative analysis of IDHS 2002-2003	Infant and Under-5 mortality; Immunization; birth delivery	Wealth quintile; education	Rural/urban	-	-
Aryastami (2002)	Quantitative analysis of IDHS 1997	Access to preventive care for children 12-23 months	Wealth; education	-	-	-
Fernald et al. (2012)	Quantitative analysis of primary data	Early child development (3-23 months)	Wealth score	Availability of Toys; child's books.	-	Parental care or stimulation.
Hodge et al. (2014a)	Quantitative analysis of IDHS 1980-2011	Under-5 and neonatal mortality	Wealth; Maternal Education	Rural/urban location; Island Division	-	-
Mani (2014)	Quantitative analysis of Indonesian Family Life Survey 1993,1997 and 2000	Child health; height for age z score and nutritional deficiency	Household economic status and assets	Physical environment; paved roads and availability of electricity	Parental Height	-
Maika et al. (2013)	Quantitative analysis of Indonesian Family Life Survey 2000 and 2007	Child cognitive function	Expenditure per capita; maternal education.	Rural/urban; Island division; Housing condition	-	-
Maharani and Rahardjo (2012)	Quantitative analysis of Indonesia Socioeconomic survey 1999-2009	Utilisation of dental care	Socio economic status	-	-	-

Author	Method and Data Source	Health Inequity	Socio determinant of health			
			Socio economic position	Material circumstances	Behavioral and Biological factors	Psychological factors
Chung (2004)	Quantitative analysis of Indonesian Family Life Survey 1997	Self-rated health	Education	Better sanitized household; provision of health facility.	Smoking, drink boiled water	-
Jusot, Mage-bertomeu and Menendez (2014)	Quantitative analysis of Indonesian Family Life Survey 1993, 1997, 2000 and 2007	Health index	Socioeconomic status; education	Location: rural/urban and island division	-	-
Assan et al. (2009)	Quantitative and qualitative study based on household interviewed	Accessing health facility	Economic condition	Availability of health personnel; distance to facility.	Culture and traditional belief, perception and relation to medical personnel.	-
Seeberg et al. (2014)	Quantitative and qualitative study based on household interviewed	Utilisation of qualified medical	Economic condition	Medical plurality; availability of modern and traditional care	-	-
Maharani and Tampubolon (2014)	Quantitative analysis of Indonesian Family Life Survey 1998.	Met need for cardiovascular care	Income	Possession of health insurance; urban residence	-	-
Hotchkiss, Godha and Do (2011)	Quantitative analysis using IDHS 1987-2007	Utilization of modern contraceptive	Household wealth	-	-	-
Nguyen et al. (2011)	Quantitative analysis using IDHS and SUPAS	Child mortality	Wealth group (quintile)	Rural/urban and Island groups	Antenatal care, Facility-based delivery, breast feeding, birth interval, birth order	-

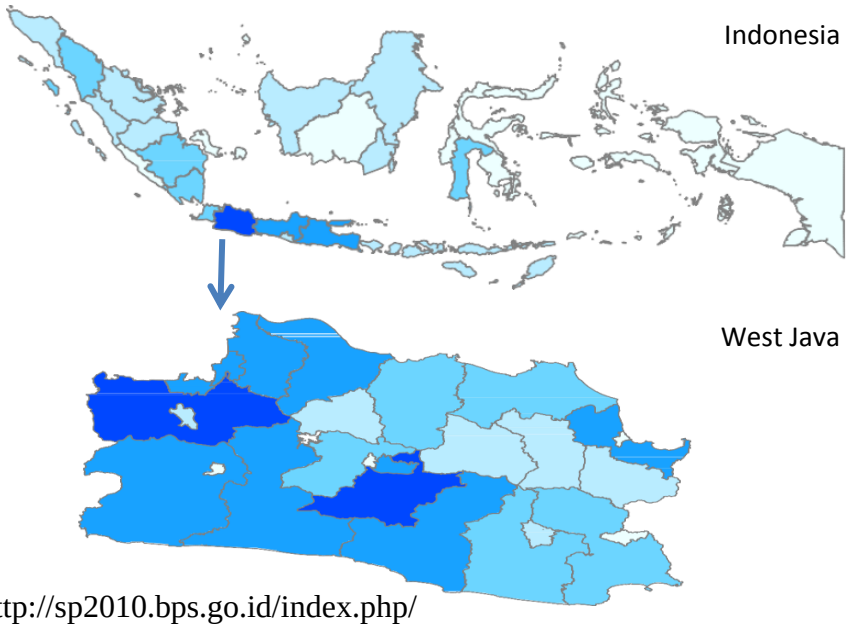
CHAPTER FOUR: Regional Disparity in Maternal Health Status in West Java Province: A Quantitative Analysis Based On Secondary Data

4.1 Background Information about of West Java

4.1.1 Topography

The province of West Java lies on Java Island at 5^{o} 50' – 7^{o} 50' south latitude and 104^{o} 48' – 108^{o} 48' east longitude (BPS, 2011b). It shares its borders with the provinces of DKI Jakarta, Banten and Central Java. Its position has a significant effect on the development of West Java. DKI Jakarta, as Indonesia's capital, is the most developed region in Indonesia and its dynamics provide both positive and negative impacts on West Java's growth.

Figure 4. 1 Map of West Java Province



Source: http://sp2010.bps.go.id/index.php/

West Java province covers an area of 37,173,97 km^2 (BPS, 2011b). This area is divided into 26 districts. These districts consist of 19 regencies and 9 municipalities. Sukabumi Regency covers the largest area and Cirebon Municipality, the smallest. The landscape of West Java is dominated by high land and mountainous spaces, especially at the centre. Among all economic activities, agriculture, specifically wetland (*sawah*) farming accounts for the largest proportion of land in this province.

This is aided by the weather as, on average, it rains 20 days per month in West Java (BPS, 2011b).

4.1.2 Population

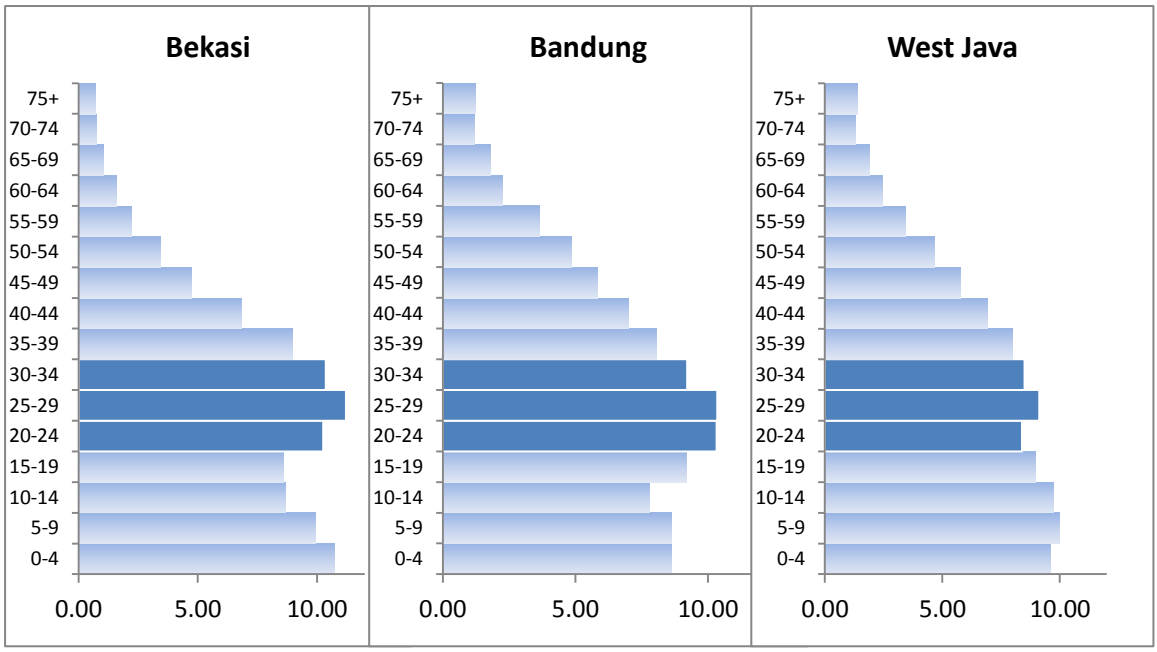
The majority of the people of West Java are Sundanese. According to R.W. Van Bemmelen (Ekadjati, 1995) the word Sunda is used to describe the western part of Java Island, including the people who live in this region. Van Bemmelen's claim is based on historical evidence from an inscription dated back to the 11th century. This inscription mentions Sri Jayabhupathi as the King of Sunda kingdom (Ekadjati, 1995). However, other evidence indicates that the Sunda Kingdom was founded in the 7th century.

As of the the 2010 population census, the total population in West Java is 43,053,732 (BPS, 2013), making it Indonesia's most populous province and the only province which has a population of more than 40 million. There are many ethnic groups living in West Java, but the ethnic Sunda constitute more than 70 % of total population of the province (Naim & Syaputra, 2011). As a consequence, "Bahasa Sunda", the local traditional language is the means by which the majority of West Javanese people communicate. Other ethnic groups which have significant numbers are the Javanese and the Cirebonese with percentages of 13.26 and 4.21, respectively.

The population density in West Java is 1,160 persons per km^2, which varies among the districts of the province. Bandung, classified as a municipal city is the capital of the province. It is the densest district with 14,236 persons per km^2. Bekasi, Depok, Bogor and Cimahi also have high population density. Of these, Bekasi, Depok and Bogor are contiguous to the national capital, Jakarta, and therefore act as a buffer to Jakarta's population. Cimahi is well known as a defence force city with an education and training centre for new army recruits and a home base for an infantry battalion. On the other hand, Sukabumi and Ciamis Regencies have low population density levels with less than 600 persons per km^2.

The impact of having a border with Jakarta can be seen in the population growth in these contiguous districts. During the period 2000 to 2010, the populations of in Depok, Bogor and Bekasi had a growth rate of more than 3 percent per annum. Industrialization and a perceived availability of public facilities are responsible for attracting immigrants to move to the national capital, Jakarta, but an already overcrowded Jakarta is not able to provide enough space for its population. Therefore, while many people work in Jakarta, they live in the surrounding areas of Depok, Bogor and Bekasi. In contrast, the population growth is vastly different in the West Java districts of Majalengka, Ciamis and Indramayu which have population growth rates of less than 0.5 percent per year.

Figure 4. 2 Age Composition of the Total Populations (male and female combined) of Bekasi Municipal City, Bandung Municipal City and West Java Province



Source: Population Census 2010

Age composition is an important factor in determining the population dynamics of a place. According to the 2010 population census, around 30% people in Bekasi, Depok, Cimahi and Bandung Municipalities are aged between 20 and 34 years, which is higher than the average figure of 26% for the West Java province. The higher proportion of young and productive aged population in Bekasi and Depok is not only attributed to commuters who work in Jakarta but these areas are themselves stimulated by industrialization and education. Bekasi is well known for its rapid

growth in industrial investment and its resultant immigrant workforce, while Depok is recognized as a region with many high level education facilities which encourage students from other regions or provinces to come to study and live in Depok. Bandung, the capital of West Java also has good education facilities and provides a similar incentive for students. The higher percentage of population aged between 20 and 34 in Cimahi can be explained by the existence of an army training centre.

Fertility, as a population characteristic also differs between the regions of West Java. Bandung and Bekasi Municipalities have a total fertility rate (TFR) of nearly 2.0. This means that women in these regions will have, on average, two children from the beginning to the end of their reproductive ages. For Garut Regency, the figure is more than 3. Other regions have a TFR between 2 or 3. Similar values occur for the Infant Mortality Rate (IMR). The IMR represents the probability that a new-born child will die before reaching its first birthday and is expressed as the number of infant deaths (i.e., deaths under the age of one year) per 1,000 live births. The IMR in West Java ranges from the lowest of 14.33 infant deaths per 1,000 live births, , to the highest of nearly 40 infant deaths per 1,000 live births. The regions which have the lowest and highest IMR are Bekasi Municipality and Tasikmalaya Regency, respectively. The variations in IMR indicate that health status in every region differs significantly from one another.

4.1.3 Socio Economic Conditions

The advanced education facility in West Java is well recognized, especially for higher degree education when compared to other provinces of Indonesia. Securing a place at one of the three prestigious universities in West Java has become an important priority for senior high school graduates in Indonesia. These state universities are the University of Indonesia in Depok (its main campus, except the Medical School and teaching hospital was relocated from Salemba in Jakarta to Depok in West Java in the late 1980s), the Institute of Technology and Padjajaran University, both in Bandung and the Institute of Agriculture, Bogor. While, there are many other institutions of higher education in other regencies (districts) of West Java, these facilities do not guarantee excellence in educational achievement. The 2010 population census identified that only 5.17 % of the West Java population reached a high level of education. Compared to the 33 provinces in Indonesia, this

percentage is a middle ranked position. The mean year of schooling (MYS) indicator for population aged over 15 years, shows that people in urban areas in West Java have access to better education than those in rural areas. Similarly, people living in Municipal Cities have a higher MYS than those living in non-municipal districts. Some municipalities have an MYS of more than 10 years; in contrast, the non-municipal district of Indramayu has the lowest MYS at 5.73 years (BPS, 2011c).

Data on labour force also exhibit significant disparities among the regions. Based on the 2010 National Socio Economic Survey (SUSENAS 2010) three industrial sectors: trade, agriculture and manufacturing, absorb the largest proportion of the workforce of West Java (BPS, 2011b), where the proportion of workers in these sectors are 24.83 %, 23.40 % and 20.00 % respectively. However, the figure varies from one district to another. In Cianjur and Indramayu Regencies (districts), nearly a half of the labour force is engaged in farming. This figure for the Bekasi Municipality is less than 1%. Manufacturing, trade and the services sectors provide the largest number of jobs in Bekasi and several other municipalities.

The distribution of the labour force by sector is not always commensurate with the contribution of all sectors in regional domestic product. For example, in Indramayu the majority of the labour force is in agriculture but the share of this sector to the domestic product is only 17.87%. In contrast, only 7.47 % of the workforce is in manufacturing but more than 50 % of domestic product comes from this sector. This is caused by the oil and gas mining in Indramayu which only involves a small workforce but the economic value of the product is high.

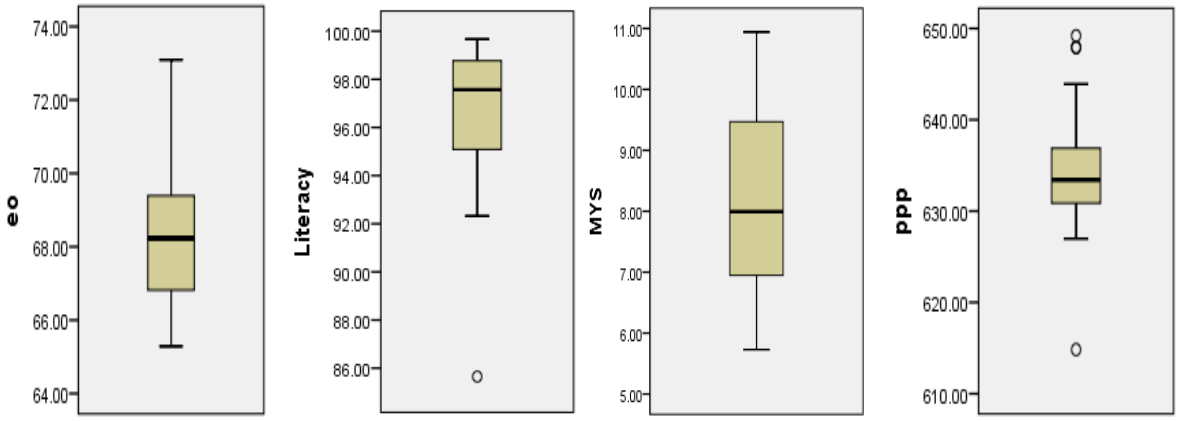
The contribution of every sector to domestic product explains the characteristic of economic development. In West Java, some regions, such as Garut, Tasikmalaya, Subang and Cianjur rely on the agricultural sector for economic development. The share of the agriculture sector is more than 35% whereas the contribution tof the municipalities such as Bandung, Cirebon, Bekasi and Cimahi to the domestic product of the province is less than one percent. The industrial sector dominates the economic development in Bekasi Regency where the share of this industry for domestic product is more than 75%. The same is true, to a lesser extent, in Bogor, Bandung and Karawang districts.

The large economic disparity between the regions can also be seen through their GNP per capita. In 2010, the GNP per capita in West Java was as Rp 7,476,142.64 per year (BPS, 2011d). These figures vary substantially among the districts from the highest in Bekasi (more than Rp. 20 million) to the lowest in Tasikmalaya (just over Rp. 3 million). Such disparity is also evident within the districts. For example, Bekasi Regency has a GDP per capita of more than Rp. 20 million. Divided by its population, hypothetically every person in Bekasi can earn Rp 1.7 million per month if the domestic product is distributed evenly across the population. But GDP per capita is a summary measure which does not reveal the disparity of GDP among the population. To show the disparities in GDP per capita, we need data on this variable by quintiles. However, data on GDP per capita are not available by quintiles, but data on expenditure, which is a measure of disposable income, are available by quintiles, and can be used for showing the disparities in income among the people of Bekasi. The socio economic survey data show that only 13.38 % of population has an expenditure of more than Rp 1 million per person (Heryani, 2011), This data indicates that a large proportion of domestic product in Bekasi Regency is only enjoyed by a small proportion of the population, a situation which also occurs in other districts.

A widely used indicator of development is the Human Development Index (HDI). The HDI is a composite index comprising an index for education, an index for health (life expectancy at birth) and per capita income. It can take value between 0 and 1. A value closer to 1 indicates high human development and a value closer to 0 indicates low development. In the case of West Java, the HDI differs significantly by district/municipal city. The Depok Municipality has the highest HDI with a value of 0.791 (BPS 2011b) while Indramayu Regency has the lowest HDI at 0.678. In general, the municipal cities have higher HDIs than regencies or districts. In the top 10 HDI ratings in West Java, there are only two regencies or districts: Bekasi and Bandung Barat. The disparity in HDI arises from disparities in the components of HDI. The boxplots, given in Figure 4.3, show that there are considerable gaps between the highest and the lowest component scores, especially the score on life expectancy at birth (e_0) and mean years of schooling (MYS). In addition, some regions have extreme values. For example, Indramayu Regency has a comparatively

low literacy rate of 85.65 %, while the average for West Java is nearly 98 %. Similar is the situation with GDP per capita expressed in purchasing power parity (PPP), which shows extremely high scores for Depok, Bogor and Cirebon municipalities, but Cianjur Regency has a very low score.

Figure 4. 3 Boxplot Chart of HDI's Component Variables, West Java 2010



Source: Created by Author based on data sources from BPS (2011c)

4.2 Maternal Health in West Java

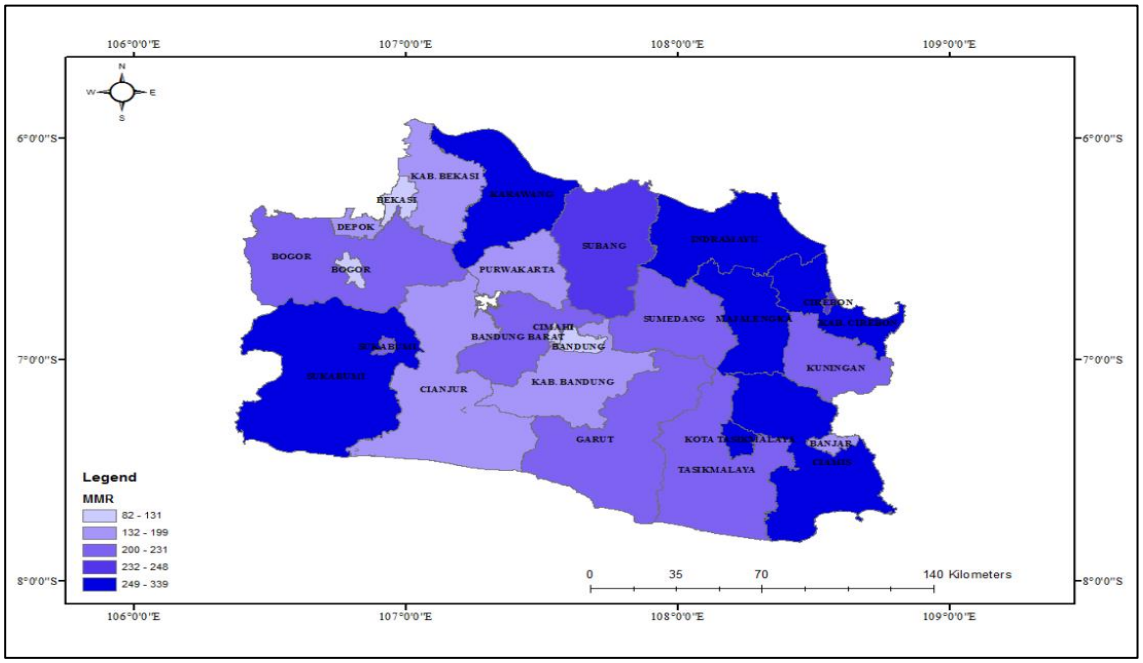
As maternal health and fertility are closely related (Riley, 1994) , this section describes the variables related to marital age, contraceptive prevalence and fertility rates that affect maternal health status. Based on the 2010 Population Census, the Singular Mean at First Marriage (SMAM) of West Java Province is 22.2 years (Nuraini, 2011). The data suggest that, on average, women in West Java marry for the first time when they are a little over 22 years of age, when women are mature enough and when their physical condition can support pregnancies. SMAM does not differ significantly between districts; however, urban areas tend to have a higher SMAM than rural areas. Thus, age at marriage should not have a negative impact on the maternal health of women in West Java. However, a significant proportion of women still marry at very young ages. The data from the National Socio Economic Survey of 2010 reveals that 27.55 % of the women of West Java were married at ages less than 17 years (Heryani, 2011) and in specific regions such as Majalengka, Indramayu and Subang, the proportion of women marrying before age 17 rises to nearly 40%. As a consequence, many women are at risk of adverse effects of pregnancy and delivery at very young ages.

The total fertility Rate (TFR) is another measure of maternal health, because it indicates the number of times a woman is exposed to the risks of pregnancy and child birth. On an average, a woman in West Java bears only 2 to 3 children until the end of her reproductive age (Nuraini, 2011). This suggests that every woman does not have frequent delivery; however, the TFR only represents the average condition of the population. The TFR is unable to capture a complete picture of maternal health where there is disparity among population groups so while the TFR in West Java is quite low, nearly 12 percent of married women have more than 6 children (Heryani, 2011). Too frequent deliveries and/or short birth spacing presents potential risks for women. In addition, the TFR does not include the pregnancies which are terminated by abortion or miscarriage and hence the TFR cannot be truly used as a single indicator of women's health.

Maternal health can also depend on the use of contraception; a means by which cases of too frequent births, short birth spacing and unintended pregnancies may be avoided. Data from the National Socio Economic Survey of 2010 show that 64.57 % of married women aged between 15 and 49 years use contraception and this figure does not differ significantly between districts (Heryani, 2011). In terms of contraceptive method, most women use injections, and only a small proportion use long term effective methods such as IUD (intra-uterine device), implants, MOW (tubectomy) or MOP (vasectomy) (Kusana, 2011). In West Java, only 11.57 % of married women aged 15-49 years use these methods (Heryani, 2011). At the district level, the figure varies from the lowest, of less than 5%, in Sukabumi and Indramayu Regencies to the highest, at nearly 30%, in Bandung and Sukabumi Municipalities.

Another indicator which can be used to illustrate maternal health is life expectancy at birth (e_0) for women. According to 2010 figures, life expectancy at birth for women in West Java is 72.7 years. This means that a new female baby born in West Java has a chance to live for 72.7 years. At the district level, e_0 ranges from 69.05 years in Tasikmalaya to 76.36 years in Bekasi Municipality.

Figure 4. 4 Maternal Mortality Ratio (MMR) by District in West Java Province



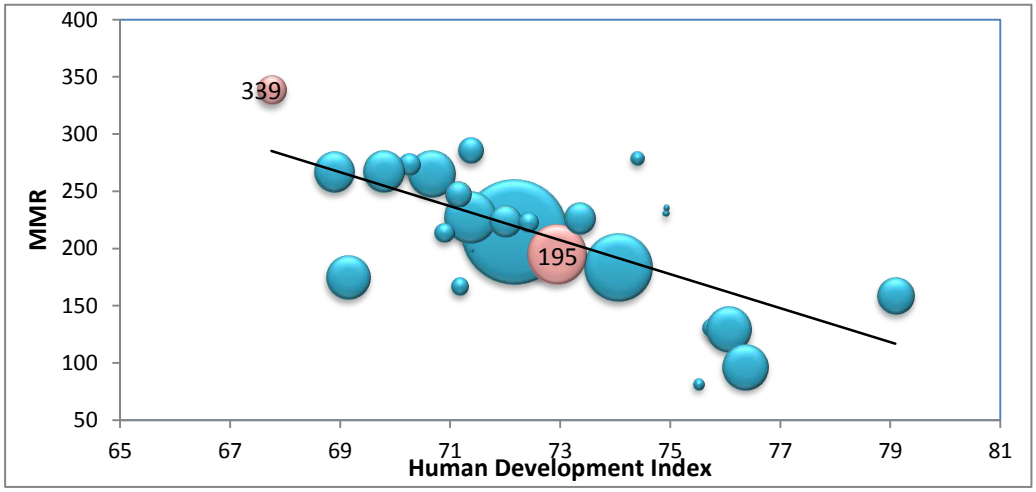
Source: Computed by the author from data collected at Population Census 2010

The indicator which measures the probability of dying due to pregnancy related causes or child birth is the maternal mortality ratio (MMR). Based on data on pregnancy related deaths collected at the 2010 population census of Indonesia, the MMR in West Java is 208 per 100,000 live births. The MMR differs considerably among the districts of the province. Bekasi and Cimahi Municipalities have an MMR lower than 100 with the figures of 97 and 82 maternal deaths per 100,000 live births respectively. In contrast, Indramayu has an MMR at 339 maternal deaths per 100,000 live births, which is more than three times higher than that of Bekasi or Cimahi. These statistics show the extent of maternal health inequality among the districts of West Java.

Figure 4.4 displays the disparity of MMR levels across the districts of West Java. The map in the figure indicates that districts close to urban areas such as Bandung, the West Javan capital, or DKI Jakarta tend have a lower MMR compared to the other districts. It may be the result of the positive impact of better health facilities in urban areas but it may also be attributed to the level of development in these regions. These findings are supported by the data presented in Figure 4.5, a graph which depicts a fitted line with negative slope indicating a negative relationship between

MMR and human development index. A district with low HDI tends to have a high MMR.

Figure 4. 5 Maternal Mortality Ratio by Human Development Index per District in West Java, 2010



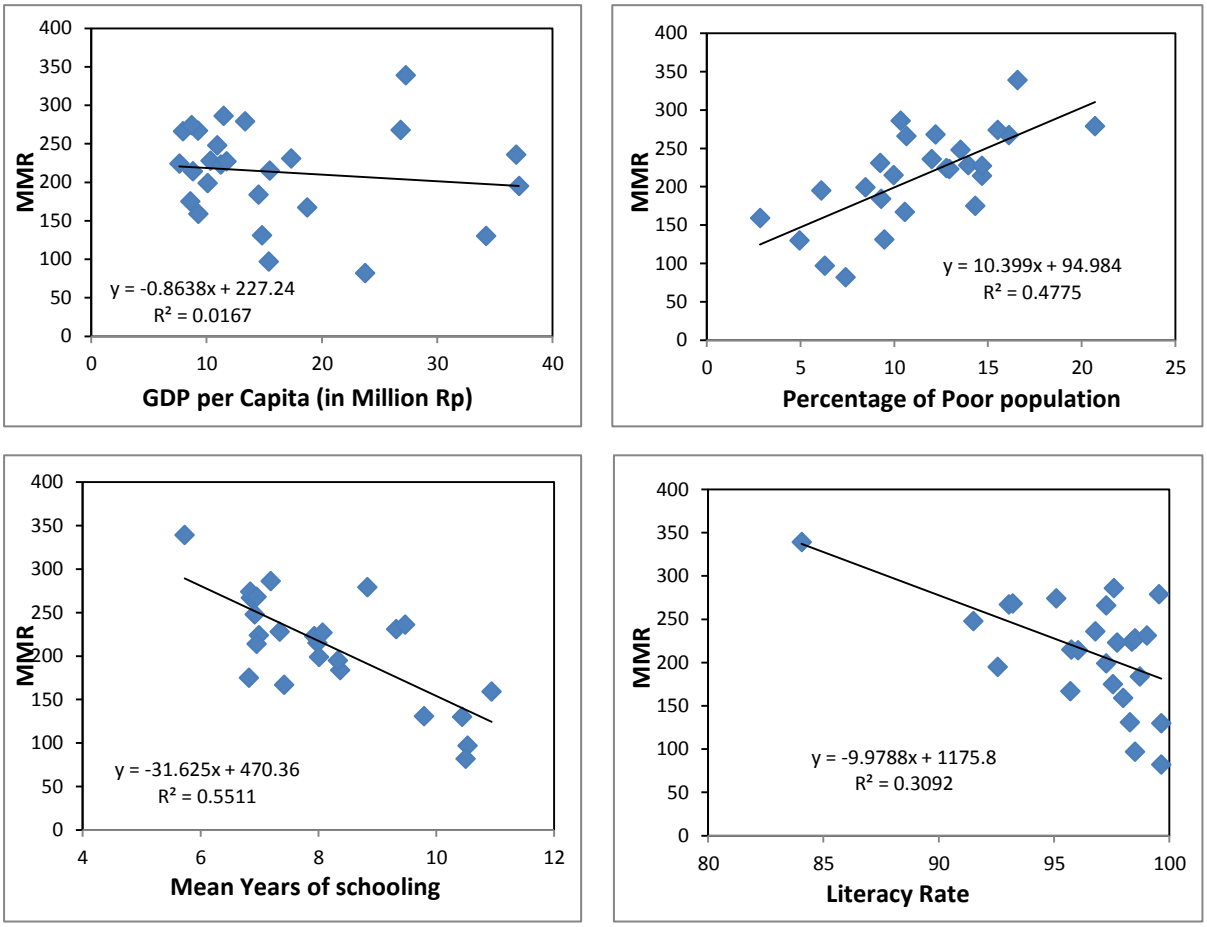
Source: MMR computed from data collected at Population Census 2010 and Human Development Index (BPS, 2011c)

As mentioned earlier, HDI is a composite index which measures development not only in a single dimension but multiple dimensions including economic, health and education variables. In order to find out which factors have a strong relationship with MMR, a number of variables representing socio economic factors are graphed with MMR at the district level and shown in Figure 4.6.

The indicator of regional economic development used here, namely gross domestic product per capita does not show a strong relationship with MMR, which is apparent from the scatter diagram in Figure 4.6 showing that some districts which have high GDP per capita also have a high level of maternal mortality. It may imply that regional economic development is not a guarantee for achieving better population health status, especially when economic development has no effect in reducing existing inequalities in health between the regions. However, the next scatter diagram shows a tendency of a negative relationship between the percentage of poor and MMR, implying that to some extent economic conditions may influence the health status at district level. A lower concentration of poor in a district tends to go hand in hand with a lower level of MMR. In fact the correlation coefficient between the percentage of poor and MMR is 0.67 indicating a strong relationship. The scatter

diagrams also reveal that poverty alleviation is more useful in enhancing maternal health status than overall economic development of a district.

Figure 4. 6 Scatter Diagram between MMR and Socio Economic Variables



Source: (BPS, 2011a, 2011c, 2011d) and MMR is estimated by the author

Education appears to have a negative relationship with maternal mortality. It is clear from the scatter diagram that districts in which people have lower levels of educational attainment on average, as indicated by the lower mean years of schooling (MYS) and lower percentage of literates tend to have higher levels of MMR. The five regions with the highest MYS: Bekasi, Depok, Bandung, Bogor and Cimahi municipalities have lower MMRs.

It should be mentioned here that the scatter diagrams show relationships at an aggregate level and may be subject to limitations of ecological fallacy in that the relationships between two variables based on data at the district level may or may not

be truly representative of the relationship between these variables at individual levels. This is so because the unit of analysis is not an individual person but a district (which consists of an aggregate number of people). For more details see Robinson (2009)

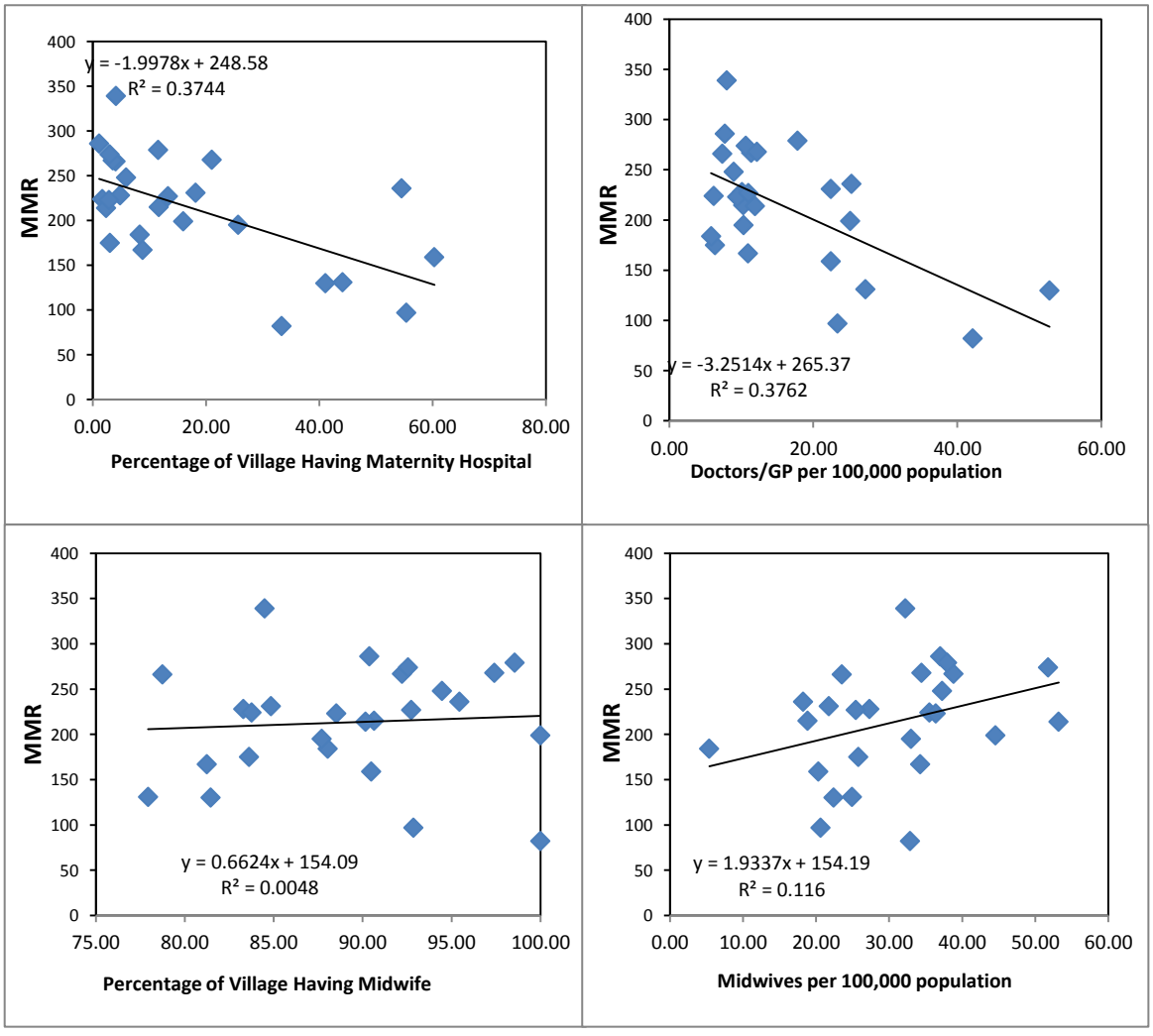
Figure 4.7 shows the scatter diagrams of the relationship between MMR and various indicators of health resources. These scatter diagrams show that the availability of health facilities at district level may affect maternal health status positively. A district consists of several sub-districts or *kecamatan* and within each sub-district there are villages. In a district which has a higher percentage of villages with access to a maternity hospital, the MMR tends to be lower. This is true also of the number of doctors/GPs available per 100,000 head of population. The correlation coefficient of each of these variables with the MMR is around -0.60. Therefore, availability of maternity hospitals and doctors has a positive effect on improving maternal health.

In contrast, the existence of village midwives and the number of midwives per 100,000 populations do not appear to have any relation with maternal health status at the district level. The scatter diagram (Figure 4.7) shows that the trend line between MMR and the percentage of villages with a midwife is almost flat, while the trend line between MMR and the number of midwives per 100,000 population has a positive slope indicating an unexpected relationship where MMR appears to increase with an increase in the number of midwives per 100,000 population. While the exact cause of this anomaly cannot be ascertained from the present analysis, it may be suggested that more midwives were placed in the districts which have high MMR and we have to wait to see the effect of this on MMR in future years. There is a time lag for the effect of the availability of village midwives in reducing MMR. Its significance can also be indicated from the changes of health indicators which stimulate the MMR reduction. This finding is similar with Hernawati (2011) analysis using data from IDHS 2007 and basic health research (*Riskesda*) 2010 which reveals the low correlation between availability of midwife and MMR at provincial level.

Further empirical data analysis is conducted to assess the correlation between availability of midwives with MMR after controlling for socio economic variables. The output from partial correlation analysis shows that ratio of midwives per 100,000

population has negative correlation with MMR after controlling for GDP per capita, percentage of poor population, literacy rate and mean years schooling. However the coefficient is only -0.113 which is not statistically significant to confirm the relationship between these variables. This evidence suggests that the positive slope of scatter diagram between availability of midwives and MMR does not explicitly indicate the positive relationship between these variables.

Figure 4. 7 Scatter Diagram between MMR and Health Resources Variables



Source: Village Potential Survey 2011 and MMR is estimated by the Author

4.3 Regional Disparity in Maternal Health in West Java

In Table 4.1, the seven variables (Y1, Y2, Y3, Y4, Y5, Y6 and Y7) which inform maternal health status, can explain the regional disparity of maternal health. The variables represent different dimensions of maternal health. Total fertility rate, the

percentage of women marrying before age 17 and the percentage of women not using effective contraception exposing them to high risk pregnancy. The variables of birth assistance and antenatal care demonstrate levels of medical care during pregnancy and delivery. The remaining two variables relate to maternal mortality specifically during pregnancy and delivery and the comparison of women's life expectancy.

Factor analysis is used to calculate maternal health index at district level. The input data has Kaiser-Meyer-Olkin (KMO) index of 0.855, which means that the data set is suitable for factor analysis. This is also confirmed by the Bartlett spherical test which has p value 0.000 (see appendix 7). Factor analysis produces only one factor to represent the seven variables. This factor can explain 57.74 % variability of input data and is said to be the maternal health factor. The factor loading of every variable can be seen in Table 4.1. The rule of thumb to include variables in the factor analysis is that factor loading should be greater or equal to 0.7. However, for exploratory purposes some researchers include variables with factor loadings 0.4 (Garson, 2013a). In this analysis Y7 has a factor loading of less than 0.7, but since this is an important variable to represent maternal health status, therefore it is included as a variable in factor analysis.

Table 4. 1 Factor loading and Coefficient Matrix of factor score

Health Indicators	Factor 1
(a) Factor loading of health indicator	
Y1 Maternal Mortality Ratio	-0.719
Y2 Female life expectancy at birth	0.825
Y3 Total Fertility Rate	-0.780
Y4 Percentage of women marrying before age 17 years	-0.869
Y5 Percentage women using effective contraception	0.721
Y6 Percentage births assisted by a doctor	0.820
Y7 Percentage of pregnancies getting sufficient antenatal care	0.536
(b) Coefficients matrix of factor score	
Y1 Maternal Mortality Ratio	-0.178
Y2 Female life expectancy at birth	0.204
Y3 Total Fertility Rate	-0.193
Y4 Percentage of women marrying before age 17 years	-0.215
Y5 Percentage women using effective contraception	0.178
Y6 Percentage births assisted by a doctor	0.203
Y7 Percentage of pregnancies getting sufficient antenatal care	0.133

Source: Output of SPSS – computed by the author

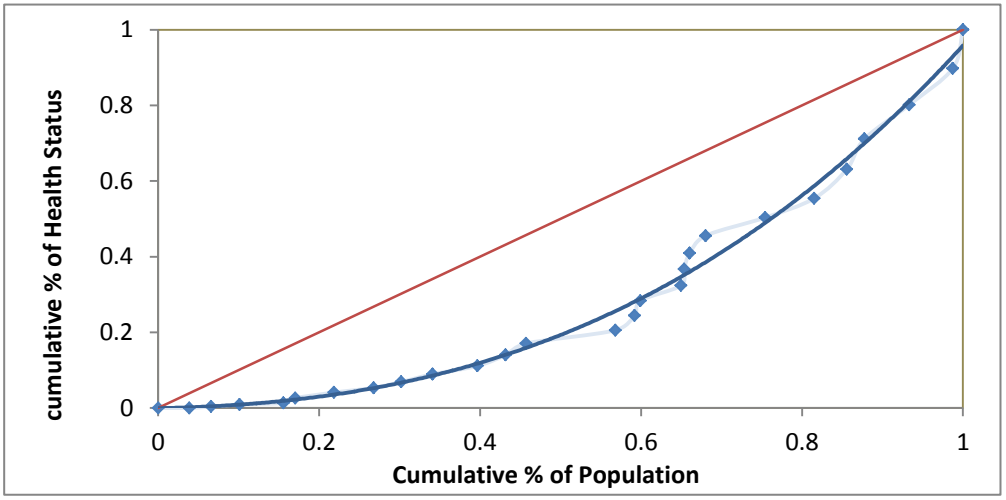
The factor analysis also produces a coefficient factor which is used as a weight for the variable to calculate the factor score (F). This factor score has been used as a maternal health index to illustrate the maternal health status at district level, according to the seven input variables. F is calculated by using a linear equation. The standardized value of the input variable is multiplied by the coefficient factor to obtain the factor score. Based on the coefficient of the factor score in the Table 4.1, it is clear that maternal health index has a negative correlation with maternal mortality ratio, total fertility rates and the percentage women marrying before age of 17 years. This means that higher values of MMR, TFR and the percentage of women marrying before age 17 produce a lower maternal health index. The other four variables, namely, Y2 (Female life expectancy at birth), Y5 (Percentage women using effective contraception), Y6 (Percentage births assisted by a doctor) and Y7 (Percentage of pregnancies getting sufficient antenatal care) have a positive contribution to maternal health status.

By using the F value as the maternal health index, the inequality of maternal health status between the districts in West Java can be estimated. According to the maternal health index, Garut, Sukabumi, Cianjur, Tasikmalaya and Indramayu have the lowest index compared with other regions. The low index in Garut, Tasikmalaya and Cianjur are mainly due to the very low percentage of doctor-assisted deliveries. Indramayu and Sukabumi have very high MMR and very low percentage of women using effective contraception. The five regions scoring the highest index are Bandung, Cimahi, Bekasi, Depok and Bogor Municipalities, all of which have a low MMR and a low percentage of women married before 17, but have a high percentage of women using effective contraception or high rates of doctor-assisted deliveries.

Inequalities in maternal health status can be measured by the Gini coefficient (Fang et al., 2010). Since the maternal health index is calculated at the district level, the entire population of that district is assumed to have the same maternal health status. Basically, the Gini coefficient measures the area between curve Lorentz and the diagonal line (See Figure 4.8). The Gini coefficient ranges from 0 to 1 with 0 indicating perfect equality and 1 indicating perfect inequality. The diagonal line represents a condition of perfect equality. In the present case, t the Gini coefficient is

0.48, which means that there is considerable maternal health inequality in West Java. The calculation of Gini ratio can be seen in the appendix 8.

Figure 4. 8 Lorenz curve of maternal health index in West Java.



Source: Calculated by the author from SPSS output

4.4 Determinants of Regional Disparity in Maternal Health

Inequalities in maternal health between the districts of West Java stand as obstacles in the efforts to improve maternal health in the province. Therefore, all the efforts to improve maternal health in West Java should include efforts to reduce such inequalities. Reduction of inequalities in maternal health is important by itself from the stand point of social justice. However, to these inequalities, it is important to understand the role of related factors which cause this regional inequality. This section describes the socio economic and health resources factors which may be closely related with the observed disparity.

Eight socio economic variables have been used in this analysis. The details of the variables are given in Table 4.2. Two of the variables, X11 (Percentage of rural population) and X12 (Percentage of labour force in agriculture) indicate the level of urbanization in the province as urban areas have more advanced facilities. Four other variables, X13 (Unemployment rate), X14 (GDP per capita at constant price), X15 (Percentage of poor people) and X16 (GDP growth) are indicators of economic capability of the population and the region. Unemployment rate and percentage of poor people represents a population group which is deprived of purchasing power. GDP per capita and GDP growth indicate the economic development of region.

These dimensions are useful to describe people's ability to afford basic needs in order to maintain healthy lives and also to identify the regional capacity in providing adequate facilities for the population. The last two variables, X17 (Literacy rate for population >= 15 year) and X18 (Mean years of schooling) relate to the educational achievement of the population which plays a crucial role in determining both people's behaviour and regional growth since people act as human capital in economic development. This set of variable of socio economic condition is correlated with the seven variables of maternal health status given in Table 4.2 (the Y variables).

The other set of variables which may influence maternal health at regional level is health resources, as seen from the scatter diagram in Figure 4.7. There are eight variables to represent the availability of health facilities deployed in the analysis. The variables describe the availability of infrastructure such as hospitals, birth clinics of private midwife practices and health personnel to support adequate maternal care. In addition, three variables indicate the regional or individual capability to provide financial resource for health care. The details of the health resource variables are given in Table 4.3.

Canonical correlation analysis (CCA) is the appropriate statistical method to find out the correlation between these two set of variables. There are some important issues that need to be checked before conducting the CCA. These are inclusion of outliers in the input data, multicollinearity, homoscedasticity and linearity of data (Garson, 2012a). The existence of outliers can be assessed by calculating standardized z scores. If the z score is higher than $\left|3.29\right|$, the data are categorized as outliers (Tabachnick & Fidell, 2007). It is found after calculating the z-scores that none of the eight independent socio economic variables has an outlier. Similar is the case with the health resources variables.

The absence of multicollinearity is essential to avoid a misleading interpretation as a consequence of high correlations among the independent variables (Garson, 2012a). An independent variable can have low regression coefficient with the dependent variable if it has a high correlation with other independent variables. Therefore, the input data need to be evaluated before including it in the CCA. A bivariate

correlation analysis of the independent variables reveals that some variables do have high correlation. The coefficient correlation between X11 and X12 is 0.96. This correlation is not unexpected, condition is reasonable because one indicator for determining a region as rural or urban is the proportion of labour force who works in agriculture. Thus, it can be said that X11 and X12 represent a similar characteristics. In addition, X18 is negatively correlated with X11 and X12 with coefficients of correlation of -0.865 and -0.885 respectively. These high correlation coefficients indicate the existence of multicollinearity in the data. The high negative correlation of X18 with X11 and X12 indicate that less urbanised areas have low MYS or, conversely more urbanized areas tend to have higher MYS. Education is an important factor to indicate socio economic condition of a population. But it can also be represented by the variable X17 (Literacy rate for population >= 15 years). Therefore, to avoid multicollinearity, X18 is not deployed in further analysis. Based on a similar reasoning, X12 is not used in further analysis as X12 and X11 are highly correlated.

In the second set independent variables, health resources factors, X22 and X28 are not included in the further analysis to avoid multicollinearity. X22 has high correlation (r = 0.918) with X11 and both variables illustrate the availability of health infrastructure. Similarly, X28 has strong correlation (r = 0.845) with X27. The variables X27 and X28 represent the budget for health development at the district level; therefore eliminating one variable would not affect the picture pf the availability health resource.

Tabachnick and Fidell (2007) mention that the assumption of variability in one variable to be roughly similar to that in the other variables (known as homoscedasticity), is not a must for predictive analysis. The presence of heteroscedasticity is also not fatal for analysing ungrouped data (Tabachnick & Fidell, 2007). Nevertheless, the input data for this analysis did not capture any heteroscedasticity, but it is indicated for plot of standardized residual and predicted value which does not have a certain pattern. The value for plotting the graph comes from regression between one variable in set of dependent variables with all independent variables.

Figure 4. 9 Scatter plot of standardized residual and standardized predicted value between maternal health status indicator and socio economic factors

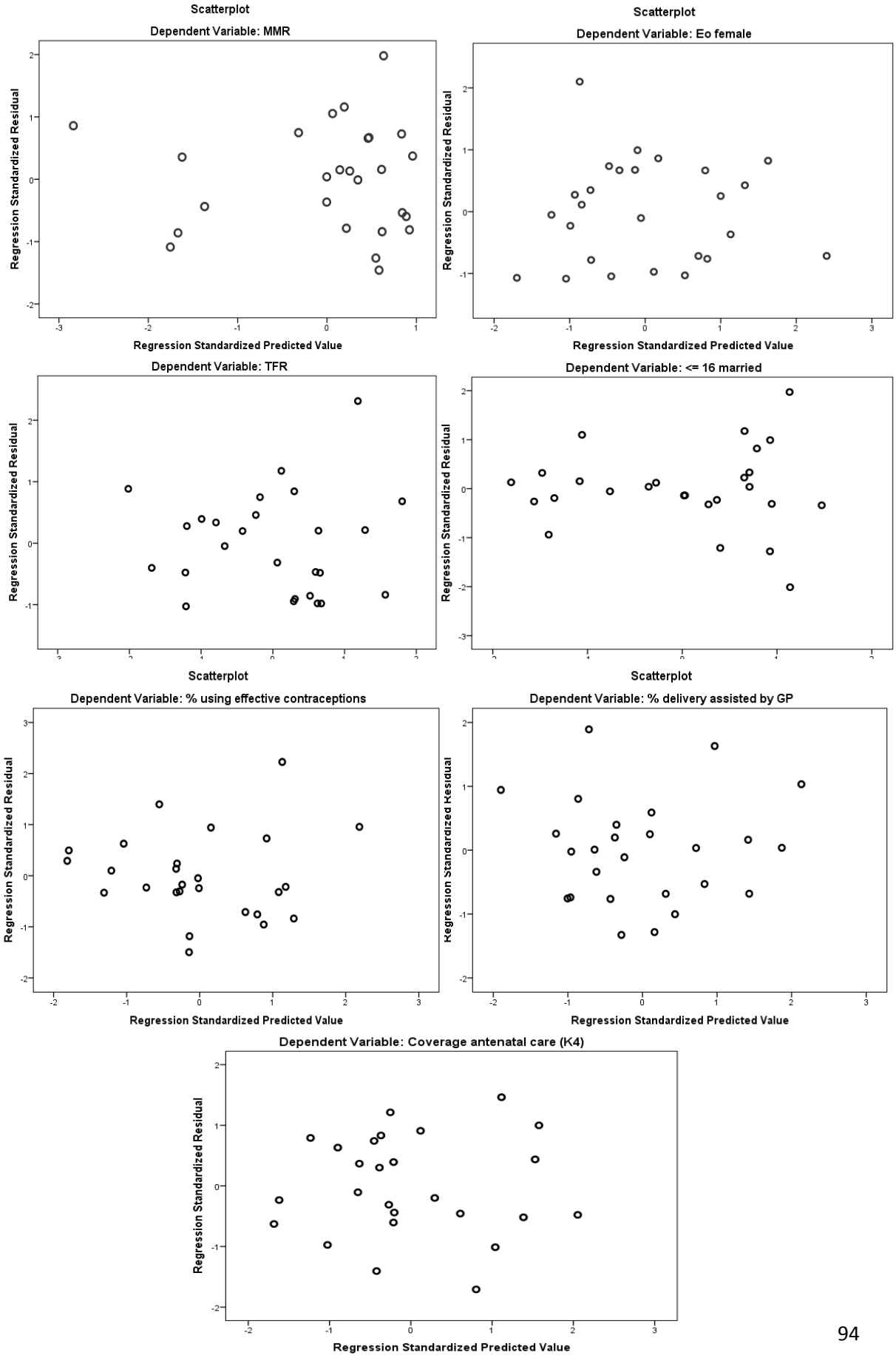
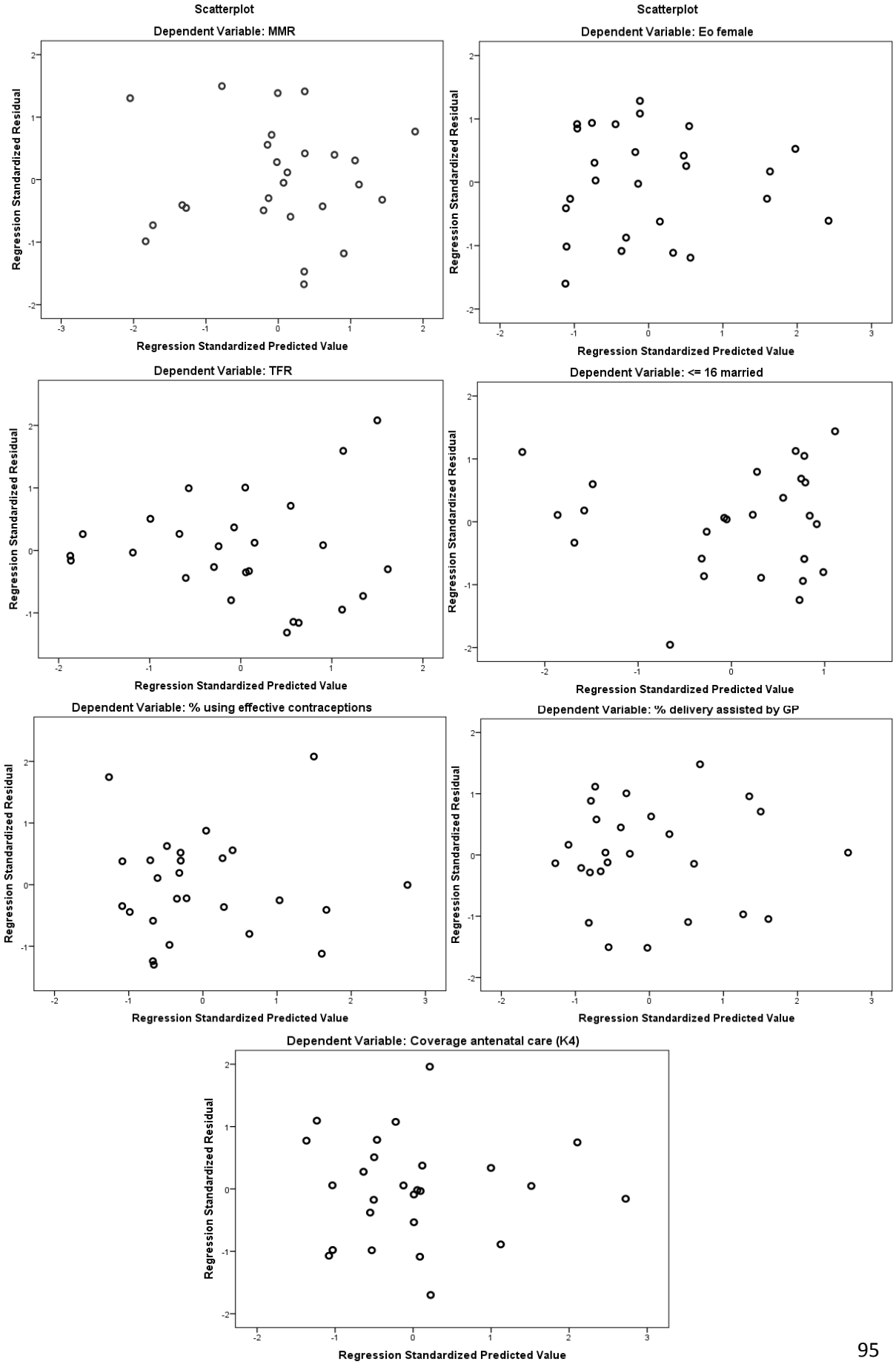


Figure 4. 10 Scatter plot of standardized residual and standardized predicted value between maternal health status indicator and health resources factor



A straight trend line shows the linearity of relationship between variables. This can be seen from the scatter plot of two variables. In the analysis involving many variables, the assessment of linearity become more complex. But linearity can also be assessed from the plot of standardized residuals against standardized predicted values (Tabachnick & Fidell, 2007). Nonlinearity is illustrated in most of the residuals which cluster above the zero line on the scatter plot in some predicted values and under the zero line for the others. Figure 4.9 and 4.10 show no clustering and therefore, there is no violation of linearity assumption.

4.4.1 Socio economic factors

The SPSS output from Canonical Correlation Analysis confirms that maternal health (dependent variable) and socio economic status (independent variable) are significantly correlated as indicated by Wilks Lambda multivariate test of significance (p value = 0.000). The canonical correlation is 0.95333 showing that the canonical variables have strong correlations (see appendix 9). Table 4.2 provides the standardized canonical correlation coefficients and canonical factor loadings for dependent variables and covariates. The values in the canonical loading column show the correlation of individual variables with the canonical variates. The standardized canonical correlation coefficients illustrate the contribution of individual variables to a canonical solution.

Based on the canonical loadings, maternal health goes hand in hand with socio economic status. High levels of maternal mortality ratios, total fertility rates and percentage of women married before 17 years of age are typified by rural area living and an economically poor society. In contrast, women from areas which are more urbanized and have fewer poor people tend to exhibit supportive behaviour for maternal health including using effective contraception, doctor assisted deliveries and sufficient antenatal care.

The canonical loading for covariates indicates that education has a strong correlation with maternal health. This is clear from the high loading factor for the literacy rate of population more than 15 years old. On the other hand, economic performance at districts level shows the smallest correlation with maternal health as can be seen

from the low loading factor and standardized canonical correlation coefficient. Perhaps this indicator only demonstrates regional economic development and does not indicate the individual economic capability.

Table 4. 2 Correlation between maternal health indicators and Socio Economic Indicators

Health Indicators	Standardized Canonical Coefficient	Canonical Loadings
Y1 Maternal Mortality Ratio	-0.12180	-0.74205
Y2 Female life expectancy at birth	0.14625	0.49868
Y3 Total Fertility Rate	-0.19452	-0.44573
Y4 Percentage women marrying before age 17	-0.74305	-0.94701
Y5 Percentage women using effective contraception	0.27089	0.79524
Y6 Percentage births assisted by a doctor	0.20026	0.63472
Y7 Percentage pregnancy getting sufficient antenatal care	0.05498	0.41936
X11 Percentage of rural population	-0.58695	-0.90873
X12 Percentage of labour force in agriculture	-	-
X13 Unemployment rate	0.07586	0.46267
X14 GDP per capita at constant price	0.11357	0.33567
X15 Percentage of poor people	-0.15084	-0.62314
X16 GDP growth	-0.00405	0.43187
X17 Literacy rate for population >= 15 year	0.44795	0.67235
X18 Mean year schooling	-	-

Source: SPSS output from canonical correlation analysis

To sum up, maternal health status is associated with socio economic characteristics at an aggregate level (district). These socio-economic characteristics can be grouped in to three aspects; (1) education as indicated by adult literacy rate, (2) economic capability as indicated by poverty rate, and (3) lack of urbanization indicated by the percentage of population living in rural areas. The first characteristic determines an individual's knowledge and its possible influence on individual behaviour. The second characteristic represents an individual's the financial ability to support the expenses incurred in maintaining good health. The third and last characteristic

indicates the influence of regional facilities such as infrastructure brought about by urbanisation.

4.4.2 Health Resources

The SPSS output from the analysis shows that maternal health (dependent variable) and health resources (independent variables) are significantly correlated as confirmed by Wilke's Lambda multivariate test of significance (p value = 0.000). It means that there is only one dimension of correlation between the dependent and independent variables. The canonical correlation of this dimension is 0.95748 showing that the canonical variables have strong correlation among them (see appendix 10). Table 4.3 provides the standardized canonical coefficient and canonical loading for the dependent variables and covariates.

Table 4. 3 Correlation between Maternal health indicator and Health Resources Indicator

Health Indicators	Standardized Canonical Coefficient	Canonical Loadings
Y1 Maternal Mortality Ratio	-0.14002	-0.69019
Y2 Female life expectancy at birth	-0.24229	0.64895
Y3 Total Fertility Rate	-0.34693	-0.77405
Y4 Percentage women marrying before age 17	-0.33976	-0.88515
Y5 Percentage of women using effective contraception	0.21270	0.75004
Y6 Percentage births assisted by a doctor	0.33888	0.82788
Y7 Percentage pregnancies getting sufficient antenatal care	0.11158	0.45912
X21 Percentage of Villages having a hospital	0.52317	0.87506
X22 Percentage of Villages having a birth clinic	-	-
X23 Percentage of Villages having private midwife	0.09028	0.19259
X24 Number of midwives per 100,000 population	-0.00472	-0.30784
X25 Number doctors per 100,000 population	0.47506	0.89986
X26 Percentage of household expenditure on health	0.13173	0.74781
X27 Percentage of regional budget allocated to health	-0.18083	0.01465
X28 Budget for health sector per capita	-	-

Source: Output of SPSS

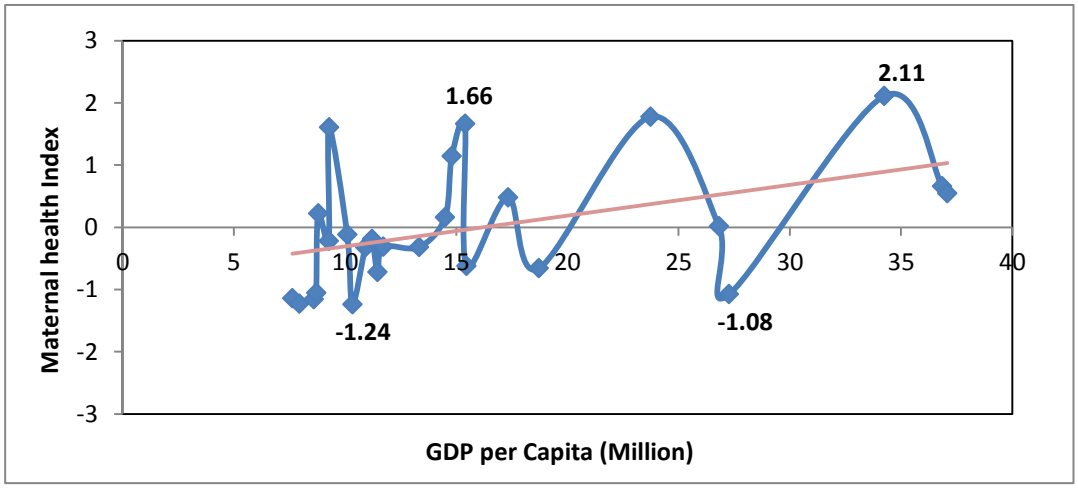
The canonical loadings given in Table 4.3 reveal that, as expected, maternal health status at the district level is strongly correlated with the availability of health facilities, particularly hospitals (Variable X21), and the availability doctors (Variable X25). These variables have high canonical loadings. In addition, the proportion of household budget allocated for health expenditure is also an important variable. Thus, an increase in the household budget spent on health would appear to have a positive impact on maternal health status. A study conducted in 8 developing countries shows that household expenditure is positively associated with health expenditure (Makinen et al., 2000), which indicates that higher the economic status (as inferred from higher household expenditure), the higher are finances for healthcare. However, the proportion of health expenditure does not always go hand in hand with the total expenditure. Households in the highest quintile of socio economic status can have low proportion of health expenditure, as evident in Burkina Faso, Paraguay and Thailand. In contrast, the percentage of household health expenditure is higher for wealthier households in South Africa and Guatemala (Makinen et al., 2000). The situation in West Java appears to be similar with that in South Africa and Guatemala, because the district which has higher average of proportion of household budget allocated for health expenditure represents a region with high economic development, as indicated by low level of poverty, high level of urbanisation and higher GDP per capita. Therefore, the higher percentage of health expenditure allocated from the household budged may well indicate higher financial resources for accessing healthcare.

Surprisingly, the same is not true of government budgets. The percentage of regional budgets for health sector and health budgets per capita are less important variables in determining maternal health. This indicates that the economic resources available at household level are more important than economic resources at regional level, an outcome with similar results of a previous study in China (Feng et al., 2012). Feng et al found that individual income has a more powerful effect on health inequality among the elderly than regional income. Elderly people having a higher income tend to report a significantly better health status, while those living in a high-level income province reported only a slight difference in health status from the other groups.

4.5 Discussion

Maternal health inequality in West Java is a matter of grave concern since the level is of MMR is very high. This disparity will persist if there is no serious effort to reduce it. Even economic performance as the main objective of development program would not automatically reduce maternal health inequality. Figure 4.11 shows the relationship between maternal health status and GDP per capita, an indicator of regional economic performance. The line graph reveals that the maternal health index does not have significant relationship with GDP per capita. The index fluctuates for any level of GDP. Even at high level of GDP per capita, the range of maternal health status index is high. For example, the range of maternal health index for districts with GDP per capita of more than 20 million is 3.2 (from -1.08 to 2.11). This range is slightly higher than that in districts with lower GDP per capita. This indicates that to some extent, economic development can increase the regional discrepancy of maternal health in the initial stages, because people in the lower socio-economic status tend to derive the benefits of development later. Therefore, improving maternal health must not only rely on economic development but include wider areas of development.

Figure 4. 11 Line graph of maternal health index per districts by GDP per capita



Sources: GDP estimated by BPS (2011d) and maternal health index calculated by Author

The canonical correlation analysis also indicates that the availability of midwife and allocation of health sector budget does not play an important role in determining maternal health status. While the village midwife program is a respected program

aimed at improving maternal health by increasing the availability and accessibility of professional health personnel, this research shows that it has not supported improvement in maternal health. It could be that the midwife is underutilized; therefore it is crucial to enhance the effectiveness of the village midwife program by improving pregnant women's and their families' propensity to use the services of trained midwives instead of continuing to rely on traditional birth attendants. Moreover, the allocated health budget by the regional government appears to be a less important variable in relation to maternal health. In contrast, the budget from the household emerges as a significant variable. Therefore, formulating a better program to use the health budget is imperative for maternal health status to improve.

CHAPTER FIVE: Inequality In Maternal Mortality In West Java Province: A Quantitative Analysis at Household Level Based On Population Census Data

5.1 Introduction

The previous chapter has identified disparities in maternal health status across the districts of West Java extrapolated from a macro data analysis because the data only represents the regional conditions. Several input variables such as health facilities and economic growth have been used to demonstrate the regional status while other variables originate from individual or household characteristics which, when aggregated, characterize the district circumstances. Because the district is used as the unit analysis, the output can only be analysed and inferences drawn from the analysis at the district level. It cannot be used to draw inferences at a household or individual level, even though some variables are sourced from these levels. In addition, ecological correlation may reveal different results with individual correlations (Robinson, 2009).

This chapter assesses maternal health issues at household level. A household is defined as a "co-resident group of persons who share most aspects of consumption, drawing on and allocating a common pool of resources (including labour) to ensure their material reproduction" (Schmink, 1984). This definition is similar with the description and inclusion of household member which is applied in Indonesian Population Census 2010 (BPS, 2009). Schmink also mentions that the main purpose of using a household as the unit analysis is to bridge the analytical gap between social and individual levels. Using households as units of analysis is not meant to replace a macro or an individual level analysis, but rather to enrich the exploration of data and present a more comprehensive approach to the research being pursued.

In the study of inequality, the household is an essential unit because of its role in redistributing the resources from the upper structure, such as companies, states or other organisations (Curtis, 1986). Economic goods, salary or other products, are disseminated to individuals in the community through these upper structure organizations. At the household level, these economic goods are redistributed to be

consumed by household members. In regions dominated by the informal sector or in the process of shifting to informal sector domination, household analysis is still relevant (Wallace & Wallace, 2002). In this situation, the household must obtain economic goods from a range of sources, both from inside and outside the household and manage their consumption. Therefore, the household and its individual characteristics have close relationships. As a consequence, the household resources may determine individual outcomes, including individual health status.

There are three economic models of family which are useful in gaining an understanding of the association between household wealth and health (Tipper, 2010). The first is the unitary model which presumes that each household member is consigned to a single utility function and all resources in the household are pooled and allocated in an efficient manner. The second is a collective labour supply model which accepts that every household member has a different preference of utility function. Then utility function of household becomes the weighted function of its members. In this model, the resource allocation for each member is not always equal and relates to the power distribution in the household. Therefore, it is possible to have intra-household inequality including that in health status but the balance of inequality can also be corrected by a transfer of resources among inter-household members. The third model is institutional economics model which regards the family as a structured organization that may change over time. Understanding the relationship between economic status and health depends on complex analyses such as the influence of neighbourhood factors or unemployment levels.

In addition, Kleinman (1980) recognized the importance of family as a domain which determines health status. Family and other components such as individual, social and community, belong to the popular sector which is mentioned as the largest sphere of any system including health care. The majority of illness is managed within popular sector (Kleinman, 1980; Phillips, 1990). In the popular sector, the family acts as the main arena in which illness is defined and health care is initiated. After the family, there may be a decision to use the folk or the professional sector to obtain health care, but the popular sector remains important to evaluate and decide further treatments. The family also influences the acceptance or refusal to continue with the previous treatment.

There are many studies that have assessed the relationship between household wealth and health outcomes. Their main premise is that the resources available at household level influence the living conditions of individuals such as fulfilment of basic needs or healthy life styles, which in turn affects the health status of household members. The total value of household possessions as a wealth indicator is strongly associated with self-rated health status (Aittomäki et al., 2010). Poorer households in terms of wealth (accumulated assets) tend to report poor self-reported health. But the association between current household incomes and self-rated health is weak. It is argued that the wealth indicator represents accumulation of life-time income, so it is more likely to identify resources rather than current income.

Another research in India shows that household wealth index has a relationship with child health (Chalasani, 2012). Household wealth is measured by the housing conditions such as the dwelling construction material, available sources of drinking water, sanitation facilities, cooking fuel and whether the household has other assets. The empirical analysis of data reveals that wealth index has an association with cases of neonatal mortality, child mortality and malnutrition. Mortality and malnutrition are concentrated in groups with lower wealth index. A cross national data analysis resulting from demographic health surveys of 42 countries also confirms the strong association between household wealth and child health (Boyle et al., 2006). However, in many countries the influence of household wealth is becoming less important for affluent groups as fulfilling basic needs to support healthy life is no longer a problem for them. The economic gradient in this group is shown in the consumption of luxury goods which are not significant to affect health status.

Similarly, IDHS 2012 reveals that household wealth index have an influence to determine child health (BPS et al., 2013). Some indicators such as percentage of live births having low birth weight, children 12-23 months received all basic vaccinations and children under 5 years had diarrhoea, have association with household socio economic condition. Children from the highest quintile of wealth index have better health status like having higher tendency to have normal birth weight and lower incidence of diarrhoea than the children from lower wealth index. It might be

supported from better health care among wealthier groups which is illustrated from higher propensity to received adequate vaccination.

5.2 Socio Economic Groupings in West Java Province

5.2.1 Monetary approach: Poverty

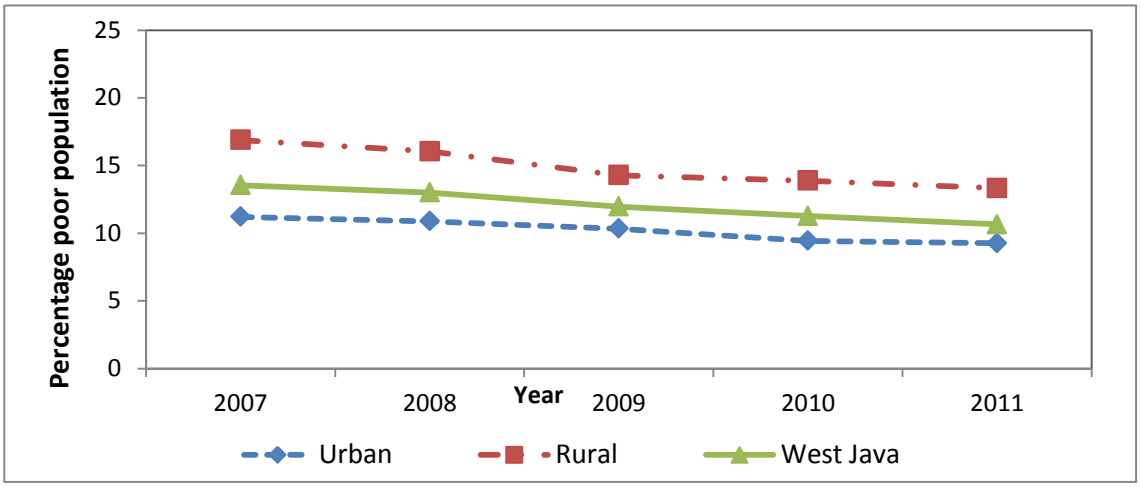
In Indonesia, the Central Board of Statistics, the official statistics agency publishes poverty data regularly. Poverty is measured by applying the basic needs approach, a calculation based on consumption data. A person is categorized as poor if his or her consumption is lower than the threshold of the basic needs. The threshold, also called the poverty line, is built from two components. The first component is food consumption, which represents the price that must be paid to obtain 2,100 calories of food per day per person. The second component consists of non-food consumption items, which identify the expenditure required for accessing a bundle of non-food commodities per month. Every commodity is weighted to form the non-food poverty line. A previous survey collecting data on basic needs (SPKKD) has decided on the bundle of commodity which best meets the consumption needs of an individual (BPS, 2008).

The Indonesian national socio economic survey, which provides data to measure poverty, asks respondents to record their food consumption for a period of 7 days and non-food consumption during the last month and last year within the survey time frame. Based on household consumption results, individual consumption is estimated by assuming that the household consumption is distributed equally among all members of the household. Thus, the poverty measurement is more likely to illustrate the household as a unit of analysis, even though the calculation provides the number of poor people.

In 2010, more than 10 percent of the population of West Java was classified as poor (BPS, 2011a). Trend data reveal that, while the number of people living in poverty is decreasing the figures still show that a significant proportion of the population has low economic capability. Rural and urban area figures differ, with the percentage of poor population being greater in rural parts. The poverty data demonstrate inequalities in the household economy, since some households have limited ability to acquire even their basic needs. The inequality is also apparent between districts.

Tasikmalaya has the highest percentage of poor people where more than a fifth of population lives in poverty, while Depok Municipality is the district/municipal city with the lowest percentage, less than 3 percent of poor people.

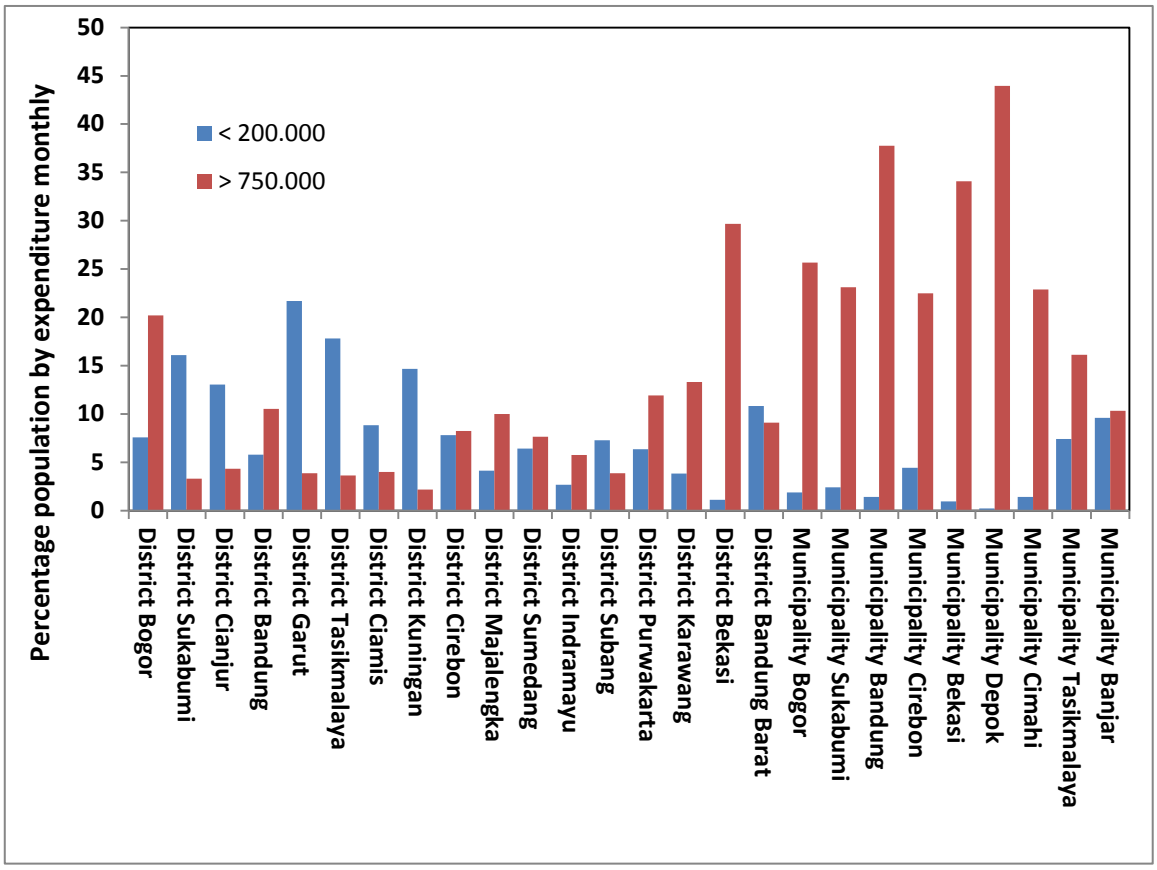
Figure 5. 1 Poverty Trend in West Java Provinces, 2007-2011



Source: www.bps.go.id

Data from the national socio economic survey 2010 reveal a large disparity in household consumption in West Java. Representing consumption by data on expenditure, it is found that 7.52 % of the population of West Java lives on an expenditure of less than 200,000 rupiahs per capita per month, which is not enough to cover basic needs. In contrast, 15.40 % of the population spends more than 750,000 rupiah per capita monthly. The disparity in household consumption is clearly evident at the district level, with some districts such as Depok and Bekasi having less than 1 % of population with a very low monthly expenditure (less than Rp. 200,000) while in some other districts such as Garut, Tasikmalaya, Sukabumi, Cianjur, Kuningan and Bandung Barat Regencies, the percentage is more than 10 % (see Figure 5.2).

Figure 5. 2 Proportion of Population by Expenditure per Capita/Month, 2010



Source: (Heryani, 2011)

5.2.2 Non-monetary approach: Household Wealth Index

Another approach to assess a household economy is to evaluate housing conditions such as building materials, household infrastructure or asset ownership. This method can be used in the absence of information about household income or expenditure. This approach has two main advantages. Firstly, the information is easier to collect, therefore, the data are more reliable. Information on income and expenditure is often unreliable, especially in areas which are dominated by self-subsistence agriculture and the informal sector (Houweling, Kunst & Mackenbach, 2003). Estimating the income or expenditure in that setting becomes time consuming and subject to reliability problems. Secondly, the use of housing variables may capture the long term status of the economic condition of a household (Filmer & Pritchett, 2001; Houweling, Kunst & Mackenbach, 2003; Vyas & Kumaranayake, 2006). Household assets and condition of the family home illustrate the accumulation of income which gives a better picture of the longer-term living standards of the household (Filmer & Pritchett, 2001). Furthermore, an empirical data analysis confirms that wealth index

can be used to present a reasonable measure of inequality (McKenzie, 2005) and has the potential for wider research applications.

However, in applying this approach, some issues must be considered (Vyas & Kumaranayake, 2006). Firstly, if the outcome of the study relates to current household resources, then a wealth asset index may not be appropriate to assess the effect of the cross-sectional economic gradient but rather indicate the long term impact of economic status. Secondly, the availability of assets does not indicate the quality of assets as application of the wealth index usually relies on ownership of the particular assets without considering their quality. Finally, there is potential for ambiguity of meaning attached to the variables determining socio economic status across ethnic groups. For example, while ceramic tiles rather than timber as floor material may indicate a higher level of wealth, that presumption cannot be applied if the research areas are Java and Kalimantan islands, because in Kalimantan, the Dayak tribe mainly build house on stilts and with a wooden floor. In this case, the type of wood must also be included to indicate levels of wealth. This last issue demonstrates the need for reliable statistical techniques to create the index and the technique must be able to fulfil the objective.

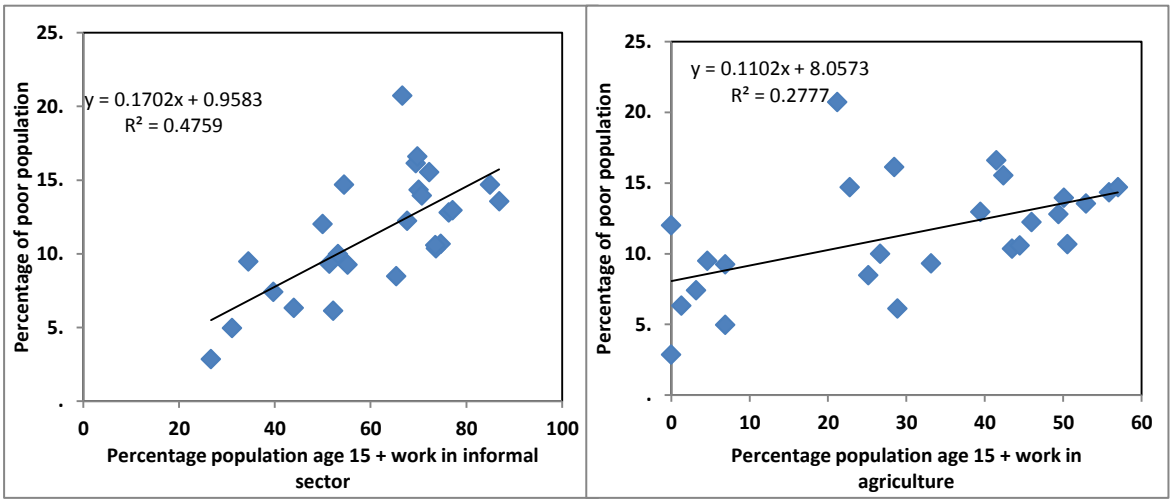
These issues are also considered in this research which focuses on maternal health as an outcome of interest. Maternal health is not determined by a condition at a single point of time and therefore is more influenced by determining household resources for longer periods. In addition, this research uses input data from the population census of 2010. Assets are undoubtedly an important variable but unfortunately, the population census did not collect any information about asset ownership and hence it is not included in building the wealth index. As a way out, this research involves economic sector of work of the head of the household to capture the economic level of households. Hence the first and second issues would not cause a problem for this study.

West Java Province is the focus of the study with the research area dominated by an ethnic group called the *Sunda* indicating that there are negligible differences in culture, house construction or investment in economic resources. Therefore, the possibility for the third issue to emerge as problem in determining household wealth

is minimized. The last issue is also handled by using Principal Components Analysis (PCA). This statistical method is applied widely and is an acceptable method in creating wealth index (Chalasani, 2012; Rutstein & Johnson, 2004).

Data from Statistics Indonesia sets a poverty line based on the amount of rupiah expenditure under which fulfilling basic needs becomes inadequate. In the poorer populations, the proportion of households having access to clean water for drinking and having a private or communal toilet are 40.69% and 60.89%, respectively (BPS, 2011a), while the figures for wealthier populations are 60.42% and 82.68% percent respectively. These data indicate that poorer populations live in worse sanitation and less hygienic conditions compared with their wealthier counterparts. In addition, poverty is also reflected in one's work in the informal sector or the agricultural sector. The percentage of poor population at the district level goes hand in hand with the percentage of the labour force working in the informal sector. This can be seen in Figure 5.3. The trend line depicts the linear association between those variables and explains 47.59% of the variability in data. Similarly, poverty may also correlate with proportion of labour work in agriculture sector but the correlation is not strong and only 27.77% percent of poverty variability across the districts can be explained by this correlation.

Figure 5. 3 Scatter Diagram and Trend Line between Percentage of Poor population and employment characteristics



Source: (BPS, 2011a)

The factor score from PCA can be seen in the Table 5.1 which is summarized from SPSS output (see appendix 11). The household wealth index is calculated based on a linear regression which uses factor scores as weights for each variable. A negative factor score gives an impact of lower wealth index. The PCA shows that a household having bamboo/wood/others as floor material, having unprotected wells or other sources of drinking water and with the head of household unemployed or working in agriculture has a lower economic condition. Every household has a wealth index. This index ranks the household from the lowest economic status to the highest. In further analysis, the households can be grouped in 5 groups or quintiles with each containing 20 % of the total number of households. Unfortunately, many households have equal ranks, thus it is difficult to divide them into exactly 5 different groups. Therefore, each of the 5 groups of households contains at least 18.45 % and 21.22 % maximally. The details of the descriptive statistics are given in Table 5.2.

Table 5. 1 The variables and their factor scores to calculate Household Wealth Index

Variables	Mean	Std. Dev.	Factor Score
(1)	(2)	(3)	(4)
Floor material			
Ceramics/Tiles	0.6866	0.4639	0.15716
Bricks/cements	0.1453	0.3524	0.18061
Wood/Bamboo/others	0.1681	0.3739	-0.36514
Source of Drinking Water			
Bottled/piped water	0.2950	0.4560	0.12041
Pump/protected well	0.4990	0.5000	0.11252
Unprotected well	0.0665	0.2491	-0.28444
Others	0.1396	0.3465	-0.11634
Availability of Toilet	0.9914	0.0922	0.22632
Availability of electricity	0.8848	0.3192	0.18102
Business Field of head household			
Unemployment	0.1317	0.3381	-0.03053
Rice/staple food farming corps	0.1992	0.3994	-0.24984
The other agriculture	0.0483	0.2144	-0.00702
Mining and Industry	0.2035	0.4026	0.05667
Trade and Hotel	0.1832	0.3869	0.05668
Transportation and communication	0.0769	0.2664	0.06978
Services	0.1384	0.3453	0.13072
Others	0.0189	0.1360	0.02317

Source: Output of PCA

Table 5. 2 Descriptive Statistics of Wealth Index Quintiles

Wealth Index quintiles	Mean	Minimum	Maximum	Percentage households
(1)	(2)	(3)	(4)	(5)
The poorest	-0.0305	-0.8994	0.3163	20.361
Poor	0.5011	0.3238	0.6544	21.217
Middle	0.7240	0.6581	0.7337	20.793
Wealth	0.7442	0.7416	0.7547	18.451
The wealthiest	0.7977	0.7571	0.8391	19.179

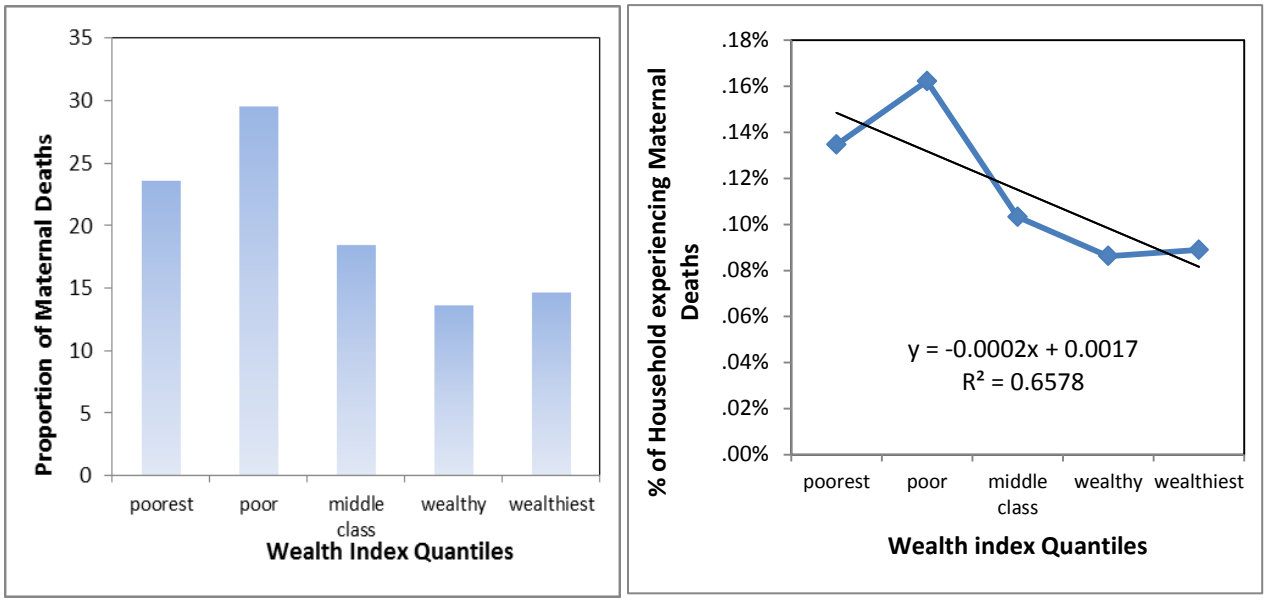
Source: Output of PCA

5.3 Maternal Mortality by Wealth index quintiles

There were 1,213 maternal deaths in West Java according to the results of the Population Census of 2010. More than half of the deaths occurred in the households with a low socio economic status while the wealthiest group recorded only 15 percent of maternal deaths. This distribution shows that there is an economic gradient to maternal mortality. This becomes more obvious by charting the line graph between the percentages of households experiencing maternal deaths with wealth index. The line graph reveals a decreasing trend and is confirmed by a linear regression model. The goodness fit of the model is quite convincing because 65.78% of data variability can be explained by the equation (R^2).

Research in many countries also indicates the importance of household wealth in influencing health status. In the urban areas of Mali, financial obstacles are mentioned as a central stressor to access medical care (Bove, Vala-Haynes & Valeggia, 2012). Therefore, women who live in wealthier households and are supported by the family, have simpler health journeys during illness. Women from the higher quintile of household wealth index in Vietnam and Nepal tend to receive adequate antenatal care, skilled delivery care and post-natal care leading to lower maternal mortality for this group when compared with women in the lowest quintile (Målqvist et al., 2013; Neupane & Doku, 2013). These studies also depict that women's education has a positive impact on utilization of maternal healthcare. Household economic status and women's education may be strongly inter-correlated, but both variables have independent impact on maternal healthcare.

Figure 5. 4 Distribution of the proportion of maternal deaths according to wealth index quintiles



Source: SP2010 (raw data)

Even though Figure 5.4 confirms the linear correlation with negative slope between maternal death and wealth index, the graph also reveals that poor households have the largest proportion of maternal deaths. This condition may be stimulated from the proportion of household in the poor class which is the largest compared to the other quintiles (see Table 5.2). Another possibility of resources from the health intervention to provide free health care is based on the economic constraints. Therefore, the poorest have a higher propensity to be covered by government intervention, while the poor group may face some difficulty to access the free health care (Figure 5.4, left hand figure).

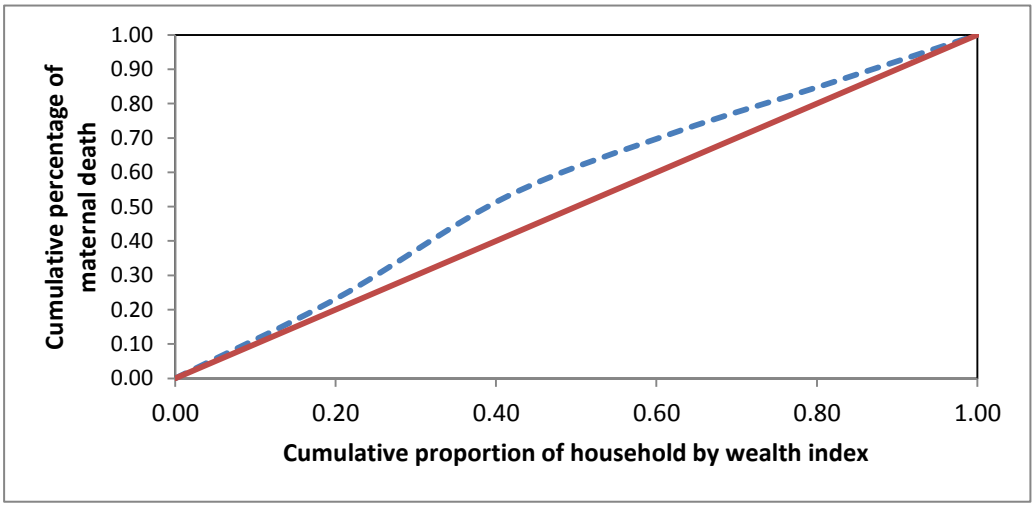
5.4 Inequalities in Maternal Mortality

One suggested measure to indicate health inequality is the Concentration Index (Kakwani, Wagstaff & van Doorslaer, 1997). This method is similar to the Gini Index and measures on a graph, the deviation of the distribution of the studied variable across population groups from the diagonal line that reflects perfect equality. The value of a concentration index ranges from -1 to 1. Negative values show that the cases of the studied variable such as infant mortality or maternal mortality are clustered in disadvantaged groups. If the studied variables are concentrated in the privileged group such as the “haves”, the concentration index is

positive. The negative value is also indicated by a convex curve (i.e., the curve which bends above the diagonal line) while a concave curve (i.e., the curve which bends below the diagonal line) provides a positive index.

Some researchers have used the concentration index to investigate disparities in other health variables. A recent study on child mortality and malnutrition in India reveals that, at the national level, the inequality ranges from -0.13 to -0.33 (Chalasani, 2012). The concentration index shows that the level of child mortality and malnutrition is more common for low socio economic groups. Zere et al (2011) studied the inequality of access to health facilities with a focus on assisted delivery for maternal care in Namibia. The concentration index for the concerned variable is 0.0979 (Zere et al., 2011). The positive values indicate that the case of delivery assisted by medical personnel cluster in the better off population group.

Figure 5. 5 Concentration Index of Maternal Mortality in West Java Province



Source: SP2010 (Raw data)

The present research shows that maternal mortality in West Java Province tends to cluster in households with low socio economic status. The concentration index for this variable is -0.1172. The value of the index is not too high; it is in line with the curve which bends narrowly with the diagonal line. However it confirms that maternal mortality inequality occurs across socio economic strata of households in West Java Province.

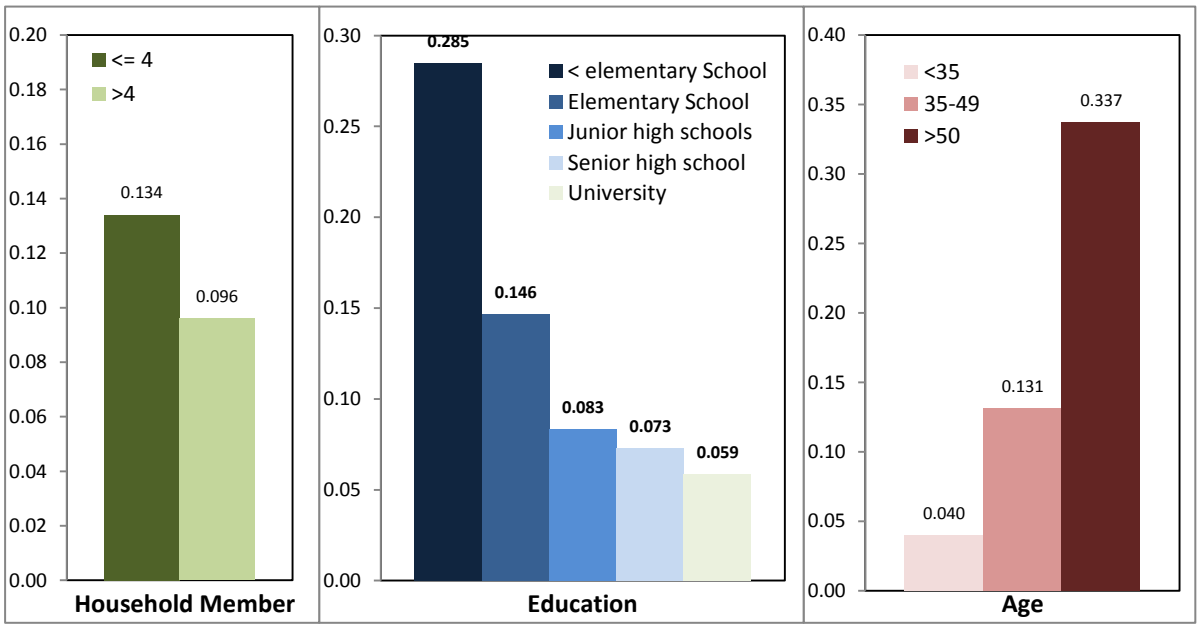
5.5 Determinants of inequalities in maternal mortality

5.5.1 Decomposing the Concentration index

One advantages of using the concentration index is that it can be decomposed into its various components. It is useful to know the characteristics which determine the concentration index. Decomposition is done by regressing selected variables which may explain the investigated variables. The coefficient of regression is used to estimate each variable contribution to construct the index (Wagstaff et al., 2003).

This study uses three variables to decompose the concentration index. These include age and education of the head of the household and number of household members. There are two reasons for choosing these particular variables to decompose the concentration index: first, the availability of data in the population census and second, the importance of identifying the head of the household to determine the socio economic status of household. The population census applied the definition of the head of the household as follows: "someone who is the most responsible to fulfil the household need' (BPS, 2009). As a consequence, the economic condition of household correlates closely with the characteristics of the head of the household.

Figure 5. 6 Percentage of Household having Maternal Mortality Based on Household Characteristics



Source: SP2010 (Raw Data)

The population census data in West Java reveal that maternal mortality is associated with certain individual characteristics of the head of the household, such as gender. A household with a female as its head tends to have a greater chance of having maternal deaths. The 2010 Census data show that maternal death occurs in 0.11 % of households if the head is a male but the figure is nearly triple that if the head is a female. Even though this is potential variable to be included in the analysis, but only 4.4% of household has female as head of the household. To conduct categorical analysis, the big disparity between categories, such as male and female, lead to higher possibility of empty cells which is not appropriate for further analysis. Therefore gender is used to decompose the concentration index. The educational background of the head of the household is another important factor in maternal mortality. When the head of the household has limited education, it is more likely that the household would experience more maternal deaths than a household with a well-educated head. Almost 0.3 % of households (i.e., N= 192) in the research area are headed by those who did not finish elementary school (Figure 5.6), and experience maternal mortality. This percentage would decrease considerably with the increase of educational level of the household head.

Similarly, the age of the head of the household is a significant variable for maternal mortality. The gradient in maternal mortality between age groups is noticeable, the younger the age, the lower the percentage of maternal deaths. Figures show 0.04 % of households experience maternal mortality if the head is aged less than 35 years. However, this figure is eight times higher where the head of the household is older than 50. Age is important in population studies as it can indicate the generation as well as the social characteristics of behaviour, knowledge, or even demographic variables like fertility. The older the head of the household, the more difficult it is for them to adapt to modern medical practices for maternal healthcare and not rely on traditional remedies. In addition, the younger head of the household tend to have a younger wife would have a shorter period of exposure to the risk of dying from pregnancy and childbirth.

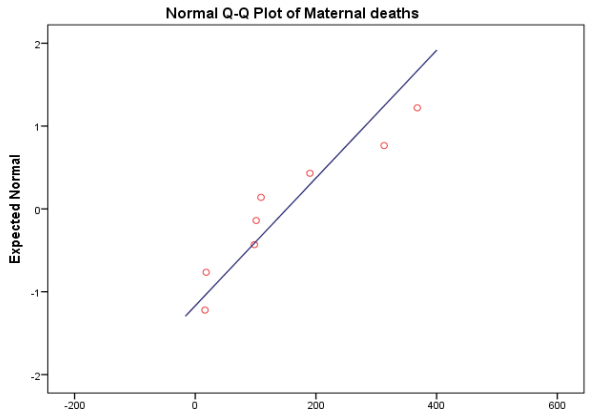
The number of household members (household size) has been used as another variable to decompose the concentration index. The inclusion of household size as a determinant of inequality across socio economic status of households is important

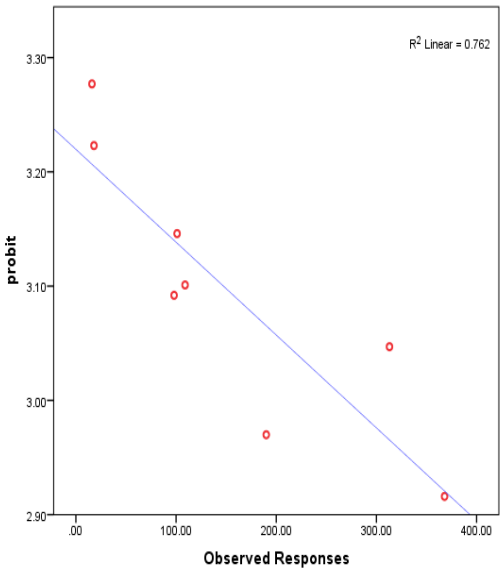
since this variable is significant to influence poverty level. A study in Nigeria indicates that household size negatively and significantly correlates with poverty. The addition of a household member progressively increases the propensity of being poor (Anyanwu, 2014). The explanation lies in the distribution of limited resources within the household. A larger household size causes smaller resources per capita. On the other hand the economics of scale in consumption theory argues against this view (Nelson, 1988). The larger households may get advantages in consumption goods by sharing common resources within households, increasing return in household production and posing opportunity of discount from bulk buying. The argument is based on the reasons that household members can share various resources. A larger household size also assumes to reduce the total time and monetary expenditure per person for daily needs such as cooking meals. An empirical study using Pakistan data indicates that the positive correlation between household size and poverty depends on size elasticity which is defined as the elasticity of consumer's welfare with respect to household size (Lanjouw & Ravallion, 1995). Therefore, it is suggested in the present research that caution should be exercised in interpreting the relationship between household size and poverty. .

The data collected in this research through a household survey show that household size does not present a positive association with maternal mortality. This can be inferred from the percentage of households experiencing maternal deaths which is higher for household size ≤ 4. It possibly indicates that a larger household size is beneficial for maternal health. In modern (nuclear) families, household size can be related to fertility which means that larger households are associated with higher fertility. But in this research, such inference is not relevant since most of the families in the study area are not nuclear families. It is common for a household in the study area to consist of relatives such as parents, parents in law, uncle, nephew, and so on. In this situation a larger household size is not necessarily due to high fertility of the wife of the head of the household and does not necessarily signify an economic burden. In fact, the number of households is positively related with the number of household members who are active in economic activity. The Pearson correlation coefficient between these two variables is 0.519 and significant at 0.01 level.

In connection with the socio economic status of households, data indicate that households headed by young and educated persons have better maternal health than households headed by other types of persons. These characteristics of household heads are used as determinants for decomposing the Concentration Index. The determinants are regressed on maternal death. The dependent variable has a nominal scale so the most suitable method is the probability linear model (Probit regression), which is used for finding the coefficients for decomposing the concentration index (Zere et al., 2011).

Figure 5. 7 Test of Normality of Distribution and Linearity of Probit





Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Maternal deaths	.254	8	.138	.885	8	.208

a. Lilliefors Significance Correction

Source: SPSS output

There are some assumptions which must be fulfilled before running a probit regression analysis. The first assumption is that the dependent variables are normally distributed (Garson, 2012b). The SPSS output indicates that the distribution of maternal death is normally distributed. This can be seen from the Kolmogorov-Smirnov test which accept null hypothesis; the variable is normally distributed (p = 0.138). The second assumption is that "the propensity to respond is linearly related to the level of independent variables" (Garson, 2012b). An indication of satisfying this assumption is that the plot of the response variable on X axis against the probit of having no maternal death in the household on Y axis is visually linear. Figure 5.7 shows that data of maternal death based on level of independent variables (education

and age of head household and household size) has negative linear association with the probit of having maternal deaths in the household. The other assumptions such as adequacy of sample (namely that there is no cell with zero frequency and 80 % of the cells have frequency more than 5), number of groups more than the number variables and no repeated measurement on the same individual, do not appear in the input data. The SPSS output of probit regression can be seen in Appendix 12.

Table 5. 3 Decomposition of Concentration Index

Variable	Coefficient	Mean	Elasticity	C	Contribution to C	% Contribution
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Household size	0.1306	0.9565	0.12508	-0.081	-0.0101	8.626
Age	-0.1760	0.4781	-0.08424	0.330	-0.0278	23.731
Education	0.0536	0.5394	0.02896	-0.197	-0.0057	4.860
Residual (unexplained): 0.07358						

Source: SP2010 (raw data)

Table 5.3 shows the result of decomposition of the concentration index. In the probit regression, the characteristics of the head of the household are re-coded as binary variables. Household size is represented by binary variable consisting of two categories of household size: ≤ 4 members and > 4 members. Education is divided in to two groups with finishing elementary school as a cut-off point, while age is grouped in to two groups: lower than or equal to median age or higher than the median age. For each of these recoded binary variables, the categories with the higher values are taken as reference categories in the analysis. For household size and education, positive coefficients mean that households with more members and having a higher educated head of household have a positive association with the chance of not experiencing maternal deaths. For age, the negative coefficient means that younger heads of households would associate positively with the chance of not experiencing maternal deaths. Age provides the greatest contribution to the concentration index. Around 23 % of the inequality is determined by the age variable. Household size also appears as an important aspect with a contribution at

8.63 %, while education of the head of the household still appears as a significant variable but its contribution to the concentration index is less than 5 %. In total those variables can only explain 37.22 % of the inequality in maternal mortality based on the socio economic gradient of households. This analysis reveals that inequality in maternal mortality must be explained by more specific variables in further analysis, such as proximate determinants of maternal mortality.

5.5.2. Multivariate analysis

Another approach which can be used to assess the determinants of maternal mortality is logistic regression. Logistic regression is the appropriate method of multiple regression when the dependent variable takes one of two values. In the present analysis, the unit of analysis is the household (as before). The dependent variable (Y) has a binary outcome and the independent variables (X) are classified as ordinal variables. In the present analysis, Y takes the value 0 (zero) when the household has experienced a maternal death and the value 1 (one) if the household has experienced no maternal death. The regression provides the probability of households having no maternal mortality (Y = 1) according to the given classifications of the dependent variables.

Table 5. 4 Logistic regression output showing the effects of socio-economic factors on maternal mortality

Dependent Variables	B	Wald	Sig.	Exp. (B)	B	Wald	Sig.	Exp. (B)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
X1 wealth quintile		75.581	0.000			17.062	0.002	
$X1_{(1)}$ Poor	-0.186	5.524	0.019	0.830	-0.260	10.562	0.001	0.771
$X1_{(2)}$ Middle class	0.266	8.855	0.003	1.304	-0.017	0.033	0.856	0.983
$X1_{(3)}$ Wealth	0.446	20.871	0.000	1.562	0.014	0.018	0.892	1.014
$X1_{(4)}$ The wealthiest	0.415	18.863	0.000	1.514	0.023	0.052	0.820	1.023
X2 Education of Head Household					0.693	105.244	0.000	1.999
X3 Age of Head Household					-2.047	704.253	0.000	0.129
X4 household size					1.349	458.265	0.000	3.407

Source: SP2010 (Raw data);

The independent variables deployed in this method are the same variables as those used for decomposing the concentration index. However, the logical framework is different. The decomposition analysis is aimed at finding out those variables which contribute to the observed inequality based on socio economic status. The independent variables such as number of household members, age and education of the head of the household are used in the regression to explain the inequality in maternal mortality caused by socio economic status and wealth index. In the logistic regression, the wealth index and the characteristics of the head of the household are treated as independent variables to assess their impact in determining the inequalities in maternal mortality.

Initially, wealth index quintiles are regressed on the dependent variable, maternal mortality. The SPSS output shows that this variable (X1) is significant in its influence on maternal mortality (Table 5.4 or Appendix 13). The lowest socio economic status group (the poorest group) is used as the reference group. In general, households with higher socio-economic status have a greater likelihood of not experiencing maternal deaths compared to the poorest group, as shown by the greater than one values of Exp.(B). The exceptions are the households in the second quintile, X1(1) which have a greater chance of experiencing maternal mortality compared to the poorest households. As shown in Table 5.4, column Exp.(B), the figure 0.830 (under 1) means that the households in the second quintile are 0.830 times less likely to have not experienced maternal deaths compared with the poorest households (the reference group). This apparent anomaly may be caused by government interventions that are focused on the poorest households, which enables the poorest group of households to get more access to public facilities including health care compared to the poor households in the second quintile. The other groups of households, namely the middle [X1(2)], wealthy [X1(3)] and the wealthiest [X1(4)], are much less likely to experience maternal deaths compared to the poorest households, and this can be explained by the greater ability of these households to avail of maternal healthcare by virtue of their being in the higher wealth quintiles and the associated socio-economic status conferred on them by their wealth status. The positive impact of wealth to avoid maternal mortality is significant from the middle wealth quintile group and above.

Further, to assess the influence of socio economic status on maternal mortality, the wealth score index is included in the regression together with the other household characteristics. The results can be seen in Table 5.4, Columns 6-9. The wealth index quintiles are still significant in explaining the incidence of maternal mortality in the household. But the coefficients for middle class, wealthy and the wealthiest groups are not significant. This means that the poorest group is only significantly different with the poor group but there is no substantial disparity in propensity of experiencing maternal deaths with the other wealth quintiles. On the other hand, the other household characteristics are significant in influencing the dependent variables. The chance to avoid maternal mortality goes hand in hand with an improvement in the head of the household's level of education. Furthermore, the SPSS output shows that larger household size possesses a chance 3.407 times higher than the smaller household size to have no maternal mortality. In accordance with the cross tabulations, the older heads of household's group has a greater chance for experiencing maternal death. In this regression, the likelihood of maternal death in households where the head is older than the median age is 1/0.129 or nearly 8 times higher than for a younger head of household. However, according to Hosmer-Lamenshow test, this regression model does not provide a good fit to the data (Garson, 2013b). It indicates that the inclusion of the characteristics of the head of the household does not improve the performance of the model to explain the variations in maternal death among the households. Therefore, it can be concluded that even though the household head's characteristics explain a part of the inequality in maternal deaths at the household level (as revealed by their contribution to the concentration index), its direct impact as a determinant of maternal mortality is uncertain.

5.6 Summary

In conclusion, the quantitative data analysis of the 2010 population census reveals several points as follows:

- The data reveal that there is inequality in maternal mortality West Java according to socio economic status.

- By using the wealth index score to group the households in to five socio economic levels, maternal mortality is found to cluster in the lower socio-economic status. This is shown by the concentration index of -0.1172.
- The decomposition of the concentration index reveals that age and education of the head of the household contributes to approximately 28.59 % of the concentration index. Thus, the characteristics of the head of the household are important variables in explaining the maternal mortality inequality.
- An assessment using logistic regression confirms that socio economic status of households is associated with the incidence of maternal mortality.

CHAPTER SIX: The Underlying Factors of Maternal Mortality: A Comparison between Deceased and Surviving Women

6.1 Introduction

Gender-specific characteristics of women have long been considered as important factors in influencing maternal health. They include women's behaviour toward health care practices, their reproductive status and characteristics relating to education or daily activities such as employment and involvement in decision making. Global research has found these variables to be essential determinants of maternal health (Bhutta et al., 2012; Caldwell, 1986; Shiffman, 2000).

Education appears to be central in discussions regarding maternal welfare. Many researchers acknowledge the importance of education in influencing women's health and suggest improving women's education as a possible intervention to enhance their health status. A cross national analysis using data from WHO global survey on maternal and perinatal health during 2004-2008 reveals that higher levels of education of women are associated with lower maternal mortality (Karlsen et al., 2011). Higher levels of education are understood to improve women's capacity to obtain and understand professional heath treatment for maternal care.

A study in sub-Saharan Africa shows that women's education, represented by literacy level influences maternal mortality rate through the utilisation of health care and economic capability (Buor & Bream, 2004). This study shows that there tends to be a higher percentage of deliveries attended by skilled health personnel where women have a better literacy rate. Women's education is also inextricably linked with GNP per capita and health expenditure which supports accessibility to health care facilities.

To some extent, education also allows women the opportunity to be active in the labour market. Without doubt, this is also beneficial in diminishing the economic constraints to access health care facilities. Therefore women's educational achievement and employment status are often used to indicate a woman's status, a

distant determinant of maternal mortality. Another variable which is considered as an indicator of women's status is her involvement in decision making. Previous studies have shown that women involved in decision making are advantaged as that role has a positive impact on their health. In Tajikistan, where women are engaged in making decisions on household financial matters, their propensity to use medical care for antenatal and delivery increases (Kamiya, 2011). Similarly in Pakistan, decision-making power appears as a significant variable to influence women's uptake of medical care even though controlled by other aspects (Hou & Ma, 2013).

External variables including household and regional circumstances also influence women's health. The availability of a health facility in the community has proven to be an important factor in influencing women's health seeking behaviour (Falkingham, 2003; Frankenberg et al., 2009). At the household level, the financial capacity to access health care is another significant factor in women's use of skilled health care (Gabrysch & Campbell, 2009). This research also considers the importance of the perceived benefit/need for women in the physical access to medical care.

In general, the indicators representing household and regional conditions do not influence women's health directly but their effects operate through proximate determinants of women's individual characteristics such as reproductive status, health status and health care behaviour.

This chapter discusses the importance of these factors to determine maternal mortality. The input data for the analysis are obtained from primary data collected for this research in two districts of the province of West Java. The data on proximate determinants have been collected from selected households. Household members may include a surviving woman (a woman who survived her pregnancy and child birth) or a deceased woman (a woman who died during pregnancy, delivery or 2 months after delivery). The characteristics of the women who, either survived or died are compared in order to find the underlying factors which caused maternal deaths.

6.2 Description of Research Areas

The research areas, Indramayu and Bekasi, have been selected to represent two different stages of regional development, which also indicate the maternal health disparity. The research areas are described in the following sections.

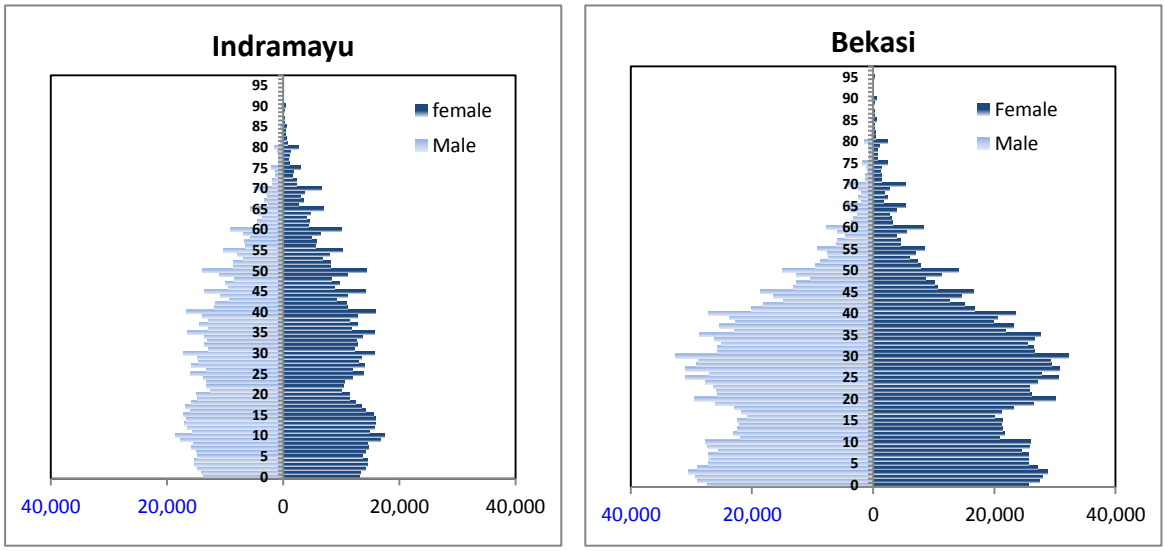
6.2.1 Population

Based on the 2010 population census, Indramayu has a population of 1,663,740, while Bekasi has a larger population of 2,630,404. One obvious difference between these two districts is in their age composition. The Bekasi population is dominated by a young and productive age group, 19 to 35 year olds, which constitute 35.96 % of the total population. This age group is known as economically active and tend to be involved in the industrial labour market in Bekasi. Many industries have been built in Bekasi which have attracted large numbers of immigrants looking for work. In addition, Bekasi is close to the Indonesian capital, Jakarta which is already overcrowded, and subsequently the surrounding areas including Bekasi have become the buffer region for the capital. Many people work in Jakarta but live in neighbouring regions close to Jakarta such as Bekasi. The tabulation of 2010 population census shows that Bekasi has a net recent migration rate of 66.10 per 1,000 population (all age groups), indicating that more people come to Bekasi than leave.

The circumstances are different for Indramayu. The population pyramid (see Figure 6.1) indicates that this district has a negative net migration rate for the 15-34 year age group. The 2010 population census data reveal that Indramayu has a net recent migration rate for Indramayu is -10.26 per 1,000 population. The negative figure shows that more people leave Indramayu than enter. The net out migration of the young population is reflected in the dent in the age pyramid of Indramayu for the 15-30 year age group (Figure 6.1). In absolute numbers, Indramayu has lost 5,855, 7,066, 2,678 and 1,.028 persons in the age-groups 15-19, 20-24, 25-29 and 30-34 years respectively, while Bekasi has gained 18,743, 51,763, 28,815 and 19,929 persons respectively in the same age-groups. This is evident from the expansions of the bars corresponding these ages in population pyramid of Bekasi (see Figure 6.1).

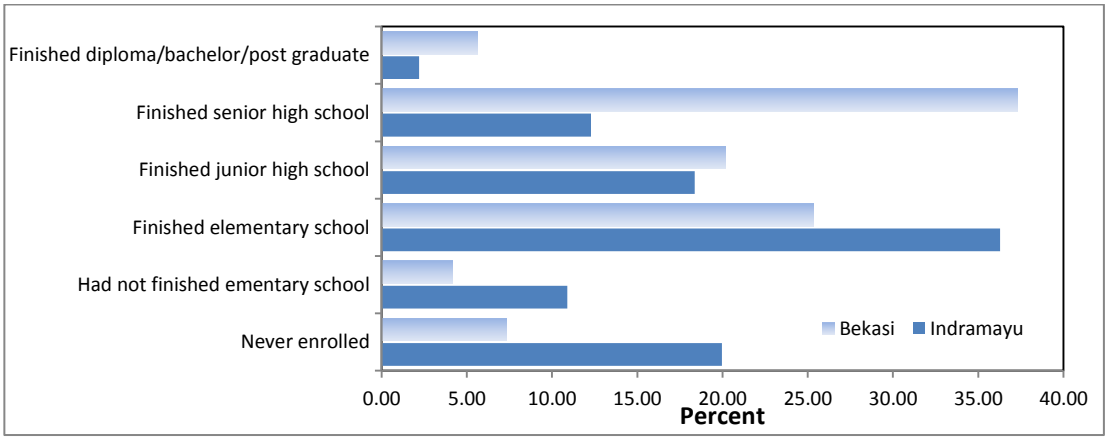
This negative net migration in Indramayu may be the result of a lack of higher educational facilities, causing young people desirous of higher studies to leave for districts such as Bandung or Jakarta. Further, not enough jobs in the industry or services sectors are available in Indramayu for employing young people. More than 55 % of the labour force in Indramayu works in agriculture, a sector known for being labour intensive and achieving low productivity. Therefore, many young persons also leave Indramayu to find better jobs elsewhere.

Figure 6. 1 Population Pyramid of Indramayu and Bekasi, 2010



Source: Population Census 2010

Figure 6. 2 Percentage of Population age ≥15 year by educational achievement



Source: Population Census 2010

Apart from numbers and age composition, the education characteristics of the populations of Bekasi and Indramayu differ considerably. In Indramayu, nearly one fifth of the population aged ≥15 years have never enrolled in school. The majority of the people only finished elementary school which is 6 years of education. In contrast, more than 35 % of the population aged 15 years or more in Bekasi have finished senior high school or 12 years of education. Figure 6.2 clearly shows that Bekasi has better rates of educational achievement than Indramayu.

6.2.2 Economic development

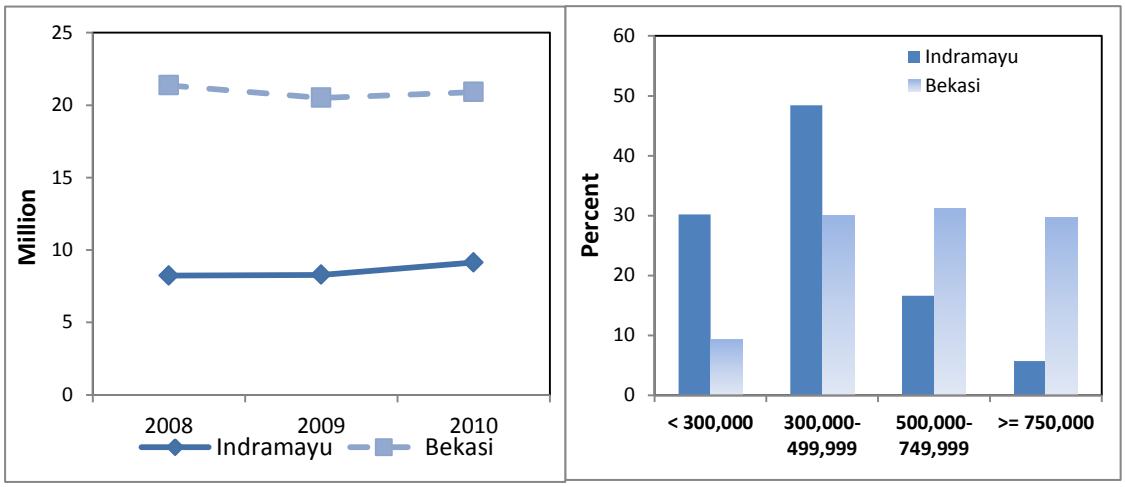
In terms of the economy, Bekasi is far more developed than Indramayu. As of the 2010 data, the figures for Gross Domestic Product per capita reached more than Rp. 20 million during 2008-2010 for Bekasi. In contrast, the GDP per capita for Indramayu is less than a half of the Bekasi figures. Another indicator of economic development is expenditure per capita data which is obtained from the National Socio economic Survey of 2010 (see Figure 6.3). The population in Bekasi has a higher monthly expenditure. Nearly 50 % of the Indramayu population have expenditure per capita from Rp 300,000 to Rp 499,999 monthly. This is comparable to US$ 30-50. In contrast, almost 60 % population of Bekasi have expenditure per capita of more than Rp 499,999. It illustrates that population of Bekasi enjoys a better lifestyle.

The difference in economic development between Bekasi and Indramayu may stem from their economic structures. According to the value added which is produced per sector, Industry provides the biggest contribution to Gross Domestic Product (GDP) both for Bekasi and Indramayu. However the figures differ considerably. In Bekasi, almost 80% of the GDP comes from the industrial sector while the percentage for Indramayu is slightly under 40 %. In Indramayu, agriculture and mining sectors also provide significant contributions to GDP while this is not the case for Bekasi.

The value added produced by every sector does not go hand in hand with the labour force employment. The agricultural sector which contribute less than 20 % of GDP in Indramayu employs more than 55 % of labour force. This indicates that the economic scale of agricultural sector is not large but many work in this sector. It is common since agriculture is known as a labour intensive sector, which does not

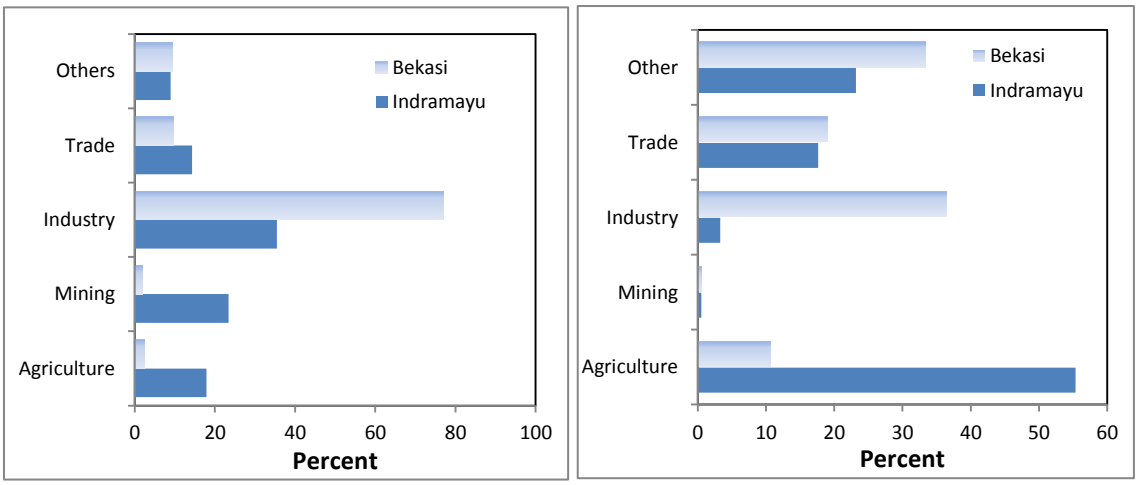
require an educated and skilled workforce. In contrast, mining provides a significant contribution to GDP but only less than 1 % of the labour force works in this capital intensive sector, as workers need to be highly skilled and qualified. In Bekasi, the industrial sector employs the largest proportion of work force providing the major contribution to GDP. Others sectors including finance, communication, transportation and services also engage a significant proportion of workers and as with mining, these sectors tend to provide formal jobs for skilled labour.

Figure 6. 3 Gross Domestic Product per Capita 2008-2010 and Monthly Expenditure per Capita 2010



Sources: PDRB 2010 and Susenas 2010

Figure 6. 4 Contribution of Several Sectors to Gross Domestic Product and Distribution of Labour Force by sectors, 2010



Sources: PDRB 2010 and Population Census 2010

Since the labour force of Indramayu is in the lower productive sector as opposed to Bekasi Regency, economic development between these districts differs significantly. It is evident from the Human Development Index (HDI) which ranks Bekasi at 72,93 and Indramayu at 67,75 (BPS, 2011c). Indramayu has the lowest HDI of all the 26 districts in West Java province, while Bekasi is ranked in the mid-range.

6.3 Distribution and Characteristics of Respondents

In discussing the determinants of maternal mortality, this research relies on a case controlled study. The data collection has been conducted with two groups of respondents classified as deceased women and surviving women. The respondents for the deceased women are the husbands, parents or close relatives. Surviving women have responded for themselves.

Table 6. 1 The distribution of respondents* by sub-districts 2013

Bekasi		Indramayu	
Subdistrict	Number of respondent	Subdistrict	Number of respondent
Serang Baru	9	Haurgeulis	12
Cikarang Pusat	3	Gantar	3
CIkarang Selatan	6	Kroya	6
Cibarusah	3	Cikedung	6
Bojongmangu	3	Lelea	3
CIkarang Timur	9	Tukdana	6
Kedungwaringin	3	Kertasemaya	6
Cikarang Utara	6	Krangkeng	3
Cibitung	9	Karangampel	12
Cikarang Barat	18	Juntinyuat	6
Tambun Selatan	18	Sliyeg	3
Tambun Utara	9	Jatibarang	3
Babelan	30	Balongan	3
Tarumajaya	3	Indramayu	24
Tambelang	3	Sindang	15
Sukawangi	3	Cantigi	3
Sukatani	3	Lohbener	3
Pebayuran	6	Kandanghaur	12
Cabangbungin	3	Anjatan	12
		Sukra	6
Total	147	Total	147

*The number of respondents comprise deceased and surviving women in the ratio: 2 surviving women for every deceased woman.

Source: Primary Data Collection

The total number respondents chosen for the sample survey is 294. Each deceased woman is paired with two surviving women. This is in line with comparing one woman dying from pregnancy and child birth with two or more women surviving pregnancy and child birth (Ganatra, Coyaji & Rao, 1998). The criteria for pairing are that the deceased and surviving women must be from the same location and must have experienced pregnancy and child birth in the same period. The sample is distributed equally over two districts which represent different socio economic conditions. The sample is distributed in 19 sub-districts in Bekasi and 20 sub districts in Indramayu (Table 6.1).

6.4. Distant Determinants of Maternal Mortality

The distant determinants of maternal mortality are basically adapted from the framework given by McCarthy and Maine (1992).

6.4.1 Women's status

Women's status is often represented by educational achievement and involvement in the labour force. It is assumed that educated women have a greater capacity to access information and are more knowledgeable about their health. Therefore, educated women are more likely to have a healthy diet, seek appropriate health treatments and avoid harmful traditional practices. It can be said that education plays a positive role in improving maternal health. Similarly, women who are employed and economically active tend to develop a better health status. The contextual logic is that their involvement in the labour market can improve their propensity to access medical care. Allied with better economic capability or the ability to access health facilities, employed women are in the position to have, or find the health information they need and adapt it to fit outside the household environment.

However, a cross tabulation based on primary data gives an inconclusive picture (Table 6.2). Women who survive after giving birth are in general, better educated than the deceased women, but the association between education and maternal survival is statistically not significant. Likewise, although a greater proportion of the

surviving women were employed, the association women's employment and maternal survival also is not statistically significant.

The only statistically significant association is observed between two indicators of women's status and maternal survival, namely women's involvement in decision making on health treatment and maternal survival and women's involvement in decision making on buying luxury goods and maternal survival. These two significant associations are important as they represent women's access to maternal healthcare and women's control over economic resources. The other indicators of women's status – involvement in decision making on visiting friends, involvement in decision making on buying daily needs and involvement in decision making on cooking meals do not have a significant association with maternal survival.

Table 6. 2 Women's status and Maternal Mortality

Variables	Deceased women	Surviving women	Chi-square	P value
Women's education			1.352	0.508
<= elementary school	56.5%	51.0%		
Junior high school	25.0%	24.5%		
>= senior high school	18.5%	24.5%		
Women's Employment			2.027	0.155
Employed	28.0%	36.5%		
Unemployed	72.0%	63.5%		
Decision for health treatment			18.623	0.000
Involved	60.2%	83.2%		
Did not involve	39.8%	16.8%		
Decision for buying luxury goods			13.991	0.000
Involved	66.3%	85.2%		
Did not involve	33.7%	14.8%		
Decision for visiting friend			2.714	0.099
Involved	74.5%	82.7%		
Did not involve	25.5%	17.3%		
Decision making for buying daily needs			1.246	0.264
Involved	84.7%	89.2%		
Did not involve	15.3%	10.8%		
Decision making for cooking meals			1.432	0.231
Involved	86.7%	91.2%		
Did not involve	13.3%	8.8%		

Source: Primary data collection; P value < 0.01 = highly significant; P Value < 0.05 = significant

6.4.2 Household status

Economic status of the household is a distant determinant of maternal health (McCarthy and Maine 1992) and is dependent on the head of the household who has the responsibility to fulfil the family needs. The education and employment status of the head of the household are indicators of income which can be earned. The assumption is that a higher education provides an investment in human capital endowment with the potential of better jobs and income. Similarly, having formal jobs illustrates a better propensity to receive higher income than being involved in informal jobs or being unemployed.

The data reveal that the education and employment status of the head of the household have a statistically significant association with maternal survival. Proportionately more surviving women tend to live in a household with an educated head compared to deceased women. Similarly, surviving women have greater propensity to belong to a household with a head who works in the formal sector. The chi-square test confirms the significant of association of education and employment of the head of the household and maternal survival.

Table 6. 3 Household Status and Maternal Mortality

Variables	Deceased women	Surviving women	Chi-square	P value
Head of Household education			9.280	0.002
<= elementary school	68.0%	49.2%		
> elementary school	32.0%	50.8%		
Head of Household Employment			10.121	0.006
Unemployed	14.3%	4.1%		
Informal Jobs	33.7%	33.8%		
Formal Jobs	52.0%	62.1%		
Number of household assets			7.724	0.021
0-1	32.7%	19.0%		
2-3	44.9%	48.2%		
>= 4	22.4%	32.8%		

Source: Primary data collection; P value < 0.01 = highly significant; P Value < 0.05 = significant

Another variable relating to household status is the ownership of assets. Information was collected about household assets such car/boat, motor cycle, electrical/electronic appliances (radio, TV etc), savings, precious metals, cattle, furniture or land which, individually, have a value greater than one million rupiah (± US$ 100). The data

show that asset ownership has a significant association with maternal mortality and indicates that the availability of economic resources at household level is meaningful to influence maternal health.

Analysing the distant determinant reveal that decision making is the only aspect of women's status which is significantly associated with maternal mortality. In fact, this variable does not only indicate women's ability to take on a role in shaping decision making in the household, but it may also illustrate the norms or values which are applied in the household. In addition, the three variables representing household status is significantly linked to maternal mortality. This result shows that maternal mortality is more likely to be influenced by external factors rather than the individual characteristics of women. This finding supports the inference that women's involvement in decision making can be shaped by household characteristics such as education of the head of the household.

6.5 Proximate Determinants of Maternal Mortality

Like the distant determinants, the proximate determinants of maternal mortality are basically adapted from the framework given by McCarthy and Maine (1992).

6.5.1 Reproductive status

Reproductive status relates to the age of a female when she marries for the first time, her age at giving birth and the number of children she has borne. Marriage at very young ages increases the possibility of reproductive health problems when the women are physiologically not prepared for pregnancy or delivery. According to Law No. 1 of 1974 of the Republic of Indonesia, the minimum legal age for marriage for girls is 21 years (Article 6, Paragraph 2), but a woman over the age of 16 can marry as long as she has parental permission (Article 7, Paragraph 1). In reality many women are married at ages less than 16, and since it is an illegal practice, the marriage age is often falsified. West Java is well known as a region where women marry below the age of 16 years (Jones, 2001).

Table 6.4 shows the association between three indicators of reproductive status and maternal survival. In general, women who have survived have tended to delay their marriage compared to those women who have died a maternal death. However, the

association between age at first marriage and maternal mortality is statistically not significant in the present case.

The association between age at birth and maternal mortality and that between parity and maternal mortality is also in the expected direction, and is statistically significant. Age at birth is uniquely associated with maternal mortality, while the number of children ever born is directly associated with maternal mortality. In other words, woman gives birth at age between 20 to 35 has the lowest chances of maternal death, while the higher the parity, higher is the chance of maternal death. The optimal age for women to give birth is in the range of 20 to 35 years (Mirowsky, 2002). This inference is based on the report of natality statistics in United States. Women aged under 20 years have a higher risk of suffering from anaemia, pregnancy-associated hypertension and eclampsia (Ventura et al., 1998). According to the same report, the risk of having diabetes and chronic hypertension increases significantly for women aged more than 35 years. In addition at this age category, women tend to deliver babies with a weight greater than 4 kilograms

Table 6. 4 Reproductive status and Maternal Mortality

Variables	Deceased women	Surviving women	Chi-square	P value
Age at first marriage			1.979	0.372
<= 15	9.6%	6.2%		
16-20	60.6%	57.2%		
>= 21	29.8%	36.6%		
Age at Giving Birth				
<20 or >=35	38.8%	21.9%	9.279	0.002
20-35	61.2%	78.1%		
Children Ever Born			11.361	0.003
0	28.9%	14.3%		
1-2	35.1%	52.0%		
>=3	36.1%	33.7%		

Source: Primary data collection; P value < 0.01 = highly significant; P Value < 0.05 = significant

The number of births per female also has a significant association with maternal mortality. The risk of maternal death is very high for the first birth (i.e., for zero parity women) and for the fourth and higher order births (i.e., for women with parity three and more) (Dior et al., 2013). The present result (Table 6.4) showing that the

proportions of deceased women with parity zero and parity three or more are greater than the proportions of surviving women of the same parities is in line with the study cited above.

6.5.2 Health Status

In the present study, health status is indicated by whether the woman had any health problem before and during pregnancy and during delivery. All these indicators have been found to be significantly associated with the death or survival of the women (Table 6.5). Women who have had no health problem before or during their pregnancy, or during their delivery had a higher probability to survive their pregnancy and child birth. Although, for each health indicator, both the deceased and the surviving women show a greater percentage not having any health problem than having a health problem, the difference between these percentages is much greater among the surviving women. The association between each indicator of health status and maternal mortality is strong, as shown by the chi-square values, and each chi-square is highly significant ($p = 0.000$). This reflects the close proximity of women's health status as a determinant of maternal survival.

The primary data collected for this study also gathered information on health problem prior or during pregnancy and delivery based on the respondents' statement. Accordingly, more than 16% of the deceased women suffered from hypertension, a commonly occurring problem in the period before pregnancy. Other diseases for this group relate to heart problems and asthma, with percentages at 7.14 % and 9.18 % respectively. During pregnancy, they also suffered bleeding (6.12%) and high fever (12.25%). Bleeding also appears as significant problem during delivery. More than 16 % of the deceased women had bleeding during delivery. In addition, for 7.14 % of deceased women, their waters broke more than 6 hours before delivery occurred. The incidence of such health problems for the surviving women is much lower (Table 6.5).

Table 6. 5 Health Status and Maternal Mortality

Variables	Deceased women	Surviving women	Chi-square	P value
Health problems before pregnancy			54.044	0.000
Yes	42.9%	7.1%		
No	57.1%	92.9%		
Health problems during pregnancy			54.089	0.000
Yes	39.8%	5.6%		
No	60.2%	94.4%		
Health problems during delivery			37.428	0.000
Yes	42.5%	10.7%		
No	57.5%	89.3%		

Source: Primary data collection; P value < 0.01 = highly significant; P Value < 0.05 = significant

6.5.3 Health Care Practices

The World Health Organization (WHO) recommends an antenatal model which consists of at least 4 visits to professional care during pregnancy (Villar & Bergsjo, 2002). The first visit must be done before 12 weeks of pregnancy or in the first three months. The follow-up visits must be done before the 26th, 32nd and 38th weeks of pregnancy. It means that 4 visits of antenatal care are distributed over one visit in the first and second trimester and two visits in the third trimester. This standard of antenatal care can be used to assess whether pregnant women have received sufficient maternal care during pregnancy.

It can be seen from Table 6.6 that the majority of pregnant women have had two or more antenatal care (ANC) visits before 12 weeks of pregnancy in each of the first and the second trimesters. In the first trimester, 8.2% of both the deceased and surviving women had not had any ANC visit. Of those women who did have ANC visits in the first trimester, 56% of the deceased women and 60% of the surviving women had two or more visits. After the first trimester ANC visits, there are more drop-outs. Over 3% of the deceased women and just 1% of the surviving women did not have any second trimester ANC visit. Of those women who did have second trimester ANC visits, a greater proportion appears to have dropped out of third trimester ANC visits. Two other patterns appear to be clear. The proportion of women dropping out of ANC visits in any trimester is larger among the deceased women, but among those who did have ANC visits in each trimester, the frequency of visits is larger among the surviving women. Thus, the surviving women not only

had lower rates of drop out, they also had a higher frequency of visits in each trimester. Overall, considering all the trimesters (i.e., the full duration of pregnancy), a larger percentage of the surviving women had the recommended four or more visits than the deceased women. Therefore, it can be concluded that the surviving women obtained better health care during pregnancy than deceased women. However, only the third trimester ANC visit has a statistically significant association with maternal survival (Table 6.6).

Table 6. 6 Health Practices during Pregnancy and Maternal Mortality

Variables	Deceased women	Surviving women	Chi-square	P value
Frequency of ANC visit - 1st trimester (WHO recommends at least one visit in the 1st trimester)	N= 98	N= 196	0.515	0.773
0	8.2%	8.2%		
1	35.7%	31.6%		
>= 2	56.1%	60.2%		
Frequency of ANC visit - 2nd trimester (WHO recommends at least one visit in the 2nd trimester)	N= 89	N= 196	1.991	0.370
0	3.4%	1.0%		
1	7.9%	8.7%		
>= 2	88.8%	90.3%		
Frequency of ANC visit - 3rd trimester (WHO recommends at least two visits in the 3rd trimester)	N=86	N=194	10.697	0.005
<=1	14.0%	4.6%		
2	29.1%	21.6%		
>= 3	57.0%	73.7%		
Overall Antenatal care (all trimesters)	N= 87	N=195	2.883	0.090
>= 4	79.3%	87.2%		
< 4	20.7%	12.8%		
Quality of Food Intake			10.316	0.006
Better than Before	12.1%	29.3%		
Similar	78.0%	60.8%		
Worse than Before	9.9%	9.9%		
Food supplement consumption			9.279	0.002
Yes	82.3%	93.8%		
No	17.7%	6.2%		

Source: Primary data collection; P value < 0.01 = highly significant; P Value < 0.05 = significant

In contrast, as seen in Table 6.7, the deceased women appear to have received better medical care than the surviving women during delivery, as proportionately more of the deceased women had delivered in a health facility and had been attended by a doctor/physician than the surviving women. However, using these figures, it cannot

be concluded that access to health facility during delivery is not beneficial for maternal health. In the first instance, this is because it is common for women to deliver their babies at home in the research areas. The community still places home deliveries as the top priority in delivery care. If there is a problem during the delivery, the patients are referred to a health facility. As the deceased women's group is more likely to suffer from complications, they are also more likely to obtain medical care than those in the surviving women's group.

Table 6. 7 Health Practices during Pregnancy and Maternal Mortality

Variables	Deceased women	Surviving women	Chi-square	P value
Place of delivery			4.561	0.031
Health Facility	66.7%	52.6%		
Home	33.3%	47.4%		
Delivery Assistants			38.000	0.000
Doctor/GP	53.7%	19.2%		
Midwife	25.6%	61.7%		
TBA	20.7%	19.2%		

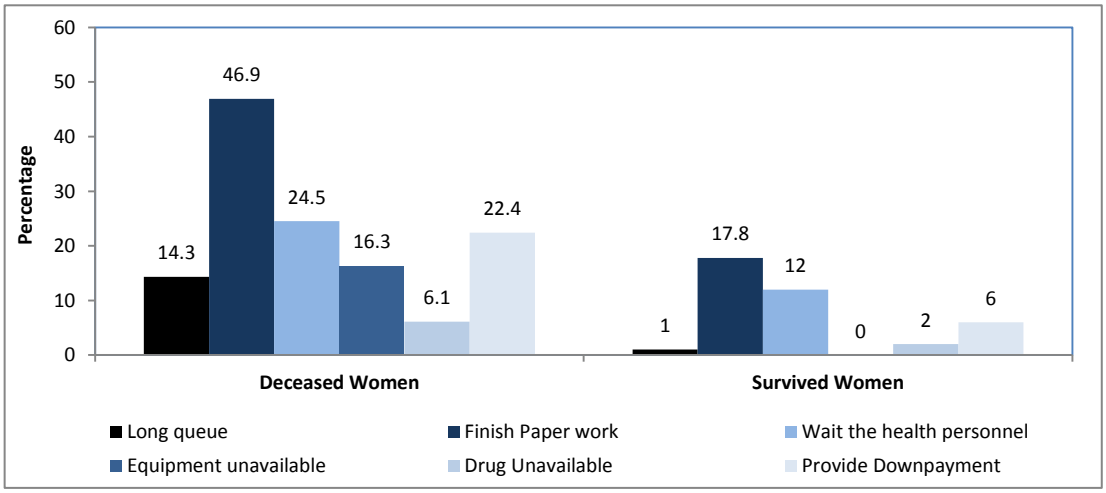
Source: Primary data collection; P value < 0.01 = highly significant; P Value < 0.05 = significant

The second reason may relate to the suitability of the treatment that patients receive in the health facility. The data given in Table 6.8 indicate that even though the deceased women's group are more likely to use a health facility, they were more likely to receive inappropriate care. This is apparent from several indicators. Nearly half of the deceased women's group who used the health facility, had to finish paper work before they were able to get the treatment and around a quarter of them needed to wait for the health personnel. In contrast, the figures for the surviving women's group reached only 17.8 % and 12 %, respectively. The deceased women's group identified with other indicators with higher percentage rates. For example, they experienced long queues, drugs or equipment being unavailable and were also asked to provide down payment before being treated.

It illustrates that the deceased women's group have lower accessibility to qualified treatment, needing to provide down payment and finish paper work before treatment. It is a common practice in Indonesia that a patient must show the ability to pay particularly those not covered by health insurance. To receive treatment, deposit in

advance is required. In other cases, patients receive health insurance provided by the government. Unfortunately to access this insurance, the patient must provide many documents to prove the expenditure is covered by government insurance and hospitals often ask the patient to finish the paper work before obtaining medical care. Using the health facility for delivery cannot assure the optimal result for maternal health since first, patient referral to the health facility occurs when the problem has already developed so critical time for patients is lost. Second, issues around care management may lead to inappropriate treatment for the patients.

Figure 6. 5 The Percentage of Deceased and Surviving Women who Used Health Facility and experienced several unexpected events



Source: Primary data collection

An increase in institutional deliveries has been found to have a weak association with MMR reduction in India (Goli & Jaleel, 2014). Institutional delivery does not directly translate to higher survival chances of mothers except when they are accompanied by full antenatal care and there are no delays in reaching the health facility. Another study done in India (Montgomery et al., 2014) also reveals that admission to a health facility does not guarantee a better outcome for maternal survival. In areas with 50 % skilled birth attendance coverage, the chance of maternal death is higher for women who are admitted in health facility than women who are not. However, in the areas with higher coverage of skilled birth attendance, health facility admission has no significant association with the chance of maternal death. Some of the reasons mentioned about this finding are poor quality care in the health facility, unfavourable prognostic factors because women come to a health facility

with the complications already underway and admission to health facility of women with low education and higher risk of maternal mortality.

6.6. Birth Preparation and Family Support

Even though birth dates can be estimated with reasonable accuracy, they can occur at unexpected times. For example, a woman may go into labour early in the morning when a health facility is closed for services except those that operate for 24 hours. In this situation, birth preparation and family support are very crucial to assure the pregnant women get adequate care. Therefore, this research has collected information which illustrates the birth preparation and family support for pregnant women.

Table 6. 8 Birth Preparation and Maternal Mortality

Variables	Deceased women	Surviving women	Chi-square	P value
Discuss about Finance of Birth			13.014	0.000
Yes	63.4%	83.4%		
No	36.6%	16.6%		
Discuss about Place delivery			1.752	0.186
Yes	51.2%	59.9%		
No	48.8%	40.1%		
Discuss about Delivery Assistants			3.713	0.054
Yes	59.8%	71.7%		
No	40.2%	28.3%		
Discuss about Transportation			0.211	0.646
Yes	29.3%	32.1%		
No	70.7%	67.9%		
Accompanied by Husband			3.758	0.053
Yes	64.0%	75.3%		
No	36.0%	24.7%		

Source: Primary data collection; P value < 0.01 = highly significant; P Value < 0.05 = significant

The data indicate that three variables of this support significantly associate with maternal mortality. Pregnant women who survive delivery tend to have had discussions about the potential costs and the need for delivery assistance. On the other hand, nearly 40% of the deceased women never had discussions about these topics. More than a third of deceased women were not accompanied by their husbands when attending medical check-ups; an indicator of lack of family support.

The figure for surviving women is lower at 24.7% and it still shows that one in four surviving women go to medical check-ups without a companion. This study also reveals that there is a lack of attention to birth preparation details by the women, husbands or families as more than 40% of respondents never discussed the place of delivery. Similarly almost 70% did not plan how they would travel to the health facility to deliver a baby.

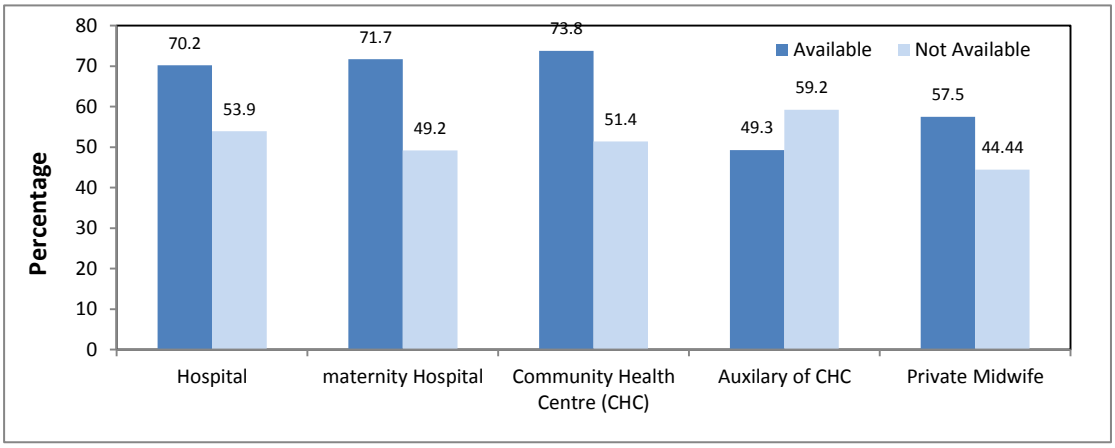
6.7. The Impact of Material Circumstances

Material circumstances can be represented by regional conditions, such as availability of health facilities or the distance of the household from the health facility. As the discussion focuses on maternal health, the availability of health facilities near the place of residence can be the most appropriate indicator of material circumstances. However, these regional material circumstances cannot be used as determinants of maternal mortality in the present study, since the sample is selected on a pre-determined ratio of two surviving women for every one deceased woman of the same region, regardless of the material conditions of the region mentioned above. In this case, maternal death is used as the dependent variable, so regional conditions cannot be deployed as independent variables because of the sample's design.

The data show that the availability of a hospital, maternity hospital or community health centre (CHC) in the village has a positive impact for maternal health care. The existence of these facilities has close associations with the use of health facilities for birthing places and skilled birth assistants. However the chi square test confirms a significant association only with the place of delivery. Support of the auxiliary of CHC has the least impact in shaping health care behaviour. The existence of this facility does not increase the percentage of pregnant women using a health facility for delivery and to be assisted by GP/midwife. This is caused by the limited function of this facility as some do not provide maternal health services and restrict opening hours to certain times during the week.

Village midwives[3], working under a government initiative to improve maternal health, provide a maternal health service in almost all villages. Many of the government appointed trained midwives work as private midwives outside of their working hours. In addition, some trained midwives (not appointed by the government) practice as private midwives in some villages. Compared with other health services, the village midwife is more mobile and flexible in providing maternal health care. It is a common practice for patients to call the midwife and get treatment at home. However, private midwife can advise the patient to utilize health facility for referral especially during emergencies. Therefore, the availability of midwife presents a positive impact for institutional delivery. In addition, private midwife can accommodate the needs of women in other villages which do not have a midwife. Therefore, a village without a midwife is also covered by midwife services.

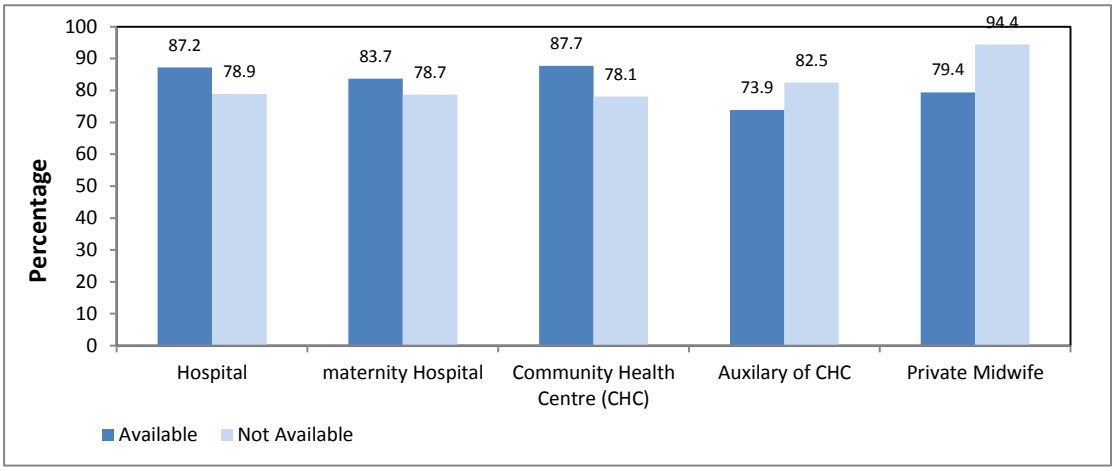
Figure 6. 6 Percentage of Pregnant women who used health facility for Place of Delivery Based on the availability health facility in the village of residence



Source: Primary Data Collection and Village Potential Survey 2011

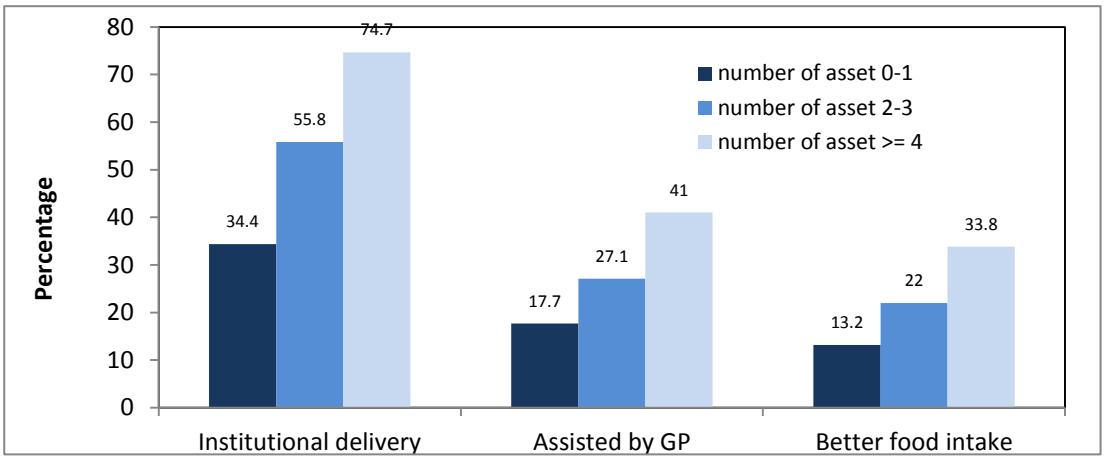
[3] The village midwife program was initiated by the Government of Indonesia in 1989 to place one trained midwife in each of the 64,000 villages to provide skilled birth assistance (Tsui, Haaga & Wasserheit, 1997, pp. 271-2)

Figure 6. 7 Percentage of Pregnant women who assisted by GP/Midwife for Delivery Based on the availability health facility in the village of residence



Source: Primary Data Collection and Village Potential Survey 2011

Figure 6. 8 Percentage of Pregnant women, who get institutional delivery, assisted by GP and have better food intake during pregnancy by group of household assets



Source: Primary Data Collection

6.8. Multivariate Analysis of Maternal Mortality Determinants

From the results of the bivariate analysis given in the previous section, the distant and proximate variables which have significant association with maternal mortality have been chosen for a multivariate analysis presented in this section. The most appropriate multivariate analysis used in this section is logistic regression, because the dependent variable, maternal death is a binary variable (deceased or surviving). The significant variables are deployed in the logistic regression analysis as independent variables. However, all the selected variables cannot be put together in

one logistic regression run because the various combinations of categories of the variables would require a large number of cells to be filled in. Therefore, the process is done in two steps. First, the variables representing similar characteristics are regressed, and then the significant variables in the first step are used as independent variables in the subsequent step. In the first step, four regressions are built. The result can be seen in the Table 6.9.

The first regression assesses the relation of women's status and household status with maternal mortality. Among the six independent variables in this category, there are three variables that have significant effect on maternal mortality, namely women's involvement in health treatment decisions, education of the household head and employment of the household head. Women's involvement in health treatment decisions appears as a strong variable to influence maternal mortality. It can be seen from the odds ratio (exp (β)), that women who are involved in deciding health treatment tend to be 3.7 times more likely to survive from giving birth compared to the women who are not involved in deciding health treatment. Similarly, the incidence of maternal survival in a household where the head of the household works in informal or formal jobs tends to be 3.6 to 3.7 times more likely than a household where the household head is unemployed. Likewise, education of the head of the household presents a positive effect on maternal survival, (households where the head is educated beyond elementary school are more than twice as likely to be associated with maternal survival compared to the households where the head is educated to only elementary school or less). The variables which do not bear a significant relationship with maternal survival are: decision for buying luxury items, decision for visiting friends and possession of household assets. It may be that the variables - decision for buying luxury items and decision for visiting friends are subsumed by the women's involvement in decisions for health treatment and the variable - household economic status is incorporated in the employment status and education of the household head.

Table 6. 9 Logistic Regression per component of Maternal Mortality Determinant

Women and Household Status	**β**	**Sig.**	**Exp (β)**	**95% CI of β**
Decision for health treatment				
Involved	1.302	0.000	3.676	2.053 – 6.583
Not involved (as reference)				
Decision for buying luxury stuff*				
Decision for visiting friends*				
Head household education				
<= elementary school (as reference)				
> elementary school	0.820	0.003	2.270	1.316 – 3.915
Household assets*				
Head household employment		0.028		
Unemployed (as reference)				
Informal jobs	1.277	0.014	3.585	1.294 – 9.929
Formal jobs	1.316	0.008	3.730	1.401 – 9.931
Reproductive and Health Status	**β**	**Sig.**	**Exp (β)**	**95% CI of β**
Age at delivery *				
Number of children ever born		0.006		
0	-1.298	0.001	0.273	0.123 – 0.605
1-2 (as reference)				
>=3	-0.469	0.188	0.626	0.312 – 1.257
Having health problem before pregnancy				
Yes (as reference)				
No	1.800	0.000	6.050	2.730 – 13.408
Having health problem during pregnancy				
Yes (as reference)				
No	1.353	0.002	3.868	1.627 – 9.198
Having health problem during delivery				
Yes (as reference)				
No	1.482	0.000	4.401	2.169 – 8.931
Health care during pregnancy	**β**	**Sig.**	**Exp (β)**	**95% CI of β**
Standard Antenatal Care*				
Health check-up in 3rd trimester		0.016		
<= 1 (as reference)				
2	0.749	0.166	2.115	0.732 – 6.108
>=3	1.298	0.009	3.662	1.375 – 9.756
Consumption food supplement*				
Quantity and Quality of food intake		0.011		
Better	0.949	0.090	2.582	0.861 – 7.743
Similar	-0.253	0.581	0.776	0.316 – 1.908
Worse (as reference)				
Family support	**β**	**Sig.**	**Exp (β)**	**95% CI of β**
Having discussion about delivery assistant*				
Having discussion about finance of birth				
Yes	1.078	0.000	2.940	1.614 – 5.356
No (as reference)				
Accompanied by husband for antenatal care*				

Sources: SPSS output * = not significant

The second logistic regression uses women's health and reproductive status as independent variables. Of the five variables considered in this regression, women's age at delivery appears to bear no significant relationship with maternal survival. Of the four variables that do exhibit significant relationships with maternal survival, the three variables representing women's health status are the most important variables influencing maternal survival. The absence of health problems before or during pregnancy and delivery appears to increase a woman's chance of survival at a rate of 4-6 times higher than if she suffered from illness or complications at those stages of her pregnancy or child birth. The number of children ever born is the only variable of reproductive status that is significantly related to maternal survival. As expected, women with parity zero (i.e., pregnant with the first birth) and women already having three or more children are negatively associated with maternal survival. In other words, women with 1-2 children have 3.66 (1/0.273) times higher chance to survive than women with 0 children. This is so the first delivery presents greater risk for maternal mortality. High parity is also not beneficial for women's chances of surviving pregnancy and child birth. This is indicated by the odds ratio which is less than 1, meaning that having three or more children is associated with a lower probability of surviving pregnancy and childbirth. However, this conclusion is weak since the standard error of estimation is high, therefore the 95% confidence interval of the odds ratio ranges from 0.318 -1.257. As a consequence, women with >= 3 children may also have a higher chance of survival than women with 1-2 children. In general the result reveals that the middle group (1-2 children) has the highest chance maternal survival.

The third logistic regression examines the influence of health care behaviour during pregnancy on maternal survival. The standard antenatal care which consists of a recommended minimum of one visit in each of the first and second trimesters does not significantly influence maternal mortality. However, that does not mean that antenatal care is not important for improving women's health. Its effect is better demonstrated by the frequency of ANC visits in the last trimester. In the period close to delivery, health check-up can provide the best medical information to guide the birth process. The likelihood of pregnant women surviving childbirth increases with the frequency of health check-up in the third trimester. Another variable also

significant in influencing maternal survival is the quality and quantity of the food intake during pregnancy. Women who have better food intake in pregnancy than before pregnancy have a higher rate of survival in childbirth (Table 6.9).

The fourth logistic regression looks at the influence of family support on maternal survival. During delivery, women rely on others for support, in particular on family members, who become crucial in safe guarding a woman's health by helping with the birth preparation or simply by being a companion at health check-ups. In this connection, only one variable, namely awareness about finances needed to cover the cost of the birth, is significant in influencing maternal survival. Since the ability to pay is a major barrier in accessing health care, it becomes a matter of great concern for women's health. Having a discussion about finances required for medical intervention during pregnancy and child birth provides some assurance that the cost of such intervention may be covered. The results of logistics regression (Table 6.9) show that women who have discussed delivery costs have a higher possibility of surviving childbirth.

Table 6. 10 Logistic Regression of Maternal Mortality Determinant

Women and Household Status	**β**	**Sig.**	**Exp (β)**	**95% CI of β**
Decision for health treatment				
Involved	1.588	0.000	4.893	2.098 – 11.413
Not involved (as reference)				
Head household education				
<= elementary school (as reference)				
> elementary school	1.554	0.000	4.731	2.084 – 10.738
Head household employment *				
Number of children ever born		0.002		
0	-1.608	0.001	0.200	0.077 – 0.518
1-2 (as reference)				
>=3	-0.118	0.787	0.888	0.377 – 2.094
Having health problem before pregnancy				
Yes (as reference)				
No	2.023	0.000	7.562	2.959 – 19.326
Having health problem during pregnancy *				
Having health problem during delivery				
Yes (as reference)				
No	1.905	0.000	6.719	2.891 – 15.618
Health check-up in 3rd trimester *				
Quantity and Quality of food intake *				
Having discussion about finance of birth *				

Sources: SPSS output * = not significant

In the second step (Table 6.10), the 10 variables representing women's status, household status, reproductive status, health status, health care behaviours and family support which, in Step 1 were found to have statistically significant relations with maternal survival (Table 6.9) are deployed as independent variables in a logistic regression with maternal survival as the dependent variable. The variables marked with an asterisk (*) in Table 6.10 do not exhibit a statistically significant relationship with maternal survival. Even though these variables are statistically significant in the first step, it can become less meaningful to influence the dependent variable in the second step because their effects become weaker than the other variables. Only five of these 10 variables are now found to have statistically significant relations with maternal survival. Of the remaining five variables that do have statistically significant relation with maternal survival, women's involvement in making decisions about their health treatment is shown to consistently influence maternal survival. This variable represents women's status and is more powerful than women's education or employment status. Education of the head of the household's also appears as a meaningful variable in maternal survival. This variable might have a wider influence on maternal survival as education does not only demonstrate knowledge but also represents the economic conditions which are crucial for accessing and affording adequate maternal health care.

The number of children ever born to the woman also influences maternal survival. Since maternal mortality occurs during pregnancy and delivery, the more frequent the pregnancy and delivery, the more frequent is the exposure to risks of dying a maternal death. The result of the regression shown in Table 6.10 is similar to that shown in the previous step (Table 6.9). Having one or two children can be confirmed as the safest parity in avoiding maternal mortality. Women with parity zero (i.e., pregnant with the first birth) and with parity three or more (i.e., pregnant with the fourth or higher order birth) are shown to have lower chances of maternal survival than women with one to two children. However the 95 % confidence interval of the odds ratio [Exp (β)] for parity 3 or above suggests that high parities may not necessarily be associated with lower maternal survival compared to parities 1 or 2 (Table 6.10). This might be due to small sample sizes for such parity women. But,

overall it can be concluded that the first delivery and deliveries of 4^{th} or higher order births are potentially risky for women.

Having health problems before pregnancy and during delivery have statistically significant relationships with maternal survival. The odds ratios for these variables are around 7 (Table 6.10), which mean that women without health problems before pregnancy or during delivery are seven times as likely to survive compared with women who did have such problems. These may be obvious conclusions as not having any health problems are much likely to result in safe pregnancy and delivery. Surprisingly, the variable representing health care during pregnancy is not significantly related with maternal survival. This result needs more explanation including a thorough investigation of the content and component of antenatal care.

6.9. Summary and Policy Implication

According to bivariate and multivariate analysis set out in the previous section, there are some important points that can be highlighted:

- Women's involvement in decision making, especially for health treatment emerges as an important variable in influencing maternal survival. The influence of this variable on maternal survival is stronger than those of women's educational level and employment status. This finding leads to two different interpretations. First, women's health is less likely to be affected by their individual characteristics if others make decisions for her. On the other hand, women who control decisions pertaining to their own health and welfare may have better educational and employment status. Educated and working mothers tend to have a higher bargaining power in deciding about their own healthcare because of their better knowledge and financial contributions to households.

- The level of education of the head of the household appears as a significant variable influencing maternal mortality. This variable is stronger than the employment status of the household head and the number of household assets related to the household's economic situation. Education has proven to be an important variable which determines human behaviour, because of its ability to influence people by providing knowledge, encouraging critical thinking,

inspiring people with new technologies and providing a conceptual map before action. In addition, education is also a component of human capital growth, because it improves human skills and productivity and subsequently, supports economic achievement (Gungor, 2010; Lebedinski & Vandenberghe, 2014). According to this premise, education of the head of the household may be seen to represent the household's economic condition and that the head of the household is a significant factor in supporting women's health. An educated head of the household is expected to have a better knowledge about health practices and adapt these to daily life which is of benefit to women's health.

- The other variable with a statistically significant relationship with maternal survival is the number of children ever born, which shows that a mother's first delivery has potential risk related to the lack of experience for young women in dealing with pregnancy, labour and birthing. Moreover, women who are giving their first birth may be very young (as evidenced by the very young age at marriage, reported in the previous chapter) and their bodies might be unable to adapt to maternal physiological changes in pregnancy, and therefore they have a higher chance of being exposed to maternal mortality.

- Women's health statuses prior to pregnancy and during delivery also emerge as significant determinant of maternal survival. It is common for those women already suffering from illness before pregnancy to be at greater risk of maternal death, since disease may complicate pregnancy and childbirth or be intensified by it. In this situation adequate health treatment with timely and qualified medical care is one solution to reduce as the potential risk of maternal death.

These findings suggest policy implication to improve maternal health in Indonesia. First, a policy which promotes women's empowerment must be endorsed as women's capacity to decide on health matters has a crucial influence on maternal survival. Second, community, especially household member participation which supports women's health should be encouraged and delivered through a comprehensive education and counselling program about maternal health. To avoid

an increased dependency of women on each other, the program of community support must be conducted jointly with programs that empower women. Education and counselling should be made available for young women to make sure that this group has sufficient knowledge for their first delivery. Third, the government should evaluate maternal health service provision with an audit of the system/management, content/component, quality and distribution of health services to discover why the health care practice during pregnancy and delivery cannot assure the improvement of maternal health. Four, a family planning program can be incorporated as a part of maternal health intervention since it is has been proven that frequent delivery increases the chance of maternal mortality. This program can also act as an intervention for young women to delay the first delivery as it is another potential risk for mortality. Lastly, health intervention to enhance women's health should cover a wider range of aspects and include all the stakeholders to participate. The Health Department cannot work alone on these issues since the determinant indicates that maternal mortality is triggered by many factors. The institutions which can collaborate in maternal health intervention are the family planning board, Ministry of Women's Empowerment and the Ministry of Education.

CHAPTER SEVEN: An Insight into Maternal Health Care Provision in Bekasi and Indramayu

7.1 Introduction

In many studies, antenatal care and birthing support are generally considered to be the main components for ensuring good maternal health and a successful completion of pregnancy (AbouZahr & Wardlaw, 2003; Campbell & Graham, 2006; Shrestha, Bell & Marais, 2014; Yang et al., 2014). However, the findings from Chapter 6 show that medical health care during pregnancy has only a minor, statistically insignificant influence on maternal survival in the research areas. It raises the question as to why health care does not have an effective impact on maternal health in Bekasi and Indramayu. To find an explanation, this chapter discusses health provision in the research areas, especially the distribution and quality of health facilities and health practitioners. It is anticipated that the discussion would identify the reasons for the cause of such an insignificant influence of health services on maternal survival.

The discussion uses input data from two main resources. The first source is the village potential survey (PODES) 2011, a conducted by the *Badan Pusat Statistik* (BPS)[4] which used the village as the unit enumeration. PODES collected data about availability of health facilities and personnel in the village. The second source of data is a survey of selected health facilities, focussing on the availability of essential drugs and equipment for maternal care. This primary data collection is conducted by using medical students as interviewer. The survey gathered information on the maternal health services provided in selected facilities.

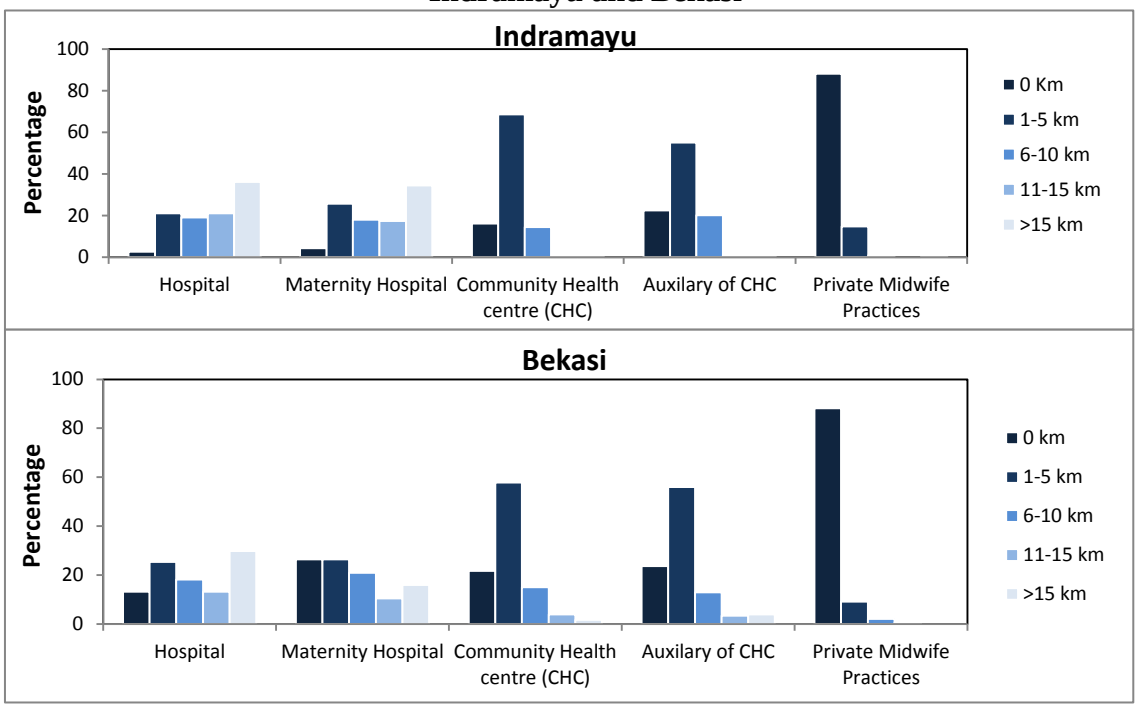
7.2 The Distribution of Health Practitioners and Facilities

One important factor which assures health services provision is the availability of facilities and health personnel. Without these two components, health services cannot be provided. In order to enhance population health status, it is essential to ensure the easiness to access health services. The distribution of health infrastructure and personnel indicate the usability of health provision.

[4] This is the Indonesian Central Board of Statistics

In Indonesia, maternal health services are provided through facilities at different administrative levels (AIPI & NRC, 2013). At the village level, service providers consist of community based-facilities operating through integrated health posts (*Posyandu*), maternity huts (*Polindes*) and auxiliary of community health centre (*Pustu*). *Posyandu*, *Polindes* and *Pustu* provide primary care focused on health promotion and prevention. At the sub-district level, community health centres (*Puskesmas*) are available to provide maternal health care in the form of inpatient services or outpatient services. The more advanced facility is the hospital which can function as a first referral service including comprehensive emergency obstetrics and newborn care. At least one state owned hospital is available in every district. In urban areas, there are private hospitals at district level, some of which are private hospitals focussing only on maternal health services and hence, are known as maternity hospitals (*rumah sakit bersalin*). In addition, there is a hospital in every capital city of a province which acts as second referral hospital. Moreover, private clinics conducted by a GP or midwife are also available to provide health at every administrative level. The main objective of such health services is to cure health problems rather than provide preventive care.

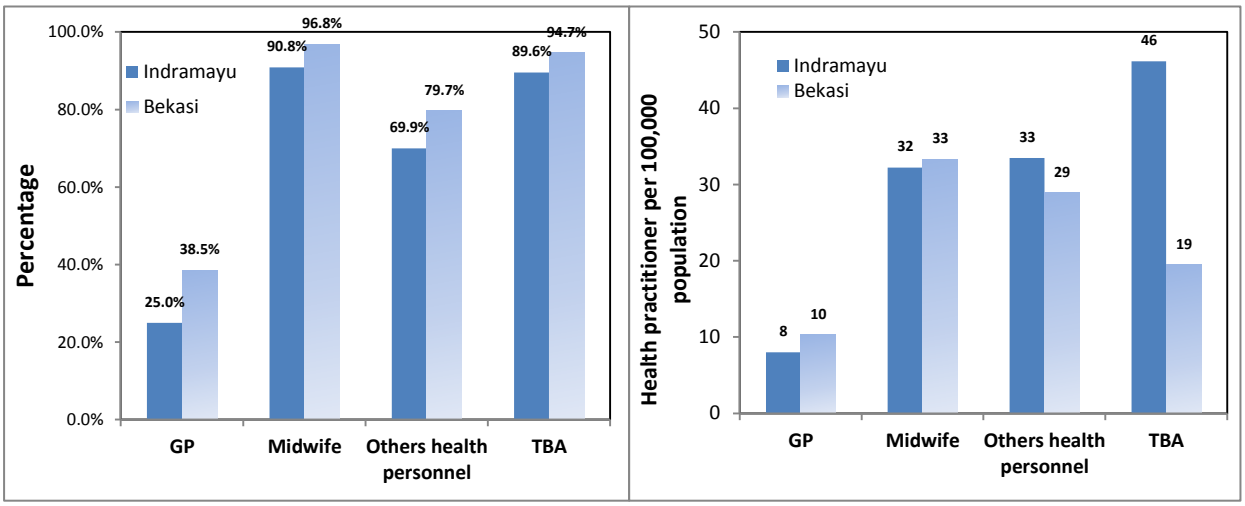
Figure 7. 1 Percentage of villages by the distance to the closest health facility in Indramayu and Bekasi



Source: PODES 2011

Data from PODES 2011 show that the distribution of CHC, auxiliary of CHC and private midwife practices is sufficient to cover the Indramayu and Bekasi areas. Nearly 90% of villages have a private midwife practice. The figure for CHC and its ancillary clinics is only around 20%, but almost 60% of villages are close to these facilities within a distance of 1 to 5 kilometres. It can be concluded that most of the population of Bekasi and Indramayu do not find it hard to reach CHC, an auxiliary of CHC or private midwife practices.

Figure 7. 2 Percentage of villages which have health practitioners and the ratio of health practitioner per 100.000 populations



Source: PODES 2011

The situation is different for access to a hospital or maternity hospital. In Indramayu less than 5% of villages have these facilities and only 20-30% of villages can reach these facilities in 1-5 km distance range while almost 40 % of villages must travel more than 15 km. It differs in Bekasi villages as 13% have a hospital and 26% have a maternity hospital. In addition, nearly 30% of villages are also within a 1 to 5 km distance from these facilities. Even though Bekasi has more hospitals, there are still 30% of villages a long distance away from a hospital.

In general people in Bekasi have better access to hospitals and maternity hospitals, which can be illustrated from the distance to reach these facilities. On average, PODES 2011 data show that the closest distance to a hospital and maternity hospital for a village in Bekasi is 12.31 km and 7.75 km, respectively. The corresponding

figures for Indramayu are 13.55 km and 14.66 km respectively. It is obvious that, compared to an average person in Bekasi, an average person in Indramayu has to travel double the distance to access maternity hospitals. The shorter averaged distance to a maternity hospital in Bekasi is made possible by the availability of more maternity hospitals in Bekasi (109) compared to only 15 in Indramayu. Bekasi also has more hospitals and private midwifes than Indramayu. On the other hand, the number of community health centres (CHC) and its auxiliary CHC is higher in Indramayu than Bekasi (49 and 68 in Indramayu compared to 39 and 42 in Bekasi), but the CHCs and auxiliary CHCs are not equipped to provide advanced level maternity healthcare such as emergency obstetric care and caesarean sections.

On the other hand, the distribution of health practitioners is more widespread than that of health facilities. In Indramayu, at least one GP is available or gives a private service in 25% of the village. The figure for Bekasi is higher at 38.5%. A midwife is even more accessible than a GP since more than 90% of village has at least one midwife residing in the village. However, the number of GPs per 100.000 population is still low: 8 and 10 GPs per 100.000 population in Indramayu and Bekasi, respectively indicating that the distribution and availability of health practitioners in Bekasi is better than Indramayu. Bekasi has a higher percentage of professional health personnel resident in its villages and also a higher ratio of professional health practitioners per 100.000 population. Additionally, there is a high ratio (approximately 90%) of resident TBA in Bekasi and Indramayu villages. In fact, in Indramayu the ratio TBA per 100.000 population is higher than the ratio for professional health personnel.

7.3 The Structural Quality of Health Facilities

7.3.1. Infrastructure and Health practitioners

PODES 2011 also provides information on the infrastructure of CHC and the auxiliary CHC which can indicate the quality of health services (Table 7.1). The data show that a significant percentage of CHC and its ancillary clinics do not support adequate services. Approximately 15% are not equipped with toilets for patients and around 10% of toilets do not have water or function properly. In some cases, the centres are neither hygienic enough nor comfortable enough for patients.

The building infrastructure of CHC and outreach clinics is very poor. In Indramayu around 20% of facilities are damaged or are in a severely damaged condition. The figure for Bekasi is 13.6%. The inadequacy of infrastructure is further demonstrated in the lack of availability of laboratories which have an important role in supporting and enhancing quality care through better diagnosis and treatment. Unfortunately only 41.4% of centres in Indramayu and 33.3% in Bekasi Have laboratories

The Indonesian Family Life Survey (IFLS) 2007 has also recognised the inadequacy of infrastructure of health facilities (Rokx et al., 2010). Almost 30% of supplementary clinics do not have an internal water source and the figure is only slightly better for CHC with 11%. The capacity to offer inpatient services are further impeded by a lack of inpatient beds; the CHC at 28% and the outreach clinic at 3%. However, health infrastructure has improved in the decade from 1997 to 2007. For example, in 1997 there were no inpatient beds in the outreach health centres and only one third of them had internal access to water. From IFLS data, it can be seen that conditions relating to the CHC are equal to those of the private midwife.

Table 7. 1 Percentage of CHC and Auxiliary of CHC by Infrastructure and Availability of Health Practitioners

Infrastructure/Health practitioners	Indramayu	Bekasi
Electricity	96.6%	97.5%
Available toilet for patients	87.1%	83.9%
Available water in the toilet	87.1%	80.3%
Functionality and cleanliness of toilet		
clean and functioning	62.1%	66.7%
functioning but dirty	12.1%	9.9%
not functioning	12.9%	7.4%
The floor damaged or severely damaged	20.7%	13.6%
The wall damaged or severely damaged	23.3%	13.6%
Available laboratory	41.4%	33.3%
Health Practitioner		
GP/Doctor	52.6%	70.4%
Midwife	91.4%	95.1%
Nurse	99.1%	86.4%

Source: PODES 2011

Health practitioners have a central role in providing adequate health care. The availability of professionally trained staff is essential to ensure the provision of

qualified services. In CHC and auxiliary CHC, the midwife and the nurse are the main health care providers as they are the health personnel available in around 90% of the facilities (Table 7.1). However, a GP is not available in all health facilities. For example, only 50% of CHC and auxiliary CHC in Indramayu have a GP but in Bekasi it is much higher, at 70%. It indicates a shortage in these districts to provide health services. Other barriers to accessing GP services occur because a significant proportion of the villages are too remote from the hospital, maternity hospital or private services where GPs usually have their practice. The health centres which are more accessible to the population, in terms of distance, do not always provide health services from a GP.

7.3.2. The Availability of drugs and equipment

The usefulness of a health facility is linked to the availability of specialized medicine and equipment essential for maternal health care. This section examines the availability of medicines required for maternal healthcare. This examination is based on data obtained from a health facility survey which uses lists of essential drugs from "Life Saving Skills Manual: Essential Obstetric and Newborn Care", published by the Royal College of Obstetricians and Gynaecologists, in partnership with the Liverpool School of Tropical Medicine, World Health Organisation (WHO) and Liverpool Associates in Tropical Health, as references.

Drugs for resuscitation are an important component of emergency kits. Adrenaline, atropine sulphate and ephedrine hydrochloride are vital in supporting cardio pulmonary resuscitation (CPR) and anaesthesia (Van Den Broek, 2006). The present data reveal that 37.5% of health facilities in Indramayu and 28.6% of those in Bekasi do not have access to these drugs. Private midwifery practices and health centre outreaches struggle with less than 40% of resuscitation drugs at their disposal. In contrast, 100% of hospitals have these drugs available. While Bekasi is in a slightly better position than Indramayu, these data illustrate that a significant proportion of health facilities in the two districts do not have the required medication to support emergency care.

Antibiotics are important to manage maternal health problems relating to sepsis or for treatment of antenatal urinary tract infections (Van Den Broek, 2006). Because

sepsis is a major cause of maternal mortality, the availability of antibiotics is crucial to avoid maternal deaths. There are 10 different antibiotics listed in the questionnaire of health facility survey. The data show that no health facilities operate without antibiotics: Amoxicillin is readily available; Gentamicin and Chloramphenicol are also widely available. However, some important antibiotics such as Metronidazole, Nitrofurantion and Clozacilin, which are useful in curing infection during antenatal and postnatal cases, are provided by only 10% of health facilities. Hospitals have a greater range of different antibiotics than other health facilities, while for private midwife practices, it is the opposite.

Drugs for antenatal and postnatal care must also be available in health facilities. There are some recommended essential drugs such as anti-malarial, ferrous sulphate, nystatin and anti-tetanus vaccine (Van Den Broek, 2006). The data show that anti-malarial medicine is not a common drug administered in the research areas. Malaria is endemic in West Java Province, especially in five districts: Sukabumi, Cianjur, Garut, Ciamis and Tasikmalaya (MoH, 2010a). There is no evidence that Bekasi and Indramayu have a high incidence of malaria which may be the reason why less than 10% of the health facilities in the two districts store anti-malarial drugs. Anti-tetanus vaccine which is important to avoid sepsis during delivery or the post-natal period is available in nearly 80% of health facilities of the two districts. The percentage of availability of ferrous sulphate and nystatin is lower at around 60%. Nystatin is used to treat candidosis, a fungal infection which is common during pregnancy, while ferrous sulphate is an iron supplement for pregnant women and is sometimes combined with folic acid and used to support women's health and foetal health.

Drugs for obstetrics emergencies must be available to provide emergency obstetric care (EmOC). There are some important drugs such as magnesium sulphate, hydralazine, labetalol, nifedipine and methyldopa. These drugs are used to treat pre-eclampsia and eclampsia, one of the main causes of maternal mortality. Unfortunately, 25% of health facilities do not have a supply of magnesium sulphate. The figure for hydralazine, labetalol and methyldopa is higher at 70-90%. Other essential drugs, such as oxytocin and ergometrine are used to cure post-partum haemorrhage (PPH). Again, not all health facilities have these drugs, with health

facilities only supplying 88% of oxytocin and 80% of ergometrine, Once again these percentages are higher in Bekasi than Indramayu.

Together with adequate drug supplies, the quality of maternal care is also determined by the availability of equipment. WHO (1991) has created a standard for maternal care at the first referral level. There are several essential elements required of a health provider including the ability to conduct a laparotomy which is an important procedure for emergency obstetric care and is defined as "a surgical procedure involving a large incision through the abdominal wall to gain access into the abdominal cavity" (Vincent & Hall, 2012) This operation is done to treat many maternal complications such as caesarean section, surgical treatment of sepsis, repair of high vaginal and cervical tears, surgical removal of ectopic pregnancy, and hysterectomy. Therefore, having the equipment to perform laparotomies is very important for saving women's lives. There are approximately 36 items of equipment which should be available but only few health facilities would have the complete set or at least 90% of them. While hospitals and maternity hospital are well equipped, other health facilities certainly cannot perform laparotomies.

The primary data collected for the present study also investigated the availability of equipment for conducting vacuum extractions and caesarean section (C-section) deliveries. This procedure is to treat a major cause of maternal mortality: eclampsia and foetal distress (WHO, 1991). The data show that hospitals are well supplied with equipment for vacuum extraction and C-section. But less than 30% of other health facilities have this instrument indicating they are unable to provide the treatment required to reduce the number of deaths from this major cause of maternal mortality.

7.3.3. Maternal Health Services Provision

Based on the primary data collected for the present study, only hospitals (both private and public) and maternity hospitals are capable of providing emergency caesarean sections and emergency obstetric care. The data also indicate that conducting these health services is not without obstacles. One of the most obvious impediments is ensuring adequate blood supplies for transfusions. Almost 50% of hospitals and 42.9% of maternity hospitals cannot provide immediate blood transfusion. In fact, blood replacement is an essential element for surgical obstetrics and medical

treatments of almost all of major causes of maternal mortality (WHO, 1991). In addition, one fifth of these health facilities cannot start a caesarean section in less than 30 minutes. Based on this premise, only hospitals and maternity hospitals can function as first referral for emergency obstetric care and other facilities only have limited resources to support essential medical treatments.

PODES 2011 also shows that not all CHC and auxiliary CHCs provide adequate maternal care as represented by the low percentage of CHC and the auxiliary conducting deliveries by GP/midwife. In addition, there is only a small percentage of CHC and the auxiliary which have the capacity to provide inpatient services. 20.5% of CHC can accept hospitalized patients, while none of the auxiliary of CHC can do that.

Table 7. 2 Percentage of CHC and Auxiliary of CHC by Maternal health services Provision

Maternal health services	Indramayu	Bekasi
Obstetric care service	91.4%	96.3%
Delivery care by GP/midwife	35.3%	25.9%
Immunization	70.7%	70.4%
Family planning	89.7%	91.4%
Inpatient services	7.8%	11.1%

Source: PODES 2011

Hospitals, which have qualified services, are less accessible for pregnant women in terms of distance and since the majority of CHC cannot provide the needed services, they are mainly on the private midwife practice for delivery care. The private midwife practices are focused on antenatal care, delivery care, immunization and family planning. The midwife usually works in the CHC or the auxiliary of CHC during the working hours. Since only a few CHC and none of the auxiliary are open for 24 hours, midwives provide 24 hours private practices at home. Therefore, the services are highly accessible for community because of longer working hours and availability in almost all villages. In addition, 83.3% of the private midwife practices

have facility for hospitalization of obstetric care patients. This is a higher percentage than for CHC or the auxiliary.

7.4 The Quality of Health Practitioners

The other aspect which determines the adequacy of care is the ability of health practitioners to diagnose and provide proper treatment. The primary data collected for the present study gathered some information on the varying components of antenatal care provided by health practitioners. The component consist of several selected antenatal care which are suggested by previous researches (Hanson et al., 2009; Villar & Bergsjo, 2002). Based on the data, diagnosis of sexually transmitted infection (STI) and is not conducted during antenatal care for around 50 to 58 % of patients in Indramayu and Bekasi, and diagnosis for urinary tract infections are not conducted for 30 to 35 % of patients in the two districts. In fact, the presence of STI causes many health problems such as spontaneous abortion, stillbirth, postpartum endometritis, low birth weight and prematurity (Mullick et al., 2005). Endometritis is a uterine infection occurring after delivery and may lead to maternal mortality (Van Den Broek, 2006). The other area of antenatal care which lacks attention from health practitioners is the assessment of diabetes/heart diseases which requires screening processes and referring pregnant women to further treatments (Villar & Bergsjo, 2002). If the diseases are present, a higher level care must be provided. Unfortunately, nearly 25% of health practitioners do not perform this procedure which indicates that assessing previous health status is not a high priority for antenatal care in Bekasi and Indramayu.

Health counselling is also recommended as part of antenatal care service. It is important to educate pregnant women to understand the many health issues during pregnancy and delivery. Birth preparation is popular topic in health counselling since 100% of health practitioners discuss this topic with pregnant women. Information about dangerous substances affecting health during pregnancy and delivery is paid the least attention from health personnel. Around 20% of medical personnel did not include this topic during counselling. In addition 6.6% of medical practitioners did not deliver information about the danger signs of pregnancy complications. This knowledge is very important to ensure pregnant women get adequate health care at

critical times. In this regard, provided antenatal care is better in Indramayu than Bekasi.

The extent of the quality of health personnel can be appraised by their ability to identify and manage maternal health problems. This information is obtained by investigating the medical knowledge of health personnel around diagnosis and treatment of the major causes of maternal mortality. The symptoms and the standard methods to treat pregnancy complication are cited in "Life Saving Skill Manual" (Van Den Broek, 2006). The data from health facility survey show that a significant proportion of health personnel cannot identify haemorrhage (13.04%), post-partum haemorrhage (14.74%), pre-eclampsia (8.33%), eclampsia (15.79%) and post-partum sepsis (13.75%). Health personnel in Indramayu are better able to identify haemorrhage and post-partum haemorrhage than medical practitioners in Bekasi, however the opposite result occurred for eclampsia and pre-eclampsia within the two districts.

A health practitioner's ability to treat complications produced similar outcomes in the survey. The health facility survey also reveals that many health practitioners cannot provide adequate treatment to manage major causes of maternal mortality from a list of standard treatments for every complication. For example, 19.86% of respondents did not consider providing oxytocin for managing post-partum haemorrhage; 18.27% of respondents did not give anti-hypertensive drugs to treat pre-eclampsia; 55.12% of respondents did not consider using magnesium sulphate to cure eclampsia and 43.75% of respondents did not include giving antibiotics if patients were suspected to be in shock to treat post-partum sepsis.

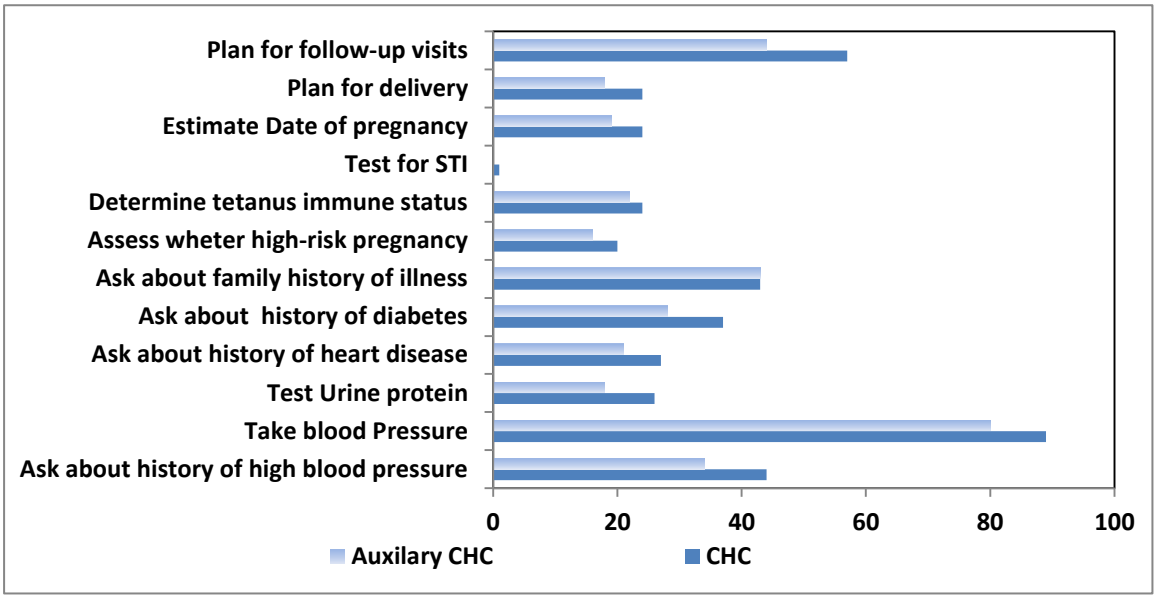
These scenarios may be caused by the regulations which restrict midwives to treat maternal complications. Initially, many midwives in private practice refused to answer questions about identification and treatments of maternal complications in the survey. The reason for this is that maternal complications are outside their jurisdiction as midwives only have the right to treat normal deliveries. When patients suffer from complications, midwives are required to refer them to a hospital. Once respondents understood the objective of the survey was to assess the level of knowledge of maternal complications, they were willing to participate. The results of

the survey show that health personnel in Bekasi tend to have better knowledge than their counterparts in Indramayu because of the larger numbers of hospitals and maternity hospitals in Bekasi. As referral facilities, hospitals need to deal with a greater variety of problems than CHCs or private midwives. As a consequence, health personnel who work in hospitals are more experienced to handle and treat maternal complications. Even though midwives or nurses do not have authority to treat complications they can assist GPs and during this process, gain knowledge and experience.

The lack of ability to provide qualified care is also documented in Indonesian Family Life Survey (IFLS) 2007 (Rokx et al., 2010). IFLS gathers data on quality of health personnel. It focuses on the ability to diagnose and provide adequate treatment on particular subject. There are three different areas to be considered: prenatal care, care for adult with a respiratory infection and care of a child who presents with diarrhoea and vomiting. The enumerator presents a case to the health worker and asks them to describe how to manage the case. The enumerator then compares the health worker's answers with a prepared list of standard diagnosis and treatments. The matched answers with the prepared list are scored 1 for a correct answer and 0 for an incorrect or missing answer.

Because of the small percentage of medical staff who perform standard diagnosis during prenatal care (Rokx et al., 2010), The capability of health workers in CHC and auxiliary CHC need to be improved to enhance maternal health. Since eclampsia and pre-eclampsia still persist as one of the major causes of maternal death, the ability to evaluate hypertensive disorders is crucial. While most health workers measure blood pressure, but only a small percentage of them ask about the history of high boll pressure (Figure 7.3). While a high bold pressure could identify a hypertensive problem, other potential issues could be diagnosed by asking about the medical history of high blood pressure. As mentioned above, unfortunately, less than 50% of health workers were concerned enough to explore this aspect. Similarly, urine testing is an uncommon procedure because less than a third of medical staff performs this procedure. In fact, a urine test is important in identifying hypertensive disorders.

Figure 7. 3 Percentage of health worker in CHC and Auxiliary of CHC Performing Some procedures During Prenatal Care Services



Source: IFLS 2007 (Rokx et al., 2010)

Asking the history of previous illnesses is also not a priority in prenatal care. Only around 20-40% of health workers are concerned with assessing previous health status of pregnant women. It means that the majority of health workers only focus on the current condition of patients. In fact, the previous condition may determine a woman's health status during her current pregnancy and delivery. Lack of preventative action against infections tetanus, sexually transmitted diseases (STI) and the potential of high risk pregnancy are very important to protect women's lives during pregnancy and delivery. Unfortunately, only 20% of health workers perform these procedures, with the STI test almost never carried out by medical staff.

Awareness of adequate maternal care and delivery preparation is not well promoted. Few medical personnel establish a plan for delivery and follow-up visits. Only around 20% and 50% of health personnel in CHC and its ancillary clinics discuss these topics with patients. This data adds to the evidence that health workers only focus on the present condition of patient and do not pay much attention on ensuring adequate prenatal care and assistance for giving birth.

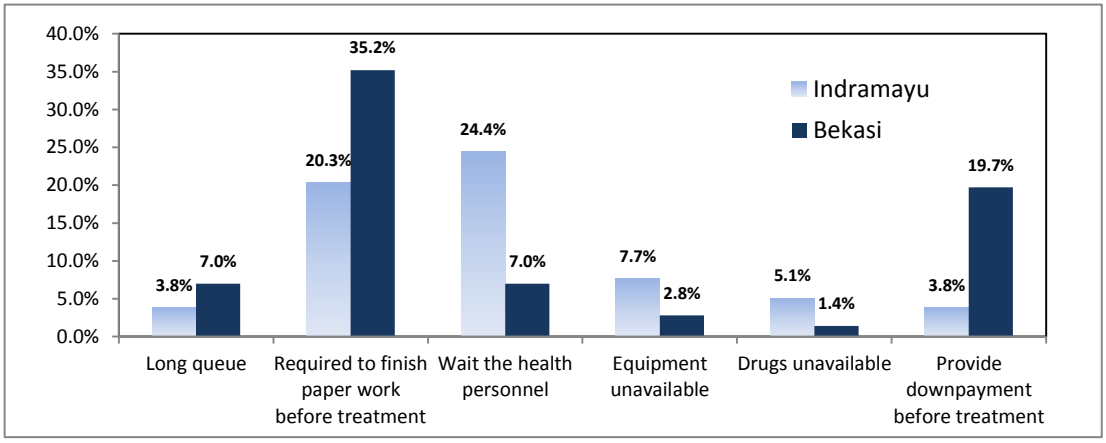
7.5. The Quality of Maternal Health Care Services Based on User Experiences

The quality of maternal health provision can also be gauged from the opinions and first-hand experience of women who have accessed health facility services (Figure 7.4). In the household survey, the respondents were asked to describe their experience in accessing health care at a health facility which caused them inconvenience. The most common experience is being required to complete paperwork before obtaining treatment. More than a quarter (27.3%) of respondents mentioned this. It usually occurs during the referral process when patients who need more advanced treatment are directed to go to a hospital. Unfortunately, many patients cannot afford to pay for health services, therefore they try to access free health services provided by the government. However there are numerous documents to be submitted in order to obtain the free government paid treatments.

To a large extent this requirement may overburden the patient and family, especially if there has been no preparation in advance. The process is common in state owned hospitals and private hospitals which cooperate with the health department to provide free health care for targeted groups in the population. As there are more hospitals in Bekasi than Indramayu, the respondents in Bekasi have greater access to free health care than those in Indramayu. Hospitals, especially private hospitals, always ensure that all documents are completed in order to guarantee refunds from the government. If the patient or her family fails to fulfil this expectation, the hospital asks for down payment in advance to recoup any financial loss and more than a tenth (11.4 %) of respondents have experienced this situation (Table 7.4).

The other problem mentioned by more than 15% of respondents is the time taken in waiting for health personnel to be available for them. Between 3% and5% of the respondents described waiting in long queues or experience their required drugs and equipment being unavailable. Such inadequacy of care most certainly influences health outcomes In general, the population in Indramayu is more likely to have to deal with long waiting times for health personnel and facing situations where drugs or equipment is unavailable. In contrast, patients in Bekasi mostly face difficulty in getting immediate treatment because of procedures in the health system such as finishing paperwork and provide down payment before the treatments.

Figure 7. 4 Percentage of Respondent Using Health Facility by Some Experiences obtained during accessing health care



Source: Primary data collection

7.6. Summary

Having described the situation for women in Bekasi and Indramayu, several points can be highlighted:

- The availability of health infrastructure is sufficient to cover the population in terms of health care provided by the CHC, the auxiliary of CHC and private midwife practice. More than 90% of villages have these facilities or are accessible with only 5 km of travel, maximally. However, the circumstances are different where hospitals or maternity hospitals are concerned as they are situated more than 5 km away and are less accessible than other medical facilities.
- The ratio of GPs per 100.000 of population is lower than any other health personnel with limited ability to cover the population, although the number of GP per 100,000 population is more in Bekasi.
- PODES 2011 shows that 40% of CHC and the auxiliary of CHC do not have a GP as a member of their medical staff. In addition, more than 60% of these facilities do not have laboratory. This data is a clear indication that the infrastructure and the lack of availability of qualified health personnel in CHC and the auxiliary of CHC cannot ensure the provision of adequate maternal care.
- Primary data collection in health facilities shows that many essential drugs which are important to manage maternal complication are not available in

many health facilities which may impact negatively improving maternal health or potentially causing maternal deaths.

- Similarly, essential equipment to conduct laparotomies or vacuum deliveries is not available in many facilities. Since this procedure is important in to manage many maternal complications, it is obvious that many health facility did not have sufficient equipment to provide adequate treatments.
- Limited resources lead to minimum services provided to patients. Caesarean section and emergency obstetric care can only be conducted in hospitals or maternity hospitals. CHC and private midwife practice focuses on antenatal care and normal delivery. Even the majority of CHC and the auxiliary of CHC do not provide delivery care and hospitalized services.
- The quality of health services is also determined by health practitioners. A significant proportion of health personnel did not recognize that diagnosis of STI, or urinary tract infections and consideration of previous health status was an important component of antenatal care. In addition some health providers also do not educate patients on the danger of hazardous substances or the signs of possible maternal complications during antenatal care. This may show that antenatal care is not effective to improve women's health.
- Many health practitioners also lack ability to identify and manage major causes of maternal mortality such as haemorrhage, post-partum haemorrhage, eclampsia, pre-eclampsia and sepsis. This may result from regulations that the management of maternal complications can only be conducted by GP/obgyn. Therefore, midwives, the main maternal health providers have no authority to treat maternal complications.
- From the user perspective, it is clear that a significant proportion of patients face major barriers to access health services. This data indicates that patients may suffer from delays in receiving adequate treatments.
- Comparing between two districts, people in Bekasi has better access to hospital and maternity hospital. This condition is important to reduce maternal mortality, because these infrastructures have better facility to conduct emergency obstetric care which is crucial to treat maternal complications.
- The availability and accessibility of GP in Bekasi is also better. GP has more capability to handle maternal health problem during pregnancy and delivery.

Pregnant women with complications should be referred to GP or specialist if midwives cannot treat the health problem. Therefore the availability of GP presents an important role to enhance maternal survival.

CHAPTER EIGHT: Maternal Health Care Practice: Cultural Impact on the Process of Candidacy

8.1 Introduction

Maternal health is not only dependent on health workers providing adequate care; it is also determined by the behaviours of pregnant women and their families seeking supportive maternal health care. The focus of this chapter is to understand the factors which shape people's behaviour and their impact on maternal health outcomes. The discussion is aimed to explain the minor contribution of utilisation of health care to determine maternal mortality.

D'ambruoso (2012) considers quality of care as an event, which occurs when service users and service providers interact, where the interactions are determined by the environment created by broader socio-cultural and health systems. It involves several factors embedded in the community, family, individuals, health systems, and health providers. To understand this interaction, the concept of *candidacy* introduced by Dixon-Woods (2006) has been used here to assess the process of achieving a standard of maternal care through several stages. The process of *candidacy* describes the successive stages through a patient must go in order to obtain adequate care. However, before the process of candidacy is discussed, a brief discussion is made of the relation between culture and health and the influence of traditional health beliefs on health in the research areas.

This chapter uses qualitative data to describe the process of candidacy in the research areas. Based on the analysis of the data, the barriers hindering women from obtaining quality care are revealed. This information is useful in explaining the previous findings which show that being able to access maternal care does not automatically reduce the risk of maternal deaths. The analysis uses data from the focus group discussions in Bekasi and Indramayu districts conducted as part of the present study. Some details on FGD activity can be seen in the appendix 16.

8.2 Culture

One important factor that determines people's behaviour is culture. Culture has a broad meaning and interpretation: UNESCO defines culture as:

> the whole complex of distinctive spiritual, material, intellectual and emotional features that characterize a society or social group including not only the art and letter but also model of life, the fundamental rights of the human being, value system, traditions and beliefs" (UNESCO, 2009).

UNESCO's definition is similar to Wosley's view (1999) that the word "culture" is used in two different ways. First, it describes the fine arts such as music, painting, sculpture and literature which usually originate in the upper classes. Second, it refers to a way of life and provides a broader meaning of culture which may differ between communities, tribes, nations or even continents.

Banwell, Dixon and Ulijaszek (2013) see culture as a blueprint which guides something imaginable, moral and possible such as ideas, knowledge, language, discourses and practices influencing social activities. This notion can be described as the first layer in understanding the term 'culture'. A second layer refers to the construction of beliefs, behaviours or artefacts as consequences of first layer which may differ between groups of people. Therefore, cultures can be found at multiple levels: global, national, state, village, social group, family or individual. The third and final layer are the processes that transmit the ideas, discourses, practices and other objects which influence people to act in a similar way.

Hence, culture has a significant influence in determining people's behaviour. Culture can act as the trigger which leads to particular phenomena and subsequently, becomes of interest when discussing the many phenomena in health science. Several terminologies are used to incorporate culture as one explanatory variable. MacLachlan (2006) notes three models which are widely used in health studies. The first is a medical sociology model focusing on the culture of health care within a society. In this field, studies are concerned with the structural organisation of health services in the society and the contribution of social structures in determining health outcomes. Another model, that of medical anthropology strives to understand the relationship between health and illness with regard to the cultural features of the

community. For example, it deals with community knowledge on the cause of illness and type of treatment people choose. The third is a health psychology model which affects individual beliefs, referring to the mechanism of how an individual's characteristics and beliefs determine personal health and illness experiences.

This study does not focus on any one model or terminology, but considers culture as a concept which influences people's beliefs and behaviours toward health treatment. Culture is represented by those beliefs and behaviours which determine health care practices. Specifically, the discussion in this chapter is concerned with the circumstances which impact on opportunities for women to obtain quality care during pregnancy or delivery.

8.3 Culture and Health

To understand the association between culture and health, it is worthwhile to consider how people comprehend illness. Murdock categorizes the theories of illness in to two groups. The first are theories of natural causation described as

> … scientific or popular, which accounts for the impairment of health as a physiological consequence of some experience of the victim in a manner that would not seem unreasonable to modern medical science" (Murdock, Wilson & Frederick, 1980).

According to Murdock, there are five well known components of natural causation theory: infection, stress, organic deterioration, accident and overt human aggression. While infection refers to the intrusion of harmful microorganism into human body, illness can be triggered by physical or psychological strain such as prolonged hunger, suffering extreme heat/cold, fear, worry or other emotional disturbances, attributed to stress. Organic deterioration describes the failure of particular organs which reduce one's physical capacity. For example, there is a general public understanding of how age impacts on physical health; the older the person, the greater the tendency to suffer with illness. Accident and overt human aggression are similar as both indicate physical injury. However accidents refer to injury from natural causes such as burns, frostbite, animal attacks, poisons and so on, while overt human aggression implies explicit violence, crimes or assaults carried out by individuals.

The second theory is known as supernatural causation and where three different approaches are required in order to understand the influence of supernatural. The first is mystical causation has the following definition:

> Any theory which accounts for the impairment of health as the automatic consequence of some act or experience of the victim mediated by some putative impersonal causal relationship rather than by the intervention of a human or supernatural being" (Murdock, Wilson & Frederick, 1980).

There are some concepts which fit with the mystical causation. The first is fate which explains illness as individual predestination or personified ill luck. Second, potent kinds of dreams, sights, sounds or other sensations are also believed to cause illness. This is known as ominous sensation. Contagion is another mystical trigger caused by contact with an allegedly polluting object, substance or person. For example, some societies believe that contact with menstrual blood or menstruating women can lead to particular illnesses. Finally, to disregard taboos or moral sanctions may cause the offender an inexplicable outbreak of illness, facilitated by a punitive supernatural being, a phenomena known as mystical retribution.

The second aspect of supernatural causation is animistic causation which refers to "any theories which ascribes the impairment of health to the behaviour of some personalized supernatural agent like a soul, ghost, spirit or god" (Murdock, Wilson & Frederick, 1980). There are two main characteristics of animistic causation: soul loss and spirit aggression. The first describes illness as a consequence of the departure of a patient's soul from his body. It can be a temporary or permanent departure for the afterlife. In contrast, spirit aggression is understood to be an illness caused by direct hostile, arbitrary or punitive action of an affronted supernatural such as ghost, spirit or deity.

The term magical causation encompasses "any theories which ascribe illness to the covert action of an envious, affronted or malicious human being who employs magical means to injure his victims" (Murdock, Wilson & Frederick, 1980, p. 46). There are two well-known terminologies which explain the magical causation of illness: sorcery and witchcraft. The first refers to magical applied by individuals, independently or assisted by a magician or shaman. Witchcraft describes a special category of humans endowed by a special power to commit evil.

According to the data on the distribution of illness theories provided by Murdock et al (1980), spirit aggression and sorcery are the main theories of illness ascribed to the Insular Pacific region. For the purposes of this analysis, societies in Indonesia such as Javanese, Balinese, Iban, Toradja and Alorese are included in the Insular Pacific region. Among the twenty-five societies in this region, the population of twenty of them believe that illness is caused by the disturbance of a supernatural being or by the supernatural powers of sorcery. In addition, violation of taboos, particularly food, is perceived by many communities in Insular Pacific, as a critical explanation of illness.

This explanation mirrors Geertz's (1976) research on Javanese culture. In his book, he asserts that Javanese societies acknowledge the existence of supernatural beings known in Indonesian language as *memedi*, *lelembut* and *tujul*. *Memedi*, which in English means 'frightener', does not provide any seriously negative impact for humans. *Memedi* usually appears in dark and quiet places with the aim of scaring people. In contrast, *lelembut* has the capacity to inflict serious damage on humans. *Lelembut* can enter the human body and create serious health problems, incurable by modern medications. However, the people believe that the Javanese traditional healer *'dukun'* is the only one who can reverse the health problems caused by *lelembut.* The other supernatural being is *tujul,* which, it is believed, will not harm humans. In fact, some people like *tujul*, believing it can help people become rich through its magical powers. However, mostly people also consider devotion to this mystic as unethical or inappropriate behaviour.

It is believed that there are four main elements which are associated with the causes of illness in Javanese culture (Geertz, 1976). The first relates to the concept of "dirty blood". It results from eating bad food or food which is not common or traditionally consumed. In addition, characteristics of a "dark mind" like envy, jealousy, anger or confusion are believed to disturb the heart function and lead to dirty blood. The second element is lack of blood, which *Dukun*, the traditional healer considers is a consequence of fear, anxiety or depression causing a person's blood to thin. In this condition, a patient is weak, pale and lethargic all day. The third element is the state known as "empty soul" and is due to insufficient spiritual activity. A person who

does not engage in enough spiritual exercise such as fasting, meditation or worship has a weak spiritual power allowing a supernatural being to enter the body. The last element is the intrusion of air, heat or other substance into the human body which may lead to a disturbance of the human body function. This intrusion can be triggered from improper activities such as wearing the wet clothes or being exposed to cold temperatures. Intrusion of substances such as nail, glass or wood in the human body can also be caused by sorcery.

As consequence of people's beliefs for the causes of illness, *dukun* has become the quintessential healer of the Javanese since the modern medical practitioner does not deal with the supernatural. Traditional healers differ widely in Javanese culture and are dependent on their specialization or expertise while Geertz (1976) argues that the difference is based on the source or process of supernatural power acquisition. *Priyayi* or *Abangan* healers gain their powers through extended fasting and long periods of meditation, while some *santri* healers are believed to perform "real Muslim" cures based on the medical knowledge included in the holy Qur'an. Therefore, *santri* usually recite or spell passages from the Qur'an or write Arabic script on a fabric which is then interpreted mystically.

Moreover, Geertz (1976) also describes the healing techniques which are applied by traditional healers. In general, three main methods or combinations of the methods are used to decide the treatments: numerology (*peretungan*), intuitive insight through medication, and the analysis of symptoms. *Peretungan* considers several aspects such as the birth date of the patient, the day he or she gets sick and so on. It determines the kind of treatment and sometimes understands the cause of the diseases. Moreover the treatment process involves three elements; spells, herbal medicine and the power of the healers. Spells and herbal medicine are be energized by the healer's ability to contact the spiritual power and significantly, it is believed that traditional healer is the only mediator between the patient and God or supernatural power (Boedhihartono, 1982).

8.4 Traditional Health beliefs in Research Areas

Based on the focus group discussions, conducted in Bekasi and Indramayu, it is evident that culture has a major impact on maternal health care. Culture influences

people's beliefs and maternal health practices, giving rise to the conviction that health problems which occur during pregnancy and delivery are mostly associated with fate, taboo and spirit aggression. Two examples from the focus group discussions demonstrate that people consider fate as the explanation for maternal death. One woman, whose sister died during delivery, commented "….If someone dies because of delivery, it was her fate. The maternal mortality is usually triggered by a specific factor such as her illness before pregnancy". The woman's intention is to explain that there is nothing wrong with the process of delivery. No one should be blamed including the traditional birth attendant. In the other case, a husband whose wife died (in childbirth) also says that it is all about fate since he had done his best to help his wife.

Table 8. 1 Some Taboo which must be avoided or Suggestions to have healthy pregnancy and delivery

Taboo or Suggestions	Consequence
Consume hot chili	It causes the hips burn during pregnancy
Drink ice	The baby will be big and difficult to deliver
Eat shrimp and squid	The baby will be in wrong position since shrimps and squid move backward
Eat milk fish "*Bandeng*"	*Bandeng* is a species of fish which die after reproduction. Therefore the mother will die after give birth.
Eat Manta ray fish	The baby will thin (*pipih*).
Sit in the gate or other way out like door	The baby will be obstructed in the birth canal
Diligent to clean anything	It will lead to an easy delivery
Never circle something like towel around neck	The foetus will be encircled by the placenta
Always say "*amit-amit*" every time something is cut	The baby will be normally formed (complete anatomy)
Always say "*amit-amit*" every time something is tied	The birth canal will open easily.

Sources: Focus Group Discussion

Table 8.1 lists the taboos about which food must be avoided and suggestions about what to do for a have healthy pregnancy and delivery. Most pregnant women and

their families observe these taboos which are believed to have an important influence on maternal health. The taboos mostly relate to abstaining from consuming particular foods or drinks and refraining from behaving inappropriately. It is believed in these communities that negative consequences would occur if a taboo was violated. From a modern medical science viewpoint, taboos seem illogical and non-scientific. Such beliefs are influenced by a lack knowledge about causes of illness while most of the bad consequences of being in violation of the taboos relate to the nature of the prohibited behaviour. For example, eating Manta Ray may lead to the baby having an abnormal anatomy - "thin" like the shape of Manta Ray. It may also relate to prohibited actions such as sitting in a gate which can block people's exit, being associated with the obstructed birth canal during delivery.

There are advantages that can be drawn from a cultural belief in taboos. The first is the effort to ensure that the baby has a normal anatomy and second, an awareness that the delivery process is not always run smoothly. Through childbirth, there are potential obstacles which may have a detrimental effect on the baby and the mother. The recognition that pregnancy and childbirth are critical periods for woman and require respect for cultural taboos by the woman and her husband is aimed to ensure a safe delivery and to have a 'normal' and healthy baby. An example of this is the uttering of the term, "*amit-amit*" with every action is believed to avoid any negative impacts.

Violating a taboo is believed to cause a harmful effect on maternal health. This can be illustrated by an example based on a story of a traditional birth attendant (TBA) in Indramayu describing the maternal death of one of her patients. The TBA said:

> This is another point of view about the maternal death. The patient had stated that she would not remarry her ex-husband, if she had to, she preferred to die. But she did remarry her ex-husband. Then people believed that she died because she broke her promise. Perhaps, God heard her words so her words became a reality. That is why she died. During the delivery, we had tried to help. She was to be injected with IV fluid, but the fluid spilled and was unable to be inserted into her body. Could be it is a sign that her time to die had come?

In this description, the TBA considers the patient's behaviour of breaking her own pledge as the cause of her death. This case also illustrates the involvement of the supernatural, which, triggered by the patient's improper manner, God had created a

condition leading to her death. Another case which also illustrates the theory of spirit aggression, appears during a discussion with TBA in Bekasi. The TBA said: "when a woman only sees darkness and faints after delivery, it means that she has been disturbed by the demon. If you do not understand you do not give her mantra". The intrusion of supernatural being is considered as the cause of health problem.

Furthermore, the methods to treat or cure the maternal health problem have a close relationship with people's beliefs about illness. There are several methods which are applied to manage the health problems. Numerology is one important approach which is used to assess the maternal health problem. An example of its use is described by a midwife in Indramayu who retells her experiences of helping a patient. Several years ago when deliveries were mostly conducted at home, there was a belief that delivery must wait for the right time, known as "*nunggu dawuh*" and described as special sign from a supernatural being. It is believed that the TBA, with the application of numerology, is the only one who can recognize the sign and therefore discern the right time for giving birth.

Since people accept the intrusion of spirit as one explanation for maternal health problems, treatment, in the form of magic is a method to cure the problem. The TBA often refers to the importance of mantra (chanting) or "*jampi-jampi*" as a means for curing the symptoms. The mantra is used to expel the supernatural which has entered the body of the pregnant woman. There another example where mantra is used to provide supernatural powers is to invigorate the patient or smoothen the progress of the delivery. A woman retells her experience of being assisted by TBA. The TBA recited the mantra "…..*Alam taro kaifafa ala robuka* …". This is a verse from the Holy Qur'an, the respected guideline for Muslim life. According to the Qur'an, translated into Indonesian language, the verse tells about God's involvement in conquering enemy troops which attacked Mecca, the centre of Islamic kingdom. God sends bird troops which bring stones from hell and throw them at enemy troops. There is no content to relate it to maternal health or the process of delivery, however, the TBA uses the verse because the sound "*buka*" is literally translated in the Indonesian language as the word "open". By chanting this verse, the TBA hopes the birth canal will open making the delivery process easier. The people do not

understand that the mantra has no influence on giving birth, but as the mantra comes from the Holy Qur'an, they trust it will be effectual in helping the delivery process.

The acculturation of religious practices or values in the health treatment is also highlighted in another case. A midwife recounts that a TBA asked a pregnant woman to drink water which had been used to wash her mother's feet so that she can have an easy delivery. The reason for this is that heaven, the ultimate destination to be achieved in the afterlife lies at the mother's feet. This concept from Islamic teaching, aims at placing a high level of respect for mothers. However the concept is interpreted and translated in different ways by TBAs.

Herbal medicine and massage are other methods applied to manage maternal health problems. In the research areas, people still use herbal medicine even though its popularity has decreased in proportion to the availability of modern medicine. There are some herbal medicines mentioned by participants in discussions such as 1) water mixed with tamarind and palm sugar is claimed to clean the blood in the womb after delivery; 2) ginger placed on the wound, is supposed to make the birth canal recover fast; 3) drinking palm oil (which is used for cooking and frying) and water given in a '*kapuk*' (cotton) leaf, as it is believed it makes the birth canal slippery and easy for delivery; and 4) drinking water of the '*wijaya kusuma*' flower, is also believed to help the delivery process.

Massage performed by the TBA is recognized as an important component of maternal care during pregnancy. When the foetus is in breech position close to delivery, complications during childbirth can be expected. The TBA or the midwife massages or performs "*gedog*" on the pregnant women's abdomen. In the local language it means to move to get right position. Pregnant women consider that this treatment is safe and gives good results. Only the TBA can perform "*gedog*", as professional health care workers avoid such actions considering that it is harmful for the feotus and the mother. On the other hand, the TBA mentions that their ability to manipulate without mechanical tools is a positive attribute which cannot be done by professional health personnel.

8.5 The Impact of Culture on Maternal Health Care Practice

Culture has an important role in shaping people's behaviour and in maternal health care practices in Indramayu and Bekasi. The community understands of the causes of illness and medication demonstrates the importance of the TBA as the preferred healer. This is illustrated by several statements or confessions from the focus group discussion participants. Mostly, women consider the TBA in the first instance to support them in childbirth rather than relying on the professional health personnel for medical treatment. People go to a health centre or call a midwife if the delivery process, being assisted by a TBA does not proceed as expected.

Unfortunately, the process of referral from TBA to medical personnel is complicated as the TBA has a different approach to assess the delivery process. For example, if the TBA uses numerology to decide the right time for delivery, potential life threatening symptoms which require the woman to be transferred to a health centre or to the services of a midwife, may not be considered. This situation, where the TBA holds onto her prediction and waits for the right time, occurs when the delivery is done at home. Should a midwife be present at that moment, she is not given the authority to refer the patient to a health centre; the family and the TBA make that decision.

Some midwives also admit that it is difficult to obtain community trust as it is evident that the TBA still plays an important role. When first starting her career, a midwife only has a few clients. People are reluctant to rely on a midwife for maternal health care because they consider she is inexperienced on account of her young age or not being married. In addition, there is a lack understanding about the potential problem of a pregnancy or delivery. Generally, women cite the feotus being in the wrong position in the womb, ("*sungsang*") as the major problem. Given the TBA is believed to have the expertise to manage such a problem, pregnant women depend on the TBA to diagnose and give treatment. The TBA's traditional method to treat '*sungsang*' is by massaging the abdomen. In contrast, the midwives discourage this practice since it may lead to a range of problems with delivery. The TBAs resists the abolition of this traditional health treatment. In defense of this traditional practice, one TBA said "if massaging the abdomen leads to health problems, many babies

would have died because this tradition has been done for decades. But the fact is, it never happens".

Women also accept massage as a desirable treatment with some women stating that they enjoy getting a massage from the TBA. The massage is not just to fix the foetal position but is also intended to enhance the mother's health. Indeed, midwives also acknowledge the concept of "*sungsang*" as a diagnosis but only offer suggestions to manage the problem such as asking the patient to pose in particular positions which may prompt the feotus to move into the correct position, a method which takes more time. If the problem still persists during the delivery, one possible medical intervention is a cesarean section. There is a reluctance to have this surgical procedure as the cost is very high. Therefore, women prefer to have the massage treatment from the TBA which they believe has an instant effect.

The question of cost features frequently in focus group discussions. Many participants mentioned that they preferred using TBAs as their fees are lower than those of professional health personnel. However, the financial gap between the two has tended to decrease since the government has introduced many health subsidies to increase accessibility to professional health care. The Government has launched free health service schemes such as *Askeskin*[5], *Jamkesmas*[6] or *Jampersal*[7]. Even though some have found that accessing free health services is not easy, to some extent these programs have increased people's inclination to try modern medical care. In addition, some regions like Haurgeulis, a sub-district of Indramayu has introduced a regulation which states that all deliveries must occur either in a midwife's house or a health facility. As a result, TBA involvement during delivery has reduced. Unfortunately, in some regions women are still give birth at home where a midwife can be called on to assist. TBA still plays an important role in such cases.

These findings collected from focus group discussions in Bekasi and Indramayu are in line with those of previous studies (Agus et al., 2012; Anggorodi, 2010; Wulandari & Whelan, 2011). In Village Dago of West Java province, the community has some

[5] *Asuransi Kesehatan Masyarakat Miskin* (Health Insurance for the poor)
[6] *Jaminan Kesehatan Masyarakat* (Community Health Insurance Scheme)
[7] *Jaminan Persalinan* (Health Insurance for giving birth)

alternative traditional beliefs which influence maternal health care (Agus et al., 2012). People consider that pregnancy is a normal cycle in a woman's life and do not admit that there can be any problem during pregnancy or delivery. If the baby or the woman dies, it is accepted as God's Will. Women in Village Dago tend to adhere to the traditional belief as they are afraid to disregard it. However, people also consider that professional health care workers provide more reliable treatment than a TBA. The opposing views of traditional health care set against modern health practices are confusing when people have to decide which is better. It may be caused by the people's belief that the TBA has supernatural powers and provide "*jampi-jampi*" or incantations make women feel more secure (Anggorodi, 2010) as women are psychologically influenced by their belief in supernatural powers.

The above-mentioned discussions show that modern medical care is in contradiction with the application of traditional health treatments and the community does not easily accept professional health care. Sciortino (1995) contends that western medical treatments are in ideological conflict with Javanese traditional culture. It is necessary for professional health care workers to adopt traditions and mix with the contemporary treatments. Sciortino's finding is also relevant for *Bekasi* and *Indramayu*. Based on a TBA's admission, a midwife may accept traditional practices while assisting in delivery. Midwives have realized that it is impossible to ignore the role of a TBA since the community places high value on traditional treatments. Therefore, midwives collaborate with the TBA to provide maternal care. TBA and midwife divide the task during delivery. The TBA performs massage on the mother after delivery, gives spells or manages the placenta in accordance with the traditional culture, while the midwife remains in charge of assisting the delivery process.

8.6 The Process of Candidacy

Dixon-Woods et al (2006) describe a process to explain how people utilize health care services. Utilization of health care is often considered as a part of a proximate e determinant of maternal mortality (McCarthy & Maine, 1992). But it cannot give distinct picture on the "correct' level of utilization, because this variable is usually based on the question of whether the women use or does not use medical care such as assisted by skilled birth attendance or having institutional delivery. There is no further evidence to illustrate that women get the needed treatment which is adequate

in quality and in the right time. As a consequence, usage of health care may not go hand in hand with health outcome. Therefore, rather than treating health care use as a binary variable signifying use or not use, Dixon-Woods puts emphasis on the process of accessing health care services to analyze health outcome, as it is the process which can really throw light on any potential problem arising while trying to access healthcare. It is difficult to conceptualize and measure the terminology of candidacy but by describing the process of how people access and obtain the health treatment, some measure can identify the "correct' level of utilization. The process, known as candidacy explains how people's eligibility to receive adequate health care can be processed through a joint negotiation between individuals and health services organizations or workers.

To some extent, the process candidacy can also be used to identify the possible delays to obtain adequate care which is similar with the Three Delays framework suggested by Thaddeus and Maine (1994). However, the process of candidacy emphasizes on the interaction between the clients (users) and health providers which can reveal the possible obstacles to obtain adequate care for the users and to provide qualified care by providers. Therefore, the process of candidacy has capability to trace in more detail, the source of problems which may come from the user, the health personnel, and the interaction between them or the local conditions such as culture or health infrastructure which may influence healthcare utilization and health services provision.

The process of candidacy follows seven stages and is initiated by how people identify their eligibility for health treatment. Based on the focus group discussion there is much evidence to indicate that women face many obstacles when identifying their need for medical care. For example, one participant narrated her experience as follows:

> I graduated from junior high school then I married. Three months later, I got pregnant. For my first delivery, I had to get a Caesarean section. I am young and do not have much knowledge. In the beginning, I also did not know that I was pregnant. Close to delivery, my water broke, again I did not know that I would give birth. My sister brought me to a midwife."

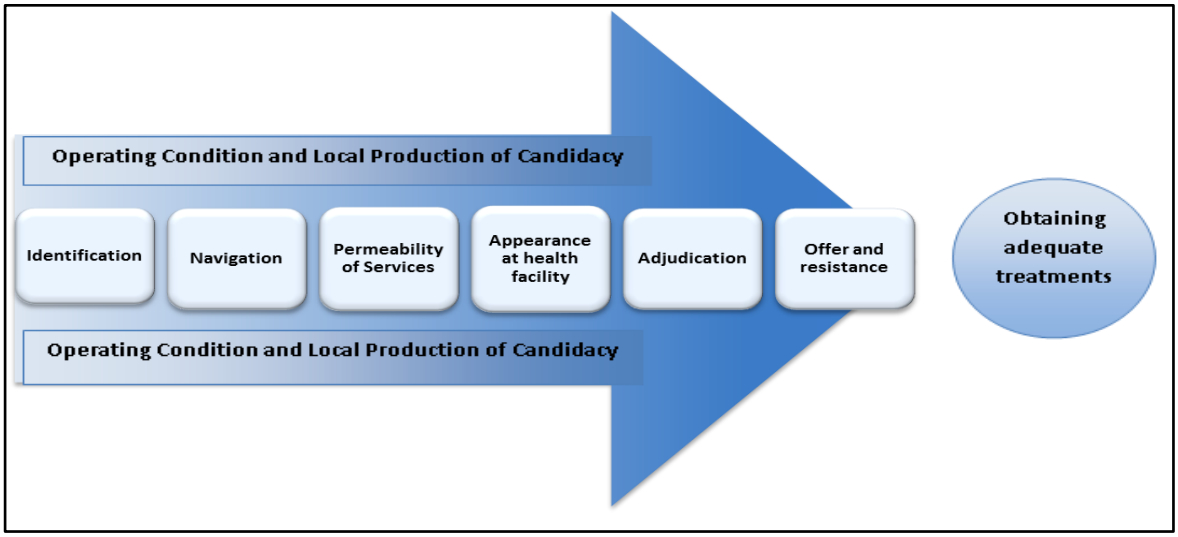
In this case the participant failed to identify that she needed maternal care since she did not know about the health problems associated with pregnancy and delivery.

Lack of knowledge about appropriate health treatment can also be illustrated from participants' statements that using health facilities is only for managing health problems. If no problem appears, people tend to give birth at home, assisted by a TBA. Therefore, many participants prefer to have their babies at home as mentioned by one woman.

> To be honest I am lazy to go to the midwife. I don't want to move since I am sick. I feel comfortable at home, especially if I must sleep beside another sick person (in a health facility). In addition if there is something we need but have left it at home, we may get into trouble.

Lack of knowledge can also be illustrated from the unwanted pregnancy which occurred to some participants. Women did not realize the pregnancy because the women used contraception. As consequence, the women also cannot identify their need for antenatal care.

Figure 8. 1 The Scheme of Process Candidacy



Source: Dixon-Woods et al (2006)

Besides lack of knowledge, economic reasons can also lead to delays in seeking appropriate health care. People may recognize their health problems but economic constraints may cause people to downgrade their priority to seek health care. A few participants mentioned this during the focus group discussion:

> "Every time we have a health problem, we need to get treatment, which would require money. But our parents would link our health problem with tradition such as prohibitions or taboo and we just follow the prohibitions or taboos."

The statement explicitly shows that the participant understands that there is a health problem and aims to find medical treatment for the same, but the cost of the treatment makes them seek an alternative by following traditions and taboos. This hinders the participant from obtaining appropriate health care. The statement also indicates that people use traditional health practices as an alternative to cure the illness. This option is chosen not only because people believe in traditional medicine but it is more likely to present a lower economic burden

The next process after identification is to navigate the need for health care. In this stage, people must identify available health care facilities and the means by which to reach them. Since the Indonesian government launched a range of health interventions which include increasing accessibility of health personnel and infrastructure, people have become very aware of the availability of maternal health care services. It is also indicated by the statement of participants during focus group discussions that most women are aware of their health problem and would consider using the private midwifery practice available in every village. However, many participants also suggest that reaching the hospital is not without its problems; for example finding transportation especially when a referral is needed. This was revealed by a midwife who had to bring a patient to the hospital.

> At that time I had been called to a patient's home. She was just accompanied by a grandma and the TBA, who was also a grandma. I see that the baby's position is "*sungsang*" meaning that the head will not come first in the birth canal. I could see that the baby's bottom appearing first in the birth canal. At this home there was no facility to support treatments. There was no table or bed to put her body higher so I could help with the delivery. Therefore, I gave her some temporary relief before bringing her to the hospital. However, it was difficult to obtain a car for transportation. However, the patient died at home before I could bring her to the hospital."

Usually the hospital is situated in the district capital. For someone who lives in rural areas and far away from the district capital obtaining a car for transportation in an emergency in not easy. This is confirmed by the participants of the Focus Group Discussion in rural areas in Indramayu. Moreover, economic reasons are also underlying factors which lead to the difficulties in obtaining transport. In one case, a midwife tells of her experience that the patient's family chose to use a relative's car, which was not immediately available for the emergency. Rather than renting another

car, the family did not mind waiting for a long time to avoid overburdening their expenses with a hired car.

People who identify their health problem and have the ability to navigate their need for health care move the next stage, where people's candidacy to obtain adequate care is determined by the easiness of health care to be accessed. This is known as permeability of services. Permeable health services require a few attributes of the patients to use healthcare. There is a commonly used saying in Indonesia: "*orang miskin dilarang sakit*", which means that poor people should be sick. This is based on the fact that medical health care is very expensive so it is impossible for the poor to afford it. However, this should not be the case anymore because, with the help of the government's intervention healthcare has been made accessible and affordable, as can be seen from the many free health care facilities that can be used by the poor. However, in reality the government programmes do not always run as expected. People still find many barriers to using free health services. This issue has been mentioned by many participants during focus group discussions. As an example, one woman tells that accessing free services require much paper work and as a consequence, it may also delay health treatment.

> Basically, we hope to get easy access to health care. This is based on my sister's experience who was referred to a hospital as she had flatulence. We used *Jamkesmas*. When we submitted the required documents, it was found that there was one document less.. My sister did not get treatment until all the documents were prepared and submitted. But she really needed immediate help. People will be happy to use health facility if it is easy to access."

Similar experiences are also narrated by midwives. Sometimes, midwives need to refer a patient to a hospital, however, accessing the hospital is not easy, especially for poor patients. Because of their economic situation, the poor patients cannot choose the closest hospital because some private hospitals do not accept patients who use free health services insurance (*jamkesmas*) from the government. The reason is that the procedure for getting reimbursements is complicated. Therefore, health services including maternal health services are still impermeable even though free health schemes are available. This is apparent from a midwife's story:

> I must argue with health personnel at the hospital when I refer a patient to get further treatment. We really need help at that time but the hospital does not want to give immediate treatment. They present many questions and require many procedures to be completed. The hospital even asked me to leave my motorcycle as a bond to obtain medical treatments."

Difficulties in accessing maternal health services also influence the fourth stage of candidacy, i.e., "appearance at health facility". Making an appearance at the health facility requires a patient to be able to communicate their needs to be clearly understood by health personnel in order to get the appropriate attention. During the focus group discussions, it was evident that health providers did not always provide the attention required. Some participants described their experience of being neglected and not receiving immediate treatment on arrival at the health facilities. Again, economic status is the discernible reason for this circumstance. Patients are discriminated against based on their ability to pay. According to the participants patients are vulnerable to inadequate attention from hospital staff. One participant's viewpoint is this.

> "If the delivery is in community health centre, we will not get enough attention, especially when we use Jamkesmas. They will give us inadequate service. But if we are a paying patient, the service is OK. Today many midwives can be called at home so I seldom go to community health centre."

The fifth stage of candidacy is adjudication and is defined as "judgement and decision made by professionals which allows or inhibits the continued progression of candidacy" (Dixon-Woods et al., 2006). Information collected from focus group discussions shows that patients do not always get adequate treatment since the professionals do not always present an accurate diagnosis. A statement from a husband whose wife died during childbirth demonstrates the impact of professional judgement in determining people's eligibility for adequate care. This is the husband's statement as he remembered his conversation with the health professional who was assessing his wife's condition at the time.

> "The professional says, my wife is ok, it is just caused by a long birth spacing. The gap between the first and second child is 17 years. She has health problems common to other pregnant women such as 'kurang darah' or anaemia and weakness."

The husband is very unhappy when he realized that the professional had given an inaccurate assessment. The midwife's diagnosis over simplified the problem which led to the fatal consequence. Had the correct advice been given, his wife might have received the appropriate treatment. The husband mentioned that his wife's legs were swelling, indicating the possible onset of eclampsia. Another case involves a young

woman who was married at 17 years of age and had twice suffered from miscarriage. When retelling her experience, the woman says:

> "Initially my stomach feels sick before going to the midwife. Then the midwife assesses my condition. She said it is ok and gives me medicine. I go home. When I arrive home, I have a contraction and the foetus is expelled".

In the second case, inadequate treatment by the midwife seems to have contributed to the miscarriage. The woman already knew that she had a health problem and perceived the need for obtaining medical care. Unfortunately, the consultation with the midwife did not lead to adequate treatment.

The next stage of candidacy is known as *offer and resistance*. In this phase, the patients already had been offered further health treatment. However, the continued process of candidacy is determined by the patient's decision to receive or resist the offer. The focus group discussions points to two main factors which lead to patient resistance. The first consideration is the cost of health treatment. Most patients try to avoid high costs which can overburden their economic capability. The second factor is the influence of culture and knowledge. During childbirth, a woman relies on the family and their decision as to whether to use a health facility. This decision is determined by the family's knowledge of modern health care or their beliefs in traditional treatment. If people have appropriate information on the advantages of professional care, then the health facility becomes the preference and vice versa. In reality, the two factors do not work independently, as a midwife recounts:

> "It is so complex. We ask the patient to go to hospital, but sometimes the family delays and asks more time to stay at home. It is like saying, 'wait for next two hours'. If we refer the patient to go, it means that there is a complication and the patient needs help. The best thing that we can do is just ask the family to prepare to be ready to go immediately. We cannot force them to go, since the delivery is to be at their home. We are not the ones who hold the authority."

The overarching dimension of candidacy process involves the specific condition of research areas which may not be the same for all areas. This is known as the operating condition and the local production of candidacy. This aspect refers to the interaction between patients and health personnel or the availability of resources which is influenced by the local situation. This aspect is important because it may involve every stage of candidacy. Culture is an important local characteristic which influences people's ability to identify health problems and also people's preferences

on modern health care. There are many health cultures mentioned in previous sections and those cultures affect the process of candidacy especially in the stages of *identification* and *offer and resistance.*

In addition, there are other local conditions which impact on the process candidacy. The first condition is the culture of "*balas budi*" (payment in kind) or reciprocation which can also be applied in health services. Based on this culture, a patient is reluctant to access free services from professionals. Even though there is *jampersal* (free services for delivery), patients still expect to pay as they believe, it is unacceptable or "*pamali*" to go without providing payment. The money is called as "*uang kotor*" meaning that it is used to pay the professionals who had provided services in assisting delivery. On the other hand, the midwife appreciates this cultural norm as the reimbursement given by the government for providing free services is not sufficient. Therefore, the midwives still expect payment from patients. Hence, it would appear that the free services are not implemented well and the objective to provide accessible maternal care service is not fully achieved. However, many FGD participants felt that the government program to provide free services was helpful in at least reducing the cost.

This culture is similar with the concept of social distance which is firstly defined by Borgadus as "degree of sympathetic understanding between individuals or groups" (Ouellette-Kuntz et al., 2010). Physical proximity cannot determine the closeness between individuals or groups. Altruism and intimacy are more reliable to describe social relationships. According to previous illustration on community and health personnel relations, the social distance between these groups are obvious and lead to community reluctance to access health services. Similarly, previous research in West Java also states that social distance causes the community to be hesitant to utilize village midwife, even though the free health service scheme is available (Titaley, 2010) The culture of "*balas budi*" or reciprocation also strongly indicate the existence of social distance. Hoffman, McCabe and Smith (1996) define social distance as "the degree of reciprocity that subject believe exist within as social interaction". Since the community believe that it is not appropriate to access health services without providing additional payment under the provision of *jampersal*, this

situation indicates the low level of intimacy between community and health personnel.

Locally, there is a lack of resources including supplies and facilities. According to the discussion conducted in Indramayu, some midwives spoke of their experience about the unavailability of drugs or equipment to manage health care. For example, a midwife said:

> "At that time, I assisted the delivery in the community health centre. The baby needed oxygen. But the oxygen was unavailable in community health centre. I had to go home to find my own equipment and use it to help the baby…."

The other important equipment which is crucially needed in emergency care is blood supplies for transfusions. Unfortunately, it is not easily obtained, especially for a patient living far away from the blood bank. Experience of midwives suggests that to obtain suitable blood supplies, patients have to wait for approximately five hours. This has a negative impact on patients receiving adequate care.

Availability of specialist or obstetric gynaecologist produces a similar impact for those needing healthcare. In Indramayu there are two state hospitals, one in the district capital and the other, called Sentot Hospital, which is in a suburban area. People who live in the suburbs depend on Sentot hospital for referral. However, this hospital is limited in its ability to provide emergency obstetric care. This is mentioned by a midwife:

> "In Sentot hospital, the specialists are not available every day. They provide a service in hospital only Monday to Friday. Then what will happen if a patient needs their help during Saturday or Sunday? On the other hand, I do not have authority to give help for specialised cases especially to patients with complications."

When emergency obstetric care is not available during the weekend in Sentot Hospital, a patient must be referred to the other hospital in the district capital, 80 km away. Even assuming that transportation is easy to obtain, the patients still need a travel time of 1-2 hours. The other alternative is that patient must wait at the Sentot Hospital for the doctor to come with no guarantee of when that might be.

8.7 Summary

According to the information obtained from focus group discussions, it is obvious that traditional beliefs influence people's health seeking behaviour. Traditional health beliefs include their knowledge of the causes of illnesses, preference of healers and the methods to treat illness. Those beliefs impact negatively during identification and navigation phases of the candidacy process. Similarly, health beliefs are important in shaping people's decisions for accepting or rejecting suggested medical treatment. As a consequence, traditional health beliefs can cancel or delay adequate treatments for patients. In addition, the candidacy process reveals that the economy and the health system are significant aspects which influence access to adequate care.

The process of candidacy provides the evidence of this lack of access to adequate care with examples such as:

- People's failure to identify their need for health treatment leading to delays in obtaining treatment at the right time.
- Lack of transportation to reach hospital also presents negative impact on the patient's health, especially if it occurs during the referral process or in an emergency where immediate treatment is crucial to save a patient's life.
- Low economic status also appears as an underlying factor for access to appropriate care. This situation develops over several stages of candidacy.
- Health professionals, who diagnose inaccurately, may hinder the patient to receive proper medical treatment.
- Several local conditions such as the culture of "*balas budi*", lack of specialists, drugs and equipment also present barriers for patients to access medical care and the health personnel to provide adequate treatment.

The candidacy process shows that women already utilize health facilities but it is possible that women are not receiving suitable treatment for their individual needs. This may explain why there appears to be an increase in access to maternal care resources but it also shows there is no positive effect on reducing maternal deaths.

CHAPTER NINE: Contextual and Compositional Analysis of Maternal Health Inequality in Bekasi and Indramayu

9.1 Introduction

Chapters 4, 5 and 6 contain discussions of the level of maternal health inequality at both the district and household levels. The underlying factors which may have stimulated the inequalities were also revealed. The discussion of the findings relate to those regional, household and individual characteristics which influence maternal health status. However, there is no explanation of how the individual traits and conditions in the regions interconnect with each other to affect maternal health. Therefore, this chapter is devoted to considering those factors in the relationship between regions and individuals to determine maternal health.

The discussion centres on the comparison of several variables to indicate disparity and its impact on maternal health status between the regions of Bekasi and Indramayu. The data for analysis come from two main sources. The first is a village potential survey (PODES), conducted by Statistics Indonesia, a national agency in charge of providing official data for the government or the public. This survey collects geographical information at the village level. The second source is primary data collection which has been conducted in selected households in Bekasi and Indramayu. It gathered information for the individual variables which may determine maternal health.

9.2 Geography and Health Inequality

In the literature, there are two main approaches to understand spatial disparity of health (Arcaya et al., 2012; Curtis & Rees Jones, 1998). The first approach considers the concept of *space* to explain health inequality across regions. Space is socially constructed (Curtis & Rees Jones, 1998) and therefore this approach concerns population behaviour, culture or health beliefs which determine health outcomes in particular regions. This concept also relates to social exclusion. Population groups that are marginalized or keep a social distance from other groups also tend to have poorer health status.

By using Bourdieu's work on relational thinking, Gatrell et al (2004) mentions that social space is formed by many kinds of capital including economic, culture and symbolic assets. Economy and culture are commonly included in the health inequality analysis since these factors consist of material wealth, knowledge or education, while symbolic investment represents prestige, status and authority embedded in social space. A similar opinion comes from Bernard et. al. (2007) who describes the impact of place on health inequality by describing social environment consisting of an economic domain, an institutional domain and the rules of informal reciprocity. Economic domain affects health status through price structure. This mechanism values the ability to access or provide resource and depends on the capability to afford the given price of goods or services. The role of government or official body to affect inequality works in the institutional domain. The authority can stimulate the existence of equitable society. For instance, accessibility to health resources is determined by formal rules and entitlements, especially for health services provided by the government or public sectors. While the institutional domain concerns the relationship between the higher authorities with the community, the rules of informal reciprocity focus on people to people cooperation. Essential elements of informal reciprocity are the notions of gift and trust which facilitate individual access to health services though charity or generosity.

The other approach uses the concept of *place* to explore health inequality. Place refers to location or setting in which social relations occur (Curtis & Rees Jones, 1998). Bernard et al (2007) also mention the physical domain which is in line with the concept of place and consists of natural and man-made environments such as water quality, air pollution, housing, sanitation or the other physical infrastructure. There are three ways in which the physical environment is shown to influence human health (Bernard et al., 2007; Northridge, Sclar & Biswas, 2003). The first is environment stressor, which suggests, that inappropriate conditions in the physical environment has a negative impact on human health, for example, as unhealthy sanitation or housing. The range of options such as health infrastructure or economic resources that are available in the environment can also determine health behaviour. Finally, the physical environment is able to facilitate and thus determine social

interaction in the communities, for example, the existence of a public space which enables communities to engage in sports or occasional gatherings.

The method to assess underlying factors of inequality is also multifaceted. There are at least two dominant analytical techniques to explain health inequality: contextual and compositional (Macintyre, Ellaway & Cummins, 2002). Compositional effect is stimulated from the variation of population characteristics across a region. From this point of view, health inequality can be explained by the aggregation of individual characteristics at a regional level. It may lead to ecological fallacy, since individual traits cannot be inferred from the nature of the population to which the individual belongs. However, Susser (1994) cited in (Curtis & Rees Jones, 1998) describes that "the effect of aggregation in an area may mediate the effects on health of individual level". In addition, Curtis and Rees Jones (1998) argue that over-emphasis of individual character analysis may fall into atomistic fallacy[8] described as a failure to consider the effects of some factors which can better be understood at household or regional level. Therefore analysis using aggregation data is useful to discover the underlying factors of regional health status.

Contextual analysis considers the impact of both the social and physical conditions in a region on the health status of the people of the region. The physical conditions of a place of residence including the natural and artificial geography such as weather, climate, landscape or infrastructure may be significant in determining the health outcomes of its people. Similarly, the social condition such as culture and people's behaviour is also important in influencing population health status. Macintyre et al (2002) claim that contextual factors are often viewed as residuals that still retain their significance after individual factors are controlled for in the analysis of factors influencing the health of people (Macintyre, Ellaway & Cummins, 2002).

According to Curtis & Rees Jones (1998), although there exist many theories supporting the contention that variations in human health are caused by the contextual effects of place and space, it is not well understood how place interacts

[8] The fallacy of drawing inferences regarding variability across units defined at a higher level based on data collected for units at a lower level (Diez Roux, 2002).

with health because the different theories and their parts are not well integrated and developed. There are at least three types of framework which may help understand the concept of contextual effects, and how such effects can operate on health risks and related variations in health in any population(Curtis & Rees Jones, 1998; Popay et al., 2003).

The first type of framework relates to the patterns within a space and the diffusion of physical and biological risk factors in it. Contextual variations in health have been explained by many researchers with respect to 'ecological landscape' and its importance in creating differential exposure to health risks due to climate, environmental pollution, the quality of housing or the risk of accidental injury or death. Medical geographers take this approach for explaining spatial patterns of particular diseases in human populations. Socio-economic inequalities in health are also explained in terms of exposure to physical and biological risks. In such analyses, the interaction between socio-economic and physical and biological processes influencing health risk is of fundamental importance.

The second framework emphasises that the role of space and place in social relations is important for health (Curtis & Rees Jones 1998). The theories reviewed by these two authors in this context suggest that social relations relevant to health variations are "constituted, constrained and mediated" through space. Therefore, a practical approach to the study of geographical health variation should take into account the underlying social structures as well as individual human activities. Place is considered to interact with social processes in complex ways. Health and health behaviour interact with various landscapes, namely landscapes of structural material, landscapes of consumption and landscapes of surveillance and control. The most influential and privileged groups of a society often determine these landscapes and in turn, derive the most benefit from them. These perspectives can also illuminate the ways that we think about health risk.

The third framework, the "landscapes and a sense of place framework", also known as cultural geography framework refers to the influences of regions or landscapes in shaping individual and collective social action related to health. This humanist approach to landscapes emphasises the idea of a "sense of place". Researchers have

drawn a distinction between places as public symbols and places as areas of care. This type of perspective has implications for the ways that we study health variation. It involves interpreting "subjective experiences and eliciting private accounts to explore communicative practices and power relations, metaphors, myths, stories and narrative accounts", as reported in Curtis & Rees Jones (1998).

The dichotomy of analysis focusing on contextual and compositional factors of health inequality is challenged by Cummins (2007) who suggest that the dualism of contextual and compositional analysis be collapsed. The reason is that people and place are interconnected. People's influence shape the place, and likewise the place also has a significant impact in determining people's behaviour. Another consideration is that people's nature is dynamic and place as people rarely live in one place – they can potentially move several times during their lifespan. Similarly, physical and social environments change from time to time. Therefore, statistics which show the impact of place in determining health status should consider longitudinal data. However, this type of research is not always possible, particularly if the required data are not available.

Schulz et al (2002) proposed a framework to explain health inequality between race and spatial factors. The framework includes fundamental factors which impact on health outcomes through intermediate and proximate determinants. Race-based residential segregation, economic inequality and macro social conditions such as political order are allied to fundamental factors. The intermediate determinant covers some aspects at regional or community level, such as the availability and quality of infrastructure including health facilities. Industrial activity and land use are considered as parts of the physical environment which may affect population health at regional levels. Quality of education which influences population traits, belongs to the intermediate determinant. The proximate determinant comprises health related behaviours and stressors which are described as unfavourable conditions for health outcomes. These include crime, violence, financial insecurity etc. Social integration represents people's interactions within a community, which indicates that social support is a proximate determinant. Accordingly, community support and individual health practice have important roles to play in determining health outcomes.

Research on assessing the importance of settlement in determining health outcomes is gaining more attention. There is a tendency to view health inequality by involving both individual and regional characteristics. One research in Canada uses spatial and non-spatial variables to determine population access to primary care (Bissonnette et al., 2012). Numbers of general practitioners and walk-in clinics per 1,000 population are used to represent spatial factors. Since the research areas have plurality of populations with recent migrants comprising 20% of the total, the variables must measure accessibility between the different population groups. In this case, the availability of physicians speaking French, Arabic or Tagalog per 1,000 population and the number of walk-in clinics in 1,000 recent migrants are deployed to analyse the potential access to health services at a neighbourhood level. The results of the study indicate that, at the neighbourhood level, there exist disparities in terms of availability of health services. It illustrates that residing in different neighbourhoods also leads to different access to primary care.

Gatrell et al (2004) conducted research focusing on the impact of social space on health inequality. This study mapped the determinants of health inequality by applying correspondence analysis[9]. Through multiple correspondence analyses, the finding shows that psychological morbidity has a relationship with the ability to manage financial issues. The occurrence of long-standing illnesses, of feeling lonely and age are also associated with the present of psychological morbidity. The finding indicates that material circumstance and social capital determine the psychological health. Another important result from this study is that living in the same geographical space does not indicate that the individuals have near-identical material and social capital. The finding emphasises that place of residence has less of an effect in determining psychological health.

In contrast, based on qualitative analysis, Cattell (2001) contends that social capital, social networks, and neighbourhood are linked with health outcomes. Cattell's research also shows that neighbourhood conditions, both social and physical influence social networks and social capital. A region which grows in conjunction

[9] Correspondence analysis is a method of graphically presenting tables of categorical data as a single plot so that the underlying relationships between variables are more easily seen (Watts, 1997).

with the development of a factory stimulates strong ties with the community. The population is characterized by long established family structures and work practices fed by collaborative and cooperative behaviours. The physical condition of neighbourhood also exerts a significant impact to build social network. Some participants mentioned feeling insecure and were reluctant to walk in places without appropriate lighting. Furthermore, a lack of social networks and social capital leads to unhealthy lives. Many interviewees who stayed in such conditions reported more health problems such as anxiety, depression, and suffering from headaches and stomach complaints.

Another Canadian research demonstrates the impact of availability of health services at neighbourhood level in shaping how primary care is used (Harrington et al., 2012). The variables in this study were grouped into predisposing, enabling and the needs factors. Health infrastructure at neighbourhood level enabled access to primary care. The analysis shows that a well-served neighbourhood can increase the population's propensity to access primary care, even though it is controlled by predisposing and needs factors, while place of residence appears to have a significant influence on health behaviour. However, this condition does not apply in all research areas. In Missisauga, a research area of this Canadian study, enabling factors do not significantly determine people's access to health care. Illness and individual character traits such as age, gender and marital status are more powerful determinants in how health services are used.

Another research focused on the impact of neighbourhood space to determine health behaviour and outcomes during pregnancy (Messer, Vinikoor-Imler & Laraia, 2012). This study examined incivilities factors, walkability measures and social space to represent neighbourhood space. Incivility indicators are social and physical conditions in a neighbourhood that are viewed as problematic and potentially hostile by the people who use its public spaces. Walkability is illustrated by the neighbourhood's attractiveness for physical activity – as such the availability of parks, playgrounds, pedestrian paths, makes it conducive for walking. Social space captures the potential for social interaction in residential areas; for example houses that have front porches or inviting gardens can enable or support social interaction within the community.

According to the data analysis, smoking and weight gain during pregnancy are two factors that have a consistent relationship with health behaviour. Incivilities and lower levels of walkability in the neighbourhood relate to greater tendency to smoke during pregnancy, mainly for white women but much less so for black women. Furthermore, neighbourhood incivilities can determine pregnancy outcomes: the greater the rate of incivility, the higher the propensity to suffer from pregnancy induced hypertension. It also has an impact on preterm birth and low birth weight but the effects are not consistent across regions and races. In terms of social space, pregnancy outcomes across the research areas do not appear to be affected by race.

A similar result is shown in another research (Vinikoor-Imler et al., 2011). Within a region, the presence of physical incivilities is associated with all adverse pregnancy outcomes. However, walkability has a positive impact on pregnancy-induced hypertension and preterm births, but only for non-Hispanic white women. This relationship does not apply to the non-Hispanic black population. The study also indicates that the social space factor is connected with inadequate weight gain during pregnancy. It can be inferred that only physical incivility and walkability factors influence maternal health behaviour, while the other neighbourhood features do not offer a reliable measurement.

9.3 Maternal Health Inequality between Indramayu and Bekasi

Indramayu and Bekasi have great disparity in maternal health status as illustrated by several indicators based on secondary data. Women in Bekasi tend to have a better health status in general, as determined by life expectancy at birth (e_0) which is 2 years longer than women who live in Indramayu. Life expectancy at birth is often used to represent health status since this is an age-standardised measure of mortality.

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The more specific indicator to reveal the disparity in maternal health between Indramayu and Bekasi is the maternal mortality ratio (MMR). Using the input data from the population census of 2010, Indramayu has a MMR at 339 maternal deaths per 100,000 live births while the figure for Bekasi is only 195. This significant gap can be explained by a number of conditions which differ between the two regions. One most obvious shortfall between Bekasi and Indramayu is the number of delivery

assistants. Nearly 30% of deliveries in Bekasi are assisted by doctors while in Indramayu doctors assist with only 6.73% of deliveries.

Almost 40% of first time marriages in Indramayu occurred when the woman was younger than 17 years. In Indonesia, it is common that marriage is followed soon by pregnancy. As shown from IDHS 2012, nearly a half of ever married women 15-19 years old already had one child (BPS et al., 2013). This is too young to support a healthy gestation, leading to high risk pregnancies and increased chances of maternal mortality. In addition, less than 5% of married women in Indramayu used female sterilisation (FS), male sterilisation (MS) or intra-uterine devices (IUD) as contraceptive methods compared to approximately 13% in Bekasi. These contraceptive methods are more reliable in preventing conception compared to other methods such as injections and pills, which are more popular. Injections and pills are not always effective in regulating pregnancy or birth spacing because of the need to take pills on a regular basis and schedule injections within a set time.

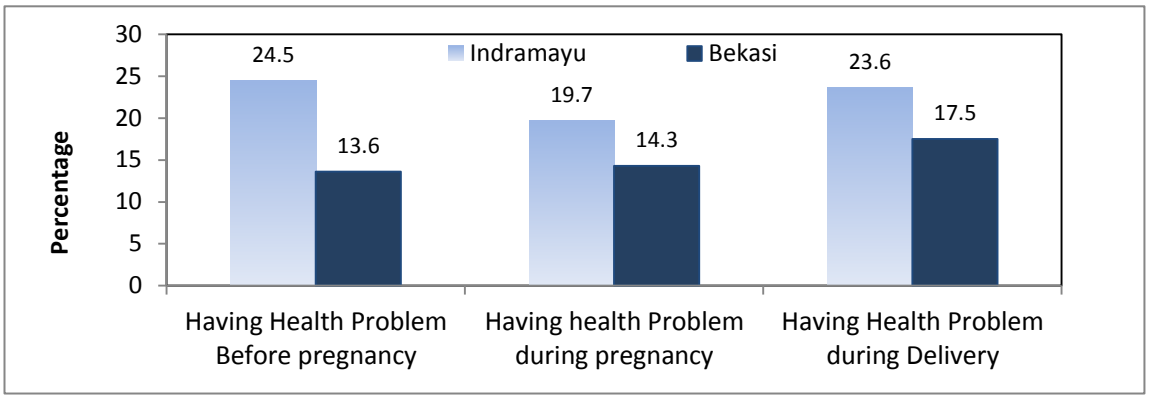
The only variable in which Indramayu performs better than Bekasi is antenatal care; however, the gap in coverage of antenatal care between these districts is not substantial. More than 80 % of pregnant women in Bekasi and Indramayu make at least four antenatal care (ANC) visits for a health check-up before delivery. Antenatal care is more accessible than the other services as it is provided by many health facilities including private midwifery practices and integrated health services posts (*Posyandu*) which are available at village level.

Table 9. 1 Maternal Health indicators in Bekasi and Indramayu

Indicators	Indramayu Regency	Bekasi Regency	Data Sources
Female Life Expectancy at Birth	72.97	74.96	SP 2010
Total fertility rate	2.36	2.31	SP 2010
Percentage delivery assisted by doctor	6.73	27.79	SSN 2010
Percentage women married < 17 years	39.42	26.35	SSN 2010
Percentage women used MOW/MOP/IUD	4.39	12.69	SSN 2010
Antenatal care (K4)	83.03	81.96	JBDA 2010
MMR	339	195	SP 2010

*SP 2010: Population Census of 2010; SSN 2010; National Socio-economic Survey of 2010; JBDA 2010: *Jawa Barat Dalam Angka* 2010 (West Java in Figures 2010)

Figure 9. 1 Percentage of Respondents who have Health Problems before Pregnancy, during Pregnancy and during Delivery



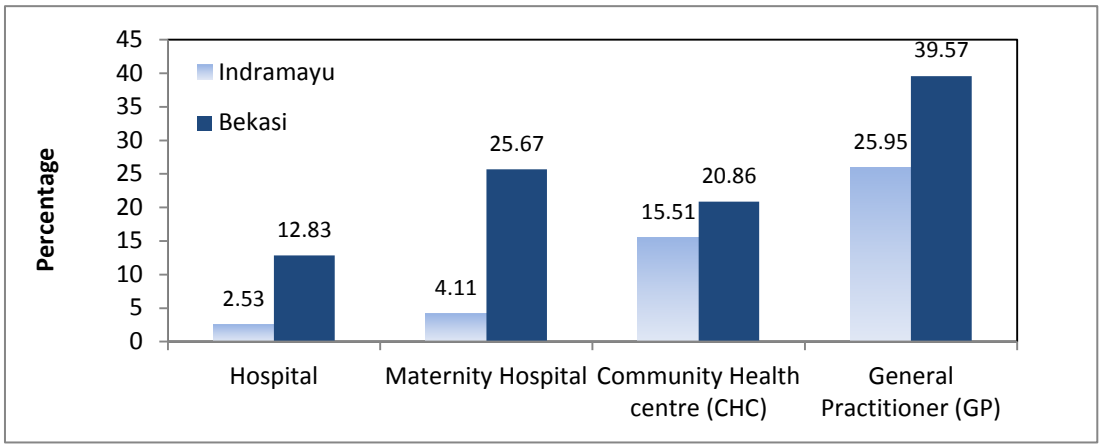
Source: Primary Data Collection

According to the household survey conducted in the two districts for the present research, the percentage of respondents who experienced health problems before pregnancy, during pregnancy or during delivery are higher in Indramayu than Bekasi. Nearly a quarter of respondents in Indramayu have had health problems before pregnancy and during child birth. In Indramayu, the percentages of women having health problems during pregnancy are lower than during the other two stages, but in Bekasi the percentage of women having problems before and during pregnancy and during child birth follow a slightly increasing linear trend. It is thus evident from these figures that the women in Bekasi are healthier than those in Indramayu.

9.4 Contextual effect of Maternal Health Inequality

Previous research has discussed the influence of the physical environment on people's health using several variables representing physical incivility (indicated by "litter, graffiti, poor housing conditions") and walkability (Messer, Vinikoor-Imler & Laraia, 2012). The main intention is to understand the effect of nature or the built environment, to determine healthy life styles. It is well known that life style shapes health outcomes, and the effects of behaviours such as smoking, diet intake and exercise on health have been well researched. There are other research topics which have a different but specific focus on health behaviour. Since this study focuses on maternal health inequality, the discussion is centred on the physical environment, health behaviour and health outcomes which relate to maternal health status.

Figure 9. 2 the Percentage of Villages with Health Facility/Services

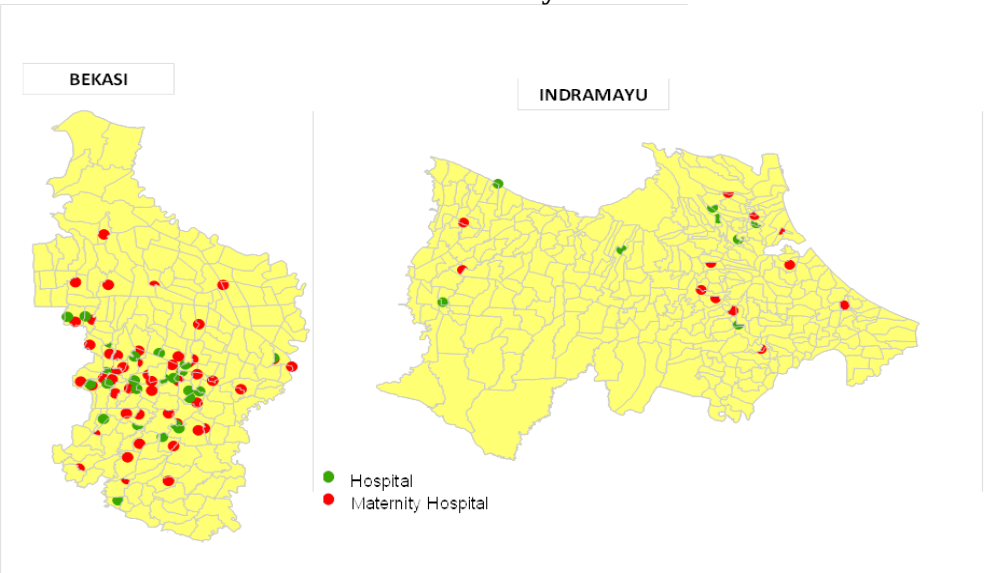


Source: PODES 2011

A physical environment variable that may influence the maternal health status is the availability of health infrastructure. According to a village potential survey 2011, conducted by Statistics Indonesia (BPS), Bekasi and Indramayu have significant gaps in the availability of health infrastructure. Less than 3% of villages in Indramayu have local hospitals while the figure for Bekasi is four times higher. Similarly, more than 25% of villages in Bekasi have maternity hospitals but in contrast, only 4.1% of villages in Indramayu have this facility. Bekasi boasts better health infrastructure with community health centres and private general practitioners at village level but the gaps between the two districts for these health services is narrower than the disparity for access to hospitals and maternity hospitals in the specific regions.

Figure 9.3 presents another illustration of the health infrastructure disparity between Bekasi and Indramayu. It is clear that Bekasi has more hospitals and maternity hospitals than Indramayu. As a consequence the population in Indramayu has to cover greater distances to access a health facility. The map in Figure 9.3 also indicates that the distribution of hospitals and maternity hospitals is not spread evenly; therefore some villages are isolated from hospital services.

Figure 9. 3 The availability of Hospital and Maternity Hospital in Bekasi and Indramayu



Source: PODES 2011

The cross tabulation and chi-square test between availability of health infrastructure at village level and maternal health behaviour shows a statistically significant association between these two variables (Table 9.2). In this study there are five variables on maternal health care including the timing for having the first health check-up, antenatal care, frequency of check-ups during the third trimester, place of delivery and assistance during delivery. The presence of health facility at village level and the distance to the closest health facility which is grouped into three categories (<2.5, 2.5-5 km and > 5 km) are used to describe the physical environment.

The availability of health facilities in the villages has a positive impact on the timing of the first health check-up during pregnancy. Women who stay in a village where there is a maternity hospital, CHC and private GP tend to obtain earlier health check-ups. For example, 52.8% respondents from the village with a maternity hospital received a health check-up in the first month of pregnancy (table 9.2). In contrast, only 30.4% of women from villages which do not have a maternity hospital got a health check. Likewise, the respondents who live in a village which is more than 5 km away from a health facility tend to have less appropriate health care. For instance, 35.1% of these respondents only have their first health check-up after the third month of pregnancy. In comparison, only 23% of respondents who live less

than 2.5 km from hospital wait for a check-up after the third month of pregnancy. Even though the cross tabulation confirms the positive influence of health infrastructure at village level, the Chi-square test shows that not all variables representing physical environments have significant association with the timing for the first check-up of pregnancy (Table 9.2).

Table 9. 2 Chi Square Tests between Availability of Health Infrastructure and Maternal Health Care

Physical Environ-ment	Statistical Test	Timing for having 1st health check up	Four Antenatal care during pregnancy	Freq. check up in 3rd trimester	Place of delivery (Institutional or Home delivery)	Delivery assistance (skilled birth attendance or TBA/others)
Availability of Hospital	Chi square	0.265	2.903	0.466	4.223	1.696
	df	2	1	2	1	1
	p Value	0.876	0.088	0.792	0.040*	0.193
Distant to hospital	Chi square	23.133	7.851	6.130	34.396	21.146
	df	4	2	4	2	2
	p Value	0.000*	0.020*	0.190	0.000*	0.000*
Availability of maternity hospital	Chi square	14.563	2.135	8.015	12.725	0.973
	df	2	1	2	1	1
	p Value	0.001*	0.144	0.018*	0.000*	0.324
Distant to maternity hospital	Chi square	23.466	2.252	6.399	22.827	9.496
	df	4	2	4	2	2
	p Value	0.000*	0.324	0.171	0.000*	0.009*
Availability of CHC	Chi square	10.996	1.437	5.795	10.194	2.897
	df	2	1	2	1	1
	p Value	0.004*	0.231	0.055	0.001*	0.089
Distant to CHC	Chi square	6.651	1.870	9.622	19.171	7.872
	df	4	2	4	2	2
	p Value	0.156	0.393	0.047*	0.000*	0.020*
Availability of GP	Chi square	11.245	0.180	0.650	28.259	8.683
	df	2	1	2	1	1
	p Value	0.004*	0.671	0.723	0.000*	0.003*
Distant to GP	Chi square	9.158	.279	0.948	30.917	13.935
	df	4	2	4	2	2
	p Value	0.057	0.870	0.918[a]	0.000*	0.001*

Source: PODES 2011 and Household survey P value < 0.01 = highly significant; P Value < 0.05 = significant

The antenatal care variable defines that respondents receive at least four health check-ups during pregnancy (Villar & Bergsjo, 2002). This variable was least affected by the availability of health facility as shown from the Chi-square tests which reveal statistically non-significant associations in almost all the cross tabulations between this variable with the availability and distance to health services. In contrast, the availability of health infrastructures and place of delivery has a substantial association. All physical environment variables have statistically significant associations with the place of giving birth. Respondents who live close to a health facility are more likely to give birth in a health facility and are more likely to use a skilled birth assistant. It appears from the data collected for this study that respondents who live more than 5 km away from a medical facility would be more likely to be assisted by Traditional Birth Attendants (TBA).

A woman's health is associated with the food she eats during her pregnancy. Table 9.3 shows that having proper medical treatment during pregnancy and delivery is related to healthy eating. This may be the result of encouragement and advice respondents receive from health personnel during medical care. Therefore, the more frequent the communication with medical personnel, the better food intake of respondents. For example, 26.3% of the respondents who obtained medical care more than 3 times in the third trimester stated that their food intake during pregnancy was better than with previous pregnancies. The figures for respondents with fewer medical care visits suggest that only 20% improve their eating habits. Similarly, women who accessed antenatal care at least 4 times, were much more likely to eat better food compared with those who had less access. Table 9.3 also reveals that adequate medical treatment during pregnancy has an impact in determining the intake of essential supplements such as calcium, iron or folic acid. The earlier a medical care in pregnancy occurs, the greater will be the number of supplements ingested. Nearly one half (48.08%) of the respondents who obtained medical check-ups in the first months of pregnancy took more than 3 supplements. On the other hand, women who went for their first check-up in the third month of pregnancy or

later tended to take fewer supplements. Likewise, the more frequent the contact with medical personnel, the greater the intake of food supplements.

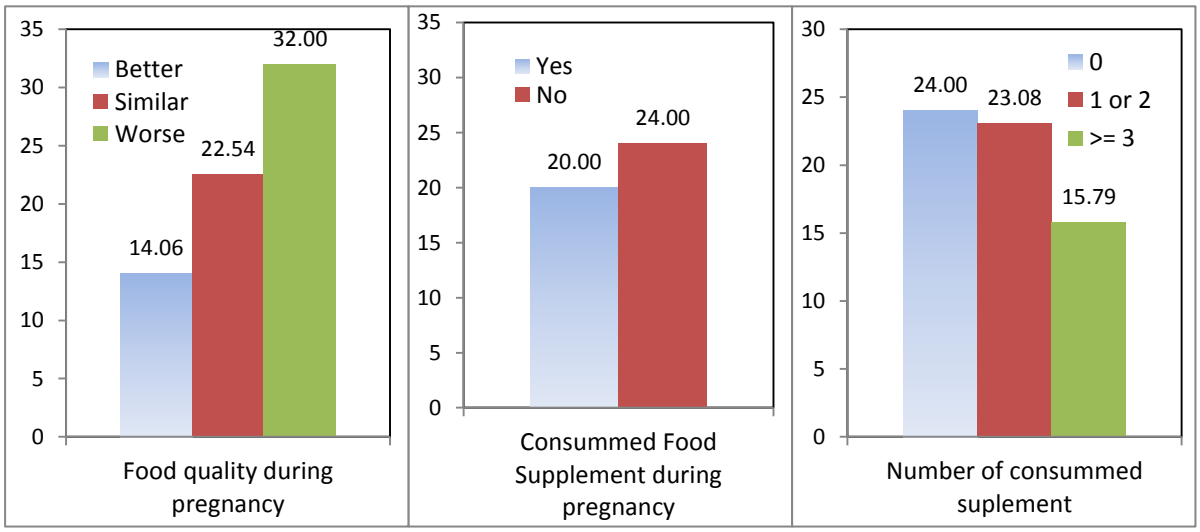
Table 9. 3 the Percentage of Respondents by Health Behaviour and Food Intake during Pregnancy

Health Behaviour	Percentage of Respondent		
	Consumed better quality of food during pregnancy	Consumed Food Supplement	Consumed >3 Supplement
Timing for having 1st health checkup			
1st month of pregnancy	27.47	91.43	48.08
2nd months of pregnancy	22.58	94.90	36.46
3rd month of pregnancy or later	20.27	92.00	16.22
Freq. check up in 3rd trimester			
<= 1	20.00	90.00	20.00
2	19.05	88.06	45.45
>= 3	26.29	94.76	33.51
Antenatal care			
at least 4 times	25.11	92.83	38.89
others	14.63	88.10	14.63
Place of delivery			
Health facility	29.29	91.03	37.66
Home or other	19.83	91.53	31.90
Delivery assistant			
Doctor/Midwife	28.22	92.27	41.01
TBA	13.46	86.54	11.76

Source: Household survey

The respondent's eating habits during pregnancy are likely to be related to their health problems during delivery. Better food intake, together with appropriate supplement allows women to have a better level of fitness, with fewer problems during delivery. The data from the household survey supports this logic. Figure 9.4 shows that women who have a poor quality of food intake during pregnancy compared with pre pregnancy have a higher chance of suffering complications during delivery. For example, among those women who had worse quality of food during their pregnancy, more than 30% had complications during delivery, but among those women who had better quality food in their pregnancy, only 14% had delivery complications. Similarly, those women who take more than three food supplements tend to be healthier during delivery than women who take less than three supplements.

Figure 9. 4 Percentage of Respondents Who Have Health Problems during Delivery by Characteristic of Food Intake during Pregnancy

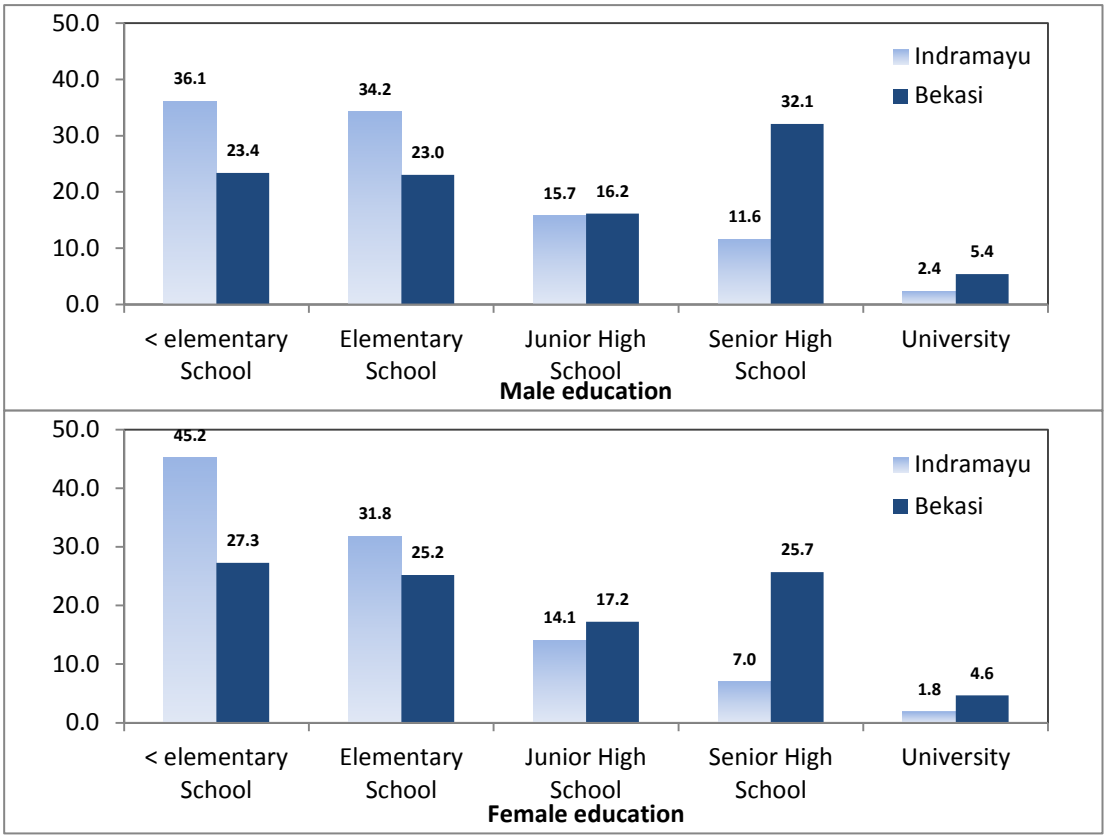


Source: Household Survey

9.5 Compositional effect of Maternal Health Inequality

The disparity of population characteristics between Indramayu and Bekasi has been discussed in Chapter 6. This section adds some data which describes male and female differences in educational levels and working status because the compositional analysis focuses on male and female characteristics. It is clear that the population of Bekasi has higher levels of education than the population of Indramayu (Figure 9.5). The majority of the Indramayu population only finished elementary school or lower, while Bekasi has a higher proportion of the population who graduated from senior high school. For example, nearly one third of the male and one quarter of the female population in Bekasi have graduated from senior high school while for Indramayu these proportions are only slightly over 10 % for males and 7 % for females. The differences in educational achievement between males and females within districts are evident but the level is not as elevated as the disparity between districts.

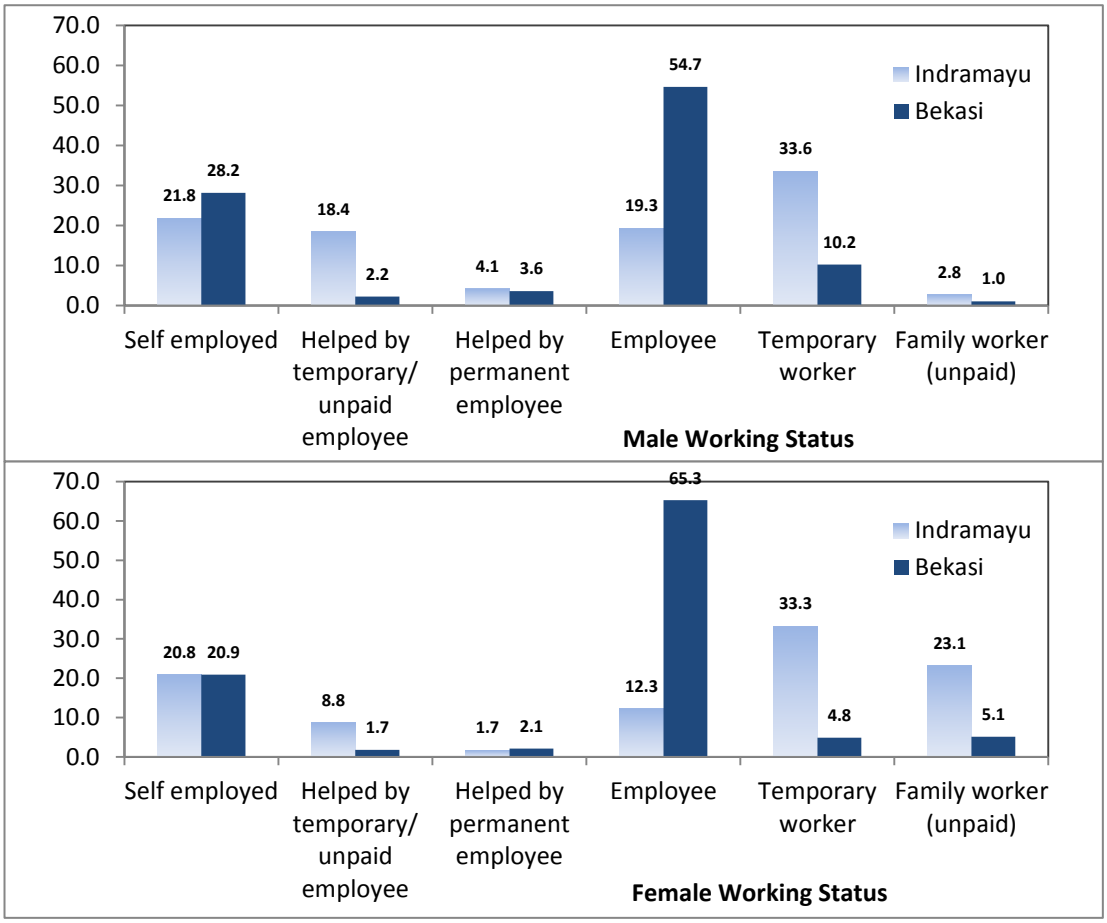
Figure 9. 5 The Percentage of the population more than 5 year old by educational level, gender and districts



Source: Population Census 2010

Bekasi residents not only fare better in levels of educational attainment but also in the employment than people who live in Indramayu. In Bekasi, the economic development is dominated by industry and services sector. More than 50% of males and of females in Bekasi are employed whereas the figure for Indramayu is less than 20%. Surprisingly, the majority of the workforce in Indramayu has the status of a temporary worker. It is an indication that the economic structure in this district cannot provide enough opportunities for workers to be involved in formal jobs. Furthermore, significant proportions of workers are employers themselves and co-opt temporary or unpaid workers to help them.

Figure 9. 6 Percentage of Workers by Gender, Working Status and Districts



Source: Population Census 2010

Bekasi residents not only fare better in levels of educational attainment but also in employment compared to the people of Indramayu. More than 50% of males and of females in Bekasi are employed, whereas the figure for Indramayu is less than 20%. In Bekasi, the economy is dominated by industry and services sectors. Surprisingly, the majority of the workforce in Indramayu has the status of a temporary worker. It is an indication that the economic structure in this district cannot provide enough opportunities for workers to be involved in formal jobs. Furthermore, significant proportions of workers are employers themselves and co-opt temporary or unpaid workers to help them.

9.5.1 The Impact of Women Characteristics

The primary data collected for this research show that women's educational achievement has an association with several variables which are significant in determining maternal death. Women's education levels can affect women's

reproductive status such as the age when they are married for the first time and the number of children they have given birth to. The cross tabulation (Table 9.4) shows that respondents, who have low education levels, have more children than women with high education attainment. For example, 17.6% of women at the lowest education achievement have more than 4 children. In contrast, none of women who graduated from senior high school or higher belong to this group. Here the age of the woman may be a factor. Generally, women who have low levels of education tend to be older women and therefore, would have more children ever born to them than women with higher levels of education, who would be younger women. Educational level of the woman is also found to be related to their age at first marriage. Women who continue studies at a higher level would also be older when they first marry. Delaying marriage and having fewer pregnancies is beneficial for maternal health. Marriage at a mature age (more than 20 years old) is advantageous since it reduces the risk of maternal death. Likewise, having fewer children reduces the risk of a maternal death. Chi square tests support and confirm the significant association between women's education and fertility and women's education and age at marriage.

Table 9. 4 Cross Tabulation between Women's Education and Reproductive Status

Women's education	**Children Ever Born (CEB)**			
	0-1	**2-3**	**>= 4**	**Mean**
<= elementary School	23.6%	58.8%	17.6%	2.38
Junior high School	34.8%	53.6%	11.6%	2.13
>= Senior High School	45.3%	54.7%	0.0%	1.72
Total	31.3%	56.6%	12.1%	2.17
Chi Square Test	**χ = 18.736**	**d.f = 4**	**p Value = 0.000**	
Women's education	**Age at first Marriage**			
	<= 15	**16-20**	**>=21**	**Mean**
<= elementary School	12.2%	63.9%	23.8%	18.76
Junior high School	4.4%	63.2%	32.4%	19.85
>= Senior High School	0.0%	37.5%	62.5%	22.33
Total	7.5%	57.7%	34.8%	19.85
Chi Square Test	**χ = 18.736**	**d.f = 4**	**p Value = 0.000**	

Source: Household Survey; P value < 0.01 = highly significant; P Value < 0.05 = significant

Women's education is linked significantly with existing health problems prior to pregnancy and during child birth. Only 7.8 % of women who graduated from senior high school or more have health problems during pregnancy, while the figure for women with a lower education level is more than 20%. The multivariate analysis in the previous chapter reveals that health problems during pregnancy are a statistically significant factor of maternal mortality. Similarly, women's education has a positive impact on health status during delivery, although the chi square test does not confirm any statistically significant association of these two variables (see Table 9.5)

Table 9. 5 Cross Tabulation between Women Education and Reproductive Status

Women's education	**Having health problem before pregnancy**	
	Yes	**No**
<= elementary School	21.3 %	78.7%
Junior high School	22.9%	77.1%
>= Senior High School	7.8%	92.2%
Total	18.7%	81.3%
Chi Square Test	**χ = 6.480 d.f = 2**	**p Value = 0.039**
Women's education	**Having Health problem during delivery**	
	Yes	**No**
<= elementary School	22.9%	77.1%
Junior high School	16.2%	83.8%
>= Senior High School	16.1%	83.9%
Total	19.7%	80.3%
Chi Square Test	**χ = 1.975 d.f = 2**	**p Value = 0.373**

Source: Household Survey; P value < 0.01 = highly significant; P Value < 0.05 = significant

The indirect impact of women's education can also be represented by women's involvement in decision making about health care. An improvement in their educational levels may influence women to participate in decision making. Women who have graduated from senior high school or above have a greater chance to play a role in decision making. However, the chi square test does not show a significant association since the gradation of women's participation in decision making between different education levels is quite small. In the same way, women's employment status does not have significant association with several variables which determine maternal death

9.5.2 The Impact of Family/Community Support

One of the closest persons to a pregnant woman is the head of the household. In the research areas, the head of the household can be the oldest person but is most commonly the woman's husband. The support that is provided by the head of the household for health treatment or birth preparation plays a strong role in a successful pregnancy. This section discusses the impact of the head of the household's education level in determining maternal health.

According to the household survey conducted for this research, women who have an educated head of household tend to obtain more adequate attention for maternal care compared to women who live in a household where the head has achieved a lower level of education. The percentage of women discussing birth preparation increases in line with the improvement of head of household's educational level. Women who live with, and close to an educated person tend to have a better preparation for giving birth such as considerations of cost, place, assistance and transportation to give birth. For example 70.7% women having a head of the household who graduated from senior high school or more, have discussed the place of delivery with husband or other family members. This figure is only 46.3% for a head of the household with lower levels of education. Besides, women having an educated head of household also obtain better support for maternal care. This is shown by the tendency to get husband as a companion for medical care during pregnancy which is higher for more educated head of household. The chi square tests indicate the significant association between the head of household's education; with birth preparation or maternal care support. However, discussion about the cost of delivery does not have any significant association with the educational level of the head of household education. It does not mean that financial matters do not count. On the contrary, finance is discussed almost universally across all levels of education of the head of the household. Thus, from the data that were collected for the present research, the educational level of the head of the household is recognized as an important variable influencing maternal mortality.

Table 9. 6 Association between education of the head of the household and family/community support during pregnancy

Head of Household Education Level	Having discussion about finance of birth	
	Yes	No
<= elementary School	72.50%	27.50%
Junior high School	81.10%	18.90%
>= Senior High School	84.10%	15.90%
Total	77.20%	22.80%
Chi Square Test	**χ = 4.453 d.f = 2**	**p Value = 0.108**
Head of Household Education Level	**Having discussion about place of delivery**	
	Yes	**No**
<= elementary School	46.30%	53.70%
Junior high School	70.30%	29.70%
>= Senior High School	70.70%	29.30%
Total	57.10%	42.90%
Chi Square Test	**χ = 15.923 d.f = 2**	**p Value = 0.000**
Head of Household Education Level	**Having discussion about delivery assistant**	
	Yes	**No**
<= elementary School	61.70%	38.30%
Junior high School	67.60%	32.40%
>= Senior High School	80.50%	19.50%
Total	68.30%	31.70%
Chi Square Test	**χ = 8.590 d.f = 2**	**p Value = 0.014**
Head of Household Education Level	**Having discussion about transportation for delivery**	
	Yes	**No**
<= elementary School	23.50%	76.50%
Junior high School	35.10%	64.90%
>= Senior High School	43.90%	56.10%
Total	31.30%	68.70%
Chi Square Test	**χ = 10.528 d.f = 2**	**p Value. = 0.005**
Head of Household Education Level	**Accompanied by husband for medical check up**	
	Yes	**No**
<= elementary School	65.80%	34.20%
Junior high School	76.90%	23.10%
>= Senior High School	81.90%	18.10%
Total	72.20%	27.80%
Chi Square Test	**χ = 7.504 d.f = 2**	**p Value = 0.023**

Source: Household Survey; P value < 0.01 = highly significant; P Value < 0.05 = significant

9.5.3 Women's Empowerment

Women's involvement in making decisions about their health is another important variable which has an effect on maternal survival (Dito, 2015; Hou & Ma, 2013). However, this variable presents a different picture in the present study. From data collected for the present study, it is found that Bekasi has better maternal health status but a lower percentage of women involved in decision making about healthcare compared to Indramayu. The respective percentages are 66.7% for Bekasi and 84.4% for Indramayu. There may be a possible explanation for this apparent anomaly if one looks at the process of how the variable of women's involvement in decision making is categorized. In the decision making variable, there are two categories - being involved and not being involved. In the group of women who are involved in decision making, there are several sub groups, i.e., deciding alone or deciding together with others such as husband and family members. In fact, only few women hold the sole authority for their treatment (12.9% in Bekasi and 10.9% in Indramayu), since the majority are involved in decision making by considering other people's opinions. Here the differentiating factor appears to the percentage of women for whom the decision for healthcare is made by the husband. In Bekasi, there are 32% of women whose healthcare decision is made by the husband, but in Indramayu, only 14.3% of the women have had their healthcare decision made by the husband. It has also be shown that the males (and therefore the husbands) in Bekasi are more educated than the males of Indramayu. Thus, the husbands (who, in most cases are also heads of households) do play an important role in decision making about treatment and their knowledge about the appropriate care for maternal health influences the decision making process.

To assess the influence of women's decision making on health and maternal survival, a cross tabulation is created between women's involvement in decision making about treatment and maternal survival, controlling for education of the household head and education of women. The result confirms the critical role of the education of the household head in strengthening women's empowerment. Women's involvement in decision making plays a positive role in reducing maternal deaths. Controlling for this variable, the importance of education of the head of the household still remains obvious (Table 9.7). The table shows, firstly that the

percentage of women surviving pregnancy and child birth is always higher when women were involved in decision making about health. Within each of the two the categories of involvement in decision making about health (Involved and Not Involved), an increase in the level of education of the household head is associated with an increase in the percentage of women surviving pregnancy and child birth. An increase in women's education is likewise associated increasing percentages of surviving women in each category of involvement in decision making, but these increases in maternal survival are not as pronounced as can be seen with the increases in household head's education. The implication of this finding is that women's education can play a stronger role in maternal survival, if it is accompanied by an increase in the education level of the head of the household.

Table 9. 7 Percentage of Respondents by Head of Household Education, Women' Education, Involvement in Decision Making and Maternal Death

Women Involvement in deciding health treatments	Head Household Education	Maternal death		
		Deceased	Surviving	Total
Involved	<= elementary School	32.00	68.00	100.00
	>=Junior high School	19.79	80.21	100.00
	Sub total	**26.70**	**73.30**	**100.00**
Not involved	<= elementary School	70.27	29.73	100.00
	>=Junior high School	35.29	64.71	100.00
	Sub total	**53.52**	**46.48**	**100.00**
Total	<= elementary School	40.74	59.26	100.00
	>=Junior high School	23.85	76.15	100.00
	Grand Total (N= 284)	**33.22**	**66.78**	**100.00**
Women Involvement in deciding health treatments	Women's Education	Maternal death		
		Deceased	Surviving	Total
Involved	<= elementary School	28.07	71.93	100.00
	>=Junior high School	22.77	77.23	100.00
	Sub total	**25.58**	**74.42**	**100.00**
Not involved	<= elementary School	55.56	44.44	100.00
	>=Junior high School	51.52	48.48	100.00
	Sub total	**53.62**	**46.38**	**100.00**
Total	<= elementary School	34.67	65.33	100.00
	>=Junior high School	29.85	70.15	100.00
	Grand Total (N = 292)	**32.39**	**67.61**	**100.00**

Source: Household Survey

The apparent anomaly that women in Bekasi have a lower involvement in deciding about their health treatment but have better maternal health status than women in Indramayu is explainable in two ways The first explanation is that the involvement in decision making about health does not mean that women hold the authority about healthcare. The decision is generally made by consulting with the husband or other family members. Only a few women decide health treatment in the absence of the other people's opinions. The percentage of women in this group (i.e., taking decision about healthcare in conjunction with other people's opinion) is higher in Bekasi than in Indramayu. Secondly, considering the nature of decision making at a household level, the head of the household's education level has an important role. The higher the level of education of the household head, the greater is the likelihood of taking a decision which is beneficial for maternal health. In fact, as shown earlier, a higher percentage of husbands have taken decision of about healthcare in Bekasi than in Indramayu. The people of Bekasi have a better educational achievement, and thus the heads of households in Bekasi also have a higher educational level than those in Indramayu. But the important thing is that the heads of the households in Bekasi allow the women to discuss healthcare options and then they arrive at a beneficial decision on treatment. Perhaps, the heads of household in Indramayu do not do this. Certainly, it presents a positive impact for maternal health in Bekasi.

9.6 Summary

This chapter aimed to find a plausible explanation on the determinants of maternal health inequality between Bekasi and Indramayu. The discussion is focused on the contextual and compositional factors contributing to shape the maternal health inequality between Indramayu and Bekasi. Contextual factors refer to disparities in physical environment that play significant roles in creating the inequality. Compositional factors comprise population characteristics including behaviours which support or hinder better health outcomes.

One prominent difference of physical condition between Bekasi and Indramayu is the availability health infrastructure. In Bekasi, the percentage of villages having a health facility is greater than that in Indramayu. The distance to the closest facility is also shorter in Bekasi than in Indramayu. These factors stimulate better maternal health services including antenatal and delivery care. Women in Bekasi experience have

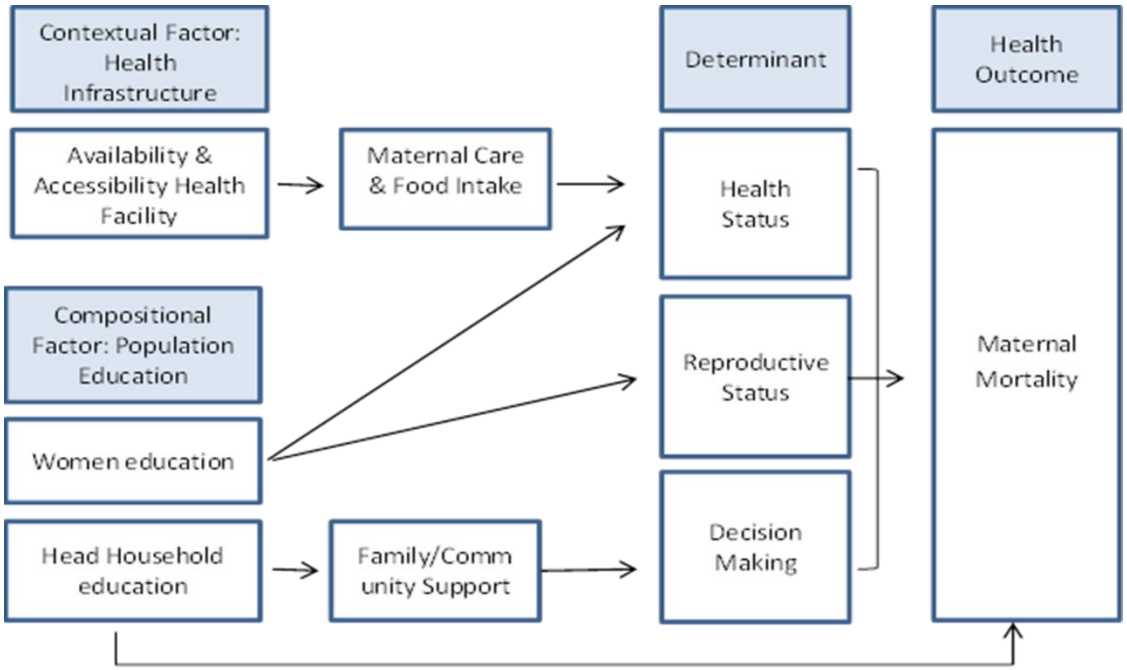
contact with medical personnel. This is likely to lead to more appropriate healthcare practices by the women of Bekasi during pregnancy such as better food intake and food supplements which are also associated with healthy outcomes such as fewer problems during delivery.

Education and employment status of the population are two characteristics which differ considerably between Bekasi and Indramayu. While employment status does not have a significant association with the determinant of maternal health, education emerges as an important factor which relates to the determinant of maternal death. Women's education has a significant association with reproductive status such as the number of children ever born and it also correlates with the health status before pregnancy. The impact of education can also be seen from the level of education of the head of the household. In the previous chapter, this variable was seen to emerge as one of the determinants of maternal deaths. The head of household is a person who has the highest authority in Indonesian family life and bears the greatest responsibility for fulfilling family needs. Accordingly, pregnant women who live in the household respect the household head's advice and decisions. Thus, education of the household head is highly likely to be important in shaping a positive behaviour for maternal care among the women of the household. Based on the primary data collected for this study, the higher the educational level of the head of the household, the better is his support for maternal healthcare. Indeed, this affects maternal health outcome including maternal deaths.

It was found in the previous chapter that education of the head of the household, women's involvement in decisions about health care, the number of children ever born and health status are important determinants of maternal death in Bekasi and Indramayu. This chapter also aimed to link the physical environment and population characteristics of Bekasi and Indramayu with the determinants of maternal mortality to explain the inequality in maternal mortality between the two districts. The analysis reveals that a higher availability of, and accessibility to of health facilities leads to better maternal health care and outcomes including women's health status during delivery. Further, educational levels affect maternal deaths in several ways. Women's higher education lead to healthy reproductive health and better health

status prior to pregnancy, while head of household's education levels influence the adequate support for maternal care. The summary can be seen in the Figure 9.7

Figure 9. 7 The Contextual and Compositional Factor of Maternal Health in Bekasi and Indramayu



Source: Primary Data Collection

With respect to all the determinants of maternal health inequality, Bekasi is in a better position except for women's involvement in deciding health treatments. This anomaly can be explained by the fact that involvement is not a guarantee for good healthcare. Mostly, the decision about healthcare is the result of collaboration with family members. Considering this nature of decision making process, the head of the household takes an important role. Women's participation in decision making is important but its impact would be boosted if women have an educated head of the household. The apparent anomaly mentioned above can be explained by the fact that the population of Bekasi has better education levels, which includes the head of the household. Thus, this chapter concludes that maternal health inequality between Bekasi and Indramayu is highly affected by a great disparity in health infrastructure and the educational levels of the population.

CHAPTER TEN: Summary, Conclusion and Policy Recommendations

10.1 Summary

The objectives of this study were:

1) To measure the extent of maternal health inequality in West Java and find out the underlying factors which are responsible for maternal health inequality between districts/municipalities;
2) To calculate the concentration index of the incidence of maternal mortality based on economic status of households and identify the determinants of maternal mortality inequality;
3) To analyse factors such as material circumstances, health status and behavioural factors, which may be linked with maternal survival and,
4) To provide recommendations for policy and further research based on the above analysis.

The first objective has been addressed in Chapter 4, while the second objective is addressed in Chapter 5. The third objective covers the determinants of maternal mortality significant for the present research and it is discussed in Chapters 6 through 9. Chapter 6 focuses on individual characteristics which influence maternal survival while Chapter 7 and 8 present further explanations on the impact of health provision and health seeking behaviour to affect maternal survival. Chapter 9 discusses the effects of contextual and compositional factors on maternal survival. The last objective is addressed Chapter 10.

10.1.1 The Level and Determinant of Maternal Health Inequality across Districts in West Java Province

The first objective of this research was to measure the level of maternal health inequality between the districts of the province of West Java, Indonesia based on the data obtained from the Indonesian Population Census of 2010. A maternal health index is calculated by Factor Analysis of seven indicators of maternal health – maternal mortality ratio, female life expectancy at birth, total fertility rate,

percentage of women marrying before age 17 years, percentage of women using effective contraception, percentage of births assisted by a doctor, and percentage of pregnancies receiving sufficient antenatal care. The Gini ratio of 0.48 indicates the existence of maternal health index inequality in the province and demonstrates that maternal health inequality is a prevalent issue in Indonesia. This finding conforms with previous research by Pitriyan and Siregar (2013) who mention the existence of health inequality between rural and urban areas in Indonesia. In some aspects, health inequality has even widened in some parts of Indonesia in recent years. For example, inequalities in child mortality have increased between the most developed islands, Java-Bali and the other islands (Hodge et al., 2014b). Inequalities in maternal health are no exception, with indicators of access and use of maternal care and maternal mortality dispersed in Indonesia across regions and socio economic indicators (Trisnantoro et al., 2009).

The discussion on determinants of inequality in maternal health between the districts of West Java reveals that certain variables illustrating regional socio-economic conditions and health resources are meaningful to explain such inequality. The variables which indicate the compositional aspects of population, representing regional economic conditions such as educational levels, labour force characteristics and percentage of poor population have greater influence to explain the inequality rather than the regional economic indicators like GDP. The remarkable point that can be drawn is that the indicators which come from aggregation of individual characteristics are more relevant to explain the inequality. Indicators of regional economic development, such as GDP growth and GDP per capita have less effect in explaining the inequalities. There may be two possible reasons for this. First, an economic development indicator such as GDP per capita is not distributed evenly across all populations in a region or district. Therefore, this variable does not represent the same level of welfare for all segments of the population. Second, the wealth that comes from the GDP is not transferred wholly into development programs that effectively improve population health.

A study by Wilkinson and Pickett (2009) shows that there is a strong correlation between income inequality and index of health and between income inequality and social problems. This study shows income inequality has a stronger correlation with

population health and social problems than gross national income per capita at purchasing power parity. A country can have high income per capita but it does not guarantee that the population's health is good and social problems are low unless the income inequality is low. Based on a review of existing evidence, a recent study also concludes that income inequality and health have a causal relationship (Pickett & Wilkinson, 2015).

Analysis of data collected for the present study shows that the socio economic variables of the maternal health inequality determinant can be grouped in to three categories: educational level (literacy rate and mean years of schooling), economic capacity (unemployment and poverty) and urbanization (percentage of rural areas and labour force in agriculture). The first category affects people's knowledge, behaviour and also their economic status. The second category illustrates the ability to overcome economic constraints, especially in maintaining adequate health care. The third category indicates the ease of access to health services and is also supported by the analysis of health resources at district level.

With respect to health care resources, the availability of health services (or the lack of it), especially that of hospitals, maternity hospitals and doctors is an important factor of maternal health inequality. This is also the case with the percentage of household expenditure on health expenses. A higher proportion of health expenditure in the household budget indicates that the household is better able to access health care. Therefore, this variable presents a positive effect on maternal health. However, the government budget for health programs does not appear to be sufficient for ensuring good maternal health status at district level. This finding confirms an earlier inference that socio-economic development programs, generated from regional economic welfare or GDP do not necessarily improve maternal health.

10.1.2 Inequality in Maternal Mortality in West Java and its Determinants: A Household Level Analysis

One of the aims of the present study was to measure the inequality in maternal mortality across different socio economic statuses (SES) of households in West Java. The household SES is measured by using several variables of housing conditions and the employment status of the head of the household. Every household is given a

score according to its SES. Based on the calculation of index of concentration in maternal morality it is found that poorer households have a greater chance to experience maternal death. Even though the magnitude of the index of concentration is not high when compared to the maximum value of 1, the index of -0.1172 shows that maternal mortality inequality occurs across SES of households in West Java province.

There is also some evidence showing that the wealth of a household affects maternal health. For example, in urban Mali, women of wealthier households have a higher propensity to report illnesses and overcome financial problems to get medical care (Bove, Vala-Haynes & Valeggia, 2012). Likewise, household welfare consistently influences the provision of maternal care during pregnancy or delivery (Goli, Doshi & Perianayagam, 2013; Målqvist et al., 2013; Singh, Rai & Kumar, 2013). The present research confirms that to live in a better SES household is beneficial for women's health.

While the above finding may not be surprising in a general sense, it was intended to find out more about the household characteristics that influence the inequality in maternal mortality in the context of West Java. To do this, the index of concentration was decomposed into its components. Since there is a constraint in the number of variables which could be used for analysis, this study considered the characteristics of the head of the household as important elements which shaped household SES and the household condition. Generally, the head of household is very close to the deceased or surviving woman, and in most cases it is the woman's husband. However, this is not to consider the relationship status of the head of household but the closeness in living in the same house and possibly influencing women's health. At this stage, age and education of the head of the household is found to explain around 28.5% of the index of concentration. Thus, the finding of the present study shows that being younger and more educated, the head of the household has a better chance to avert maternal death in the household.

The husband can have a crucial impact to assure a better outcome of pregnancy and delivery process therefore the husband's involvement in maternal healthcare is important in enhancing women's health. Several studies (Abushaikha & Massah,

2011; Kainz, Eliasson & von Post, 2010) contend that the husband's involvement is beneficial for ensuring adequate care and providing psychological or spiritual support for women during pregnancy or delivery. In addition, the husband who is purported as the more educated has a greater tendency to be involved in maternal care (Kakaire, Kaye & Osinde, 2011; Martin et al., 2007). First time fathers, more likely to be younger but not necessarily so, also pay better attention to maternal care (Martin et al., 2007). These research results conform to this study which shows that younger and educated heads of households have better maternal health outcome under their care.

In Indonesia, the husband's participation on maternal care is also considered an important factor to enhance women's health. The Government launched a "*suami siaga*" (husband alert) program in 1999 as part of Indonesia's Mother-Friendly movement (Sood et al., 2004). The "*suami siaga*" program is focused on promoting desirable behaviour of husband to avoid the possibility delays in deciding to seek care, reaching care and receiving care.

10.1.3 Social Determinants of Maternal Health Inequality in Bekasi and Indramayu

The framework of social determinants of health inequality comprises a structural and an intermediate determinant (Solar & Irvin, 2010). The structural determinant is responsible for presenting the stratification or social classes through different social and economic positions or political contexts, while the intermediate determinant is the consequence of social gradient which includes material circumstances, behaviour and psychosocial factors (CSDH, 2007; Solar & Irvin, 2010).

From the discussion in the chapter 9, education appears as an important variable in determining maternal health inequality between Bekasi and Indramayu. The population of Bekasi has better educational achievement which is associated significantly with maternal health status. Income and occupation characteristics in Bekasi are also better than in Indramayu but these variables are not significantly associated with maternal health care variables. It does not signify that regional income and occupation characteristics are less important in affecting maternal health

inequality, but the impact of these variables may work through availability of health resources or material circumstance.

The discussion on the contextual factors of maternal health inequality shows that the availability of, and accessibility to health infrastructure emerges as crucial variables to explain the disparity in maternal health between Bekasi and Indramayu. In addition, a detailed discussion on health services provision reveals that the quality of health services in Bekasi is more advanced than Indramayu, as illustrated by the availability of qualified health personnel, equipment and drugs.

Further analysis indicates that maternal mortality in Bekasi and Indramayu is influenced by head of household's education, women's health status, reproductive status and women's involvement in decision making on healthcare. Education appears again, as a crucial variable in micro level analysis. Women who live with an educated head of household have a greater chance of surviving pregnancy and childbirth. This is also the case for women who have better health status prior to pregnancy or during delivery; involvement in decision making of their health treatment and having only 1-2 children.

According to analysis at macro and micro levels, differences in structural determinants such as education and income (Solar & Irvin, 2010) are responsible in shaping maternal health inequality between Bekasi and Indramayu. Regional income may not directly affect the health indicator, but it influences the stratification of material circumstances between the two districts. In contrast, education appears as a strong variable which consistently determines maternal health status at both the macro and micro level analyses because education significantly influences maternal survival and also contributes to explain maternal health inequality at district and household levels.

In terms of intermediate determinants, it is found that the variable representing material circumstances is one of the variables responsible for the inequality at the macro level. The other components of intermediate determinant such as health behaviour, psychological aspect and biological factor are not included in the macro level analysis because the relevant data are not available. At the micro level, several

variables representing behaviour and biological factors such as parity and physical health significantly affect maternal mortality. These variables belong to health and reproductive status in the framework to analyses the determinants of maternal mortality (McCarthy & Maine, 1992). Two other variables, the level of education of the head of the household and women's involvement in decision making on health, are also important factors influencing maternal deaths. According to the socio determinant of health inequity, these variables can be deemed to represent psychosocial factors described as living circumstances including stressors, relationships and social support (Solar & Irvin, 2010). Women's involvement in decision making illustrates the existence of a positive relationship which is beneficial for women's health. Educated heads of households indicate affirmative social support for women in accessing adequate healthcare. Analysis of empirical data collected for this research also shows a positive association between education of the household head and birth preparation. Education also represents the knowledge and economic status that is fundamental to ensuring proper provision of medical care.

Further, at the micro level which can be seen in the Chapter 6, medical care during pregnancy or delivery such as frequency of antenatal care, place of delivery and delivery assistance have less of a contribution to explain maternal mortality. This result appears to contradict the findings of many studies which suggest that the provision of medical care is a key intervention to reduce maternal mortality. This result appears also to contradict the findings of the macro level analysis of the present research, which shows that the availability of health facility such as hospital and maternity hospital is important for reducing maternal mortality. This anomaly can be explained by revisiting the research design of the present study. At the macro level, the results are influenced by the variation in material circumstances of the physical environment where people live, while at micro level, the units of analysis (the case and the control, or the deceased and the surviving women) chosen in each region share the same characteristics of that region. In other words, it can be said that deceased and surviving women have similar material circumstances since both are exposed to the same health infrastructure. The difference between the two groups of women lays only in these women's ability to access health services as influenced by the household or individual economic status. It may also be noted that the government's health intervention provides free maternal care in all regions,

especially for the poor, which provides a bridge for the poor to obtain adequate care and narrows the gap of accessibility across population groups.

Based on the research design and the discussion made above, it is possible that while health infrastructure is an important factor in influencing maternal health inequality at the macro level, medical care may have no influence on maternal mortality at the micro level. A further explanation of this anomaly can be found in the discussion of the impact of culture on the candidacy process. Basically, the mere utilization of health services does not ensure the provision of adequate health care for users. This is accounted for by the process of candidacy for obtaining healthcare which leads to several delays and inappropriate treatments. The delays appear during the process of identification of health problems, navigating the patients to health centres and receiving adequate treatment in health facilities. Furthermore, inappropriate care emerges because of difficulties in accessing medical treatment, lack of equipment, drugs and the ability of health professionals in making accurate diagnosis.

The process of candidacy is unquestionably influenced by social, cultural and physical environments. The physical environment including the availability and quality of health infrastructure affects the inappropriateness of treatment obtained during the candidacy process, while in the research areas, the delays are mostly influenced by culture. Since the population still believes in the supernatural as the causation of illness, the first preference in overcoming health problems is to go to a traditional healer. People recognize that modern care is the last resort if the traditional treatment cannot cure maternal health problems. Hence delays in treatment occur because of the reluctance to rely on modern medical care. This situation results in an economic burden fuelled by the cost and misperceptions of the professional treatment.

Accordingly, the variable of utilization of maternal care services during pregnancy and delivery which is represented by binary categories of use or not use of medical care without being accompanied by detail process of accessing health care, cannot picture the attainment of adequate treatment especially, during critical times. Therefore, these variables have a trivial impact as determinants of maternal deaths. However, it does not mean that health care is not important in reducing maternal

mortality. Rather, this result is more likely to indicate that the current provision of health services is not sufficient to guarantee mortality reduction unless it is accompanied by assurance of the services' quality and the demand to use the services. To create the demand, physical environment and culture must be considered as crucial aspects. According to the socio determinants of health (Solar & Irvin, 2010), these aspects belong to the structural determinant which influences health inequality.

In general, this study reveals some structural determinants at macro level which affect maternal health inequality including education, employment and income. Based on the framework, these aspects are responsible for influencing material circumstance like health infrastructure. A cross districts analysis shows that availability of health facilities and medical personnel are significant in shaping maternal health inequality. At the micro level, education also appears a strong variable to affect maternal health. Education of the head of the household plays a crucial role in affecting maternal mortality. Education acts as a proxy for socio-economic status and the level of knowledge, including an awareness of maternal care. Therefore, the head of household education is also linked to the existence of family support for women. In addition, some variables belonging to biological and behavioural factors are significant determinants of maternal mortality. This aligns with the maternal mortality framework which mentions health and reproductive status as determinants of women's health during pregnancy and childbirth (McCarthy & Maine, 1992).

10.2 Policy Recommendations

Based on the findings, some policy recommendations are suggested to improve maternal health and reduce their inequality across population groups. Generally, the recommendations advocate the provision of adequate care during pregnancy and delivery; the assurance that women can access and use the provided health services; and the incorporation of prevention approach to minimize possibility of complications. These objectives must be followed simultaneously to improve maternal health. The failure in just one aspect may have a substantial impact for diminishing maternal health. These broad objectives can be derived in more specific recommendations as follows:

10.2.1 Improve the Quality and Accessibility of Health Services

The Indonesian Government has put the provision of health care facilities as a priority for development. Under this priority, there is a greater supply of health services, especially that for primary health care (Rokx et al., 2010). This positive trend is not without problems. Previous literature indicates that the provision of accessible and qualified care remain an obstacle to ensure the improvement of maternal health. The first point to consider is the distribution of medical personnel. It is true that the number of health personnel has increased but it does not mean that this condition gives greater access to health services for all sections of the population.

According to Heywood and Harahap (2009a), the distribution of health facilities in Indonesia is relatively good as result of the establishment community health centres (CHC). As multi providers, the establishment of CHC can give rise to solo providers such as doctors or midwives with private practices after office hours. The staff placement in CHC has operated with newly graduated doctors, nurses or midwives in compulsory services. However recently, there has been no mandatory service for new graduates. This may create difficulty in staffing the health facilities and could lead to uneven distribution across regions (Heywood & Harahap, 2009a). In addition, Rokx et al. (2010) find that since 1996, the average number of doctors per CHC has increased but there are more CHCs without a doctor.

The second problem relates to the quality of the health services. Rokx et al. (2010) find that there has been an increase in overtime work by doctors based on data from Indonesian Family Life Survey (IFLS). However, the data also show that less than 33 % and 10 % of doctors check blood pressure and protein in the urine during prenatal care. This result identifies that only a few doctors perform to the required standard for diagnostics. A problem of health personnel quality is also revealed by Barber, Gertler and Harimurti (2007) using IFLS data. Quality is measured by asking medical staff to describe processes of taking medical history, physical diagnostics and follow up, after a clinical case is presented to them. The results show there is downward trend of the quality of professional expertise in prenatal care, child and adult curative care.

Quality of services is also determined by availability of adequate equipment and drugs. But in fact many health facilities do not have supplies of standard equipment and drugs. Chapter 7 described the condition of health infrastructure in the research areas. Only hospitals and maternity hospitals can perform important procedures to treat maternal complications. But that is also not without obstacles. Blood supplies, sophisticated procedures and waiting times become main problems in providing adequate treatment.

Midwives as the frontline service providers in maternal healthcare also need to be proactive in providing qualified and accessible services. A substantial village midwife program has been endorsed to put health providers closer to the population. However, the program also faces barriers with some contracted midwives choosing to work in private practice rather than focus on the poor and there are issues around qualifications of midwives who may not have achieved the standard of education for certification (Kristiansen & Santoso, 2006). In addition, a large proportion of midwives move away from the initial placement and stay outside the village (Heywood et al., 2010) with the result that the aim to bring the services closer to population is not realized.

Besides building health infrastructure, the Government is also focused on the ease of access to services as indicated by the intervention that provides free services for the poor or for all pregnant women. But unfortunately, many people, especially those who are the target of the intervention underutilize the free services. The situation is caused by a lack of knowledge that the free service is available; a perception that using free services equates to inadequate care or a reluctance to fulfil prerequisite steps in order to access the free services. To some extent, people also feel disrespected by health personnel when they use the free services. Therefore, these issues need to be resolved to improve women's health.

The other problem relates to the sustainability of health provision impacted heavily by a decentralized system of government. The regional autonomy era allows for the district leader to be elected directly and not because of the candidate's capability and performance but rather a massive campaign and support from a political party.

Therefore, the elected leader may not have the capability or interest in developing the health sector (Utomo, Sucahya & Utami, 2011) resulting in poor fiscal governance. This notion is supported by the evidence that there has been no significant improvement in health services (Barber, Gertler & Harimurti, 2007; Heywood & Harahap, 2009b).

Health provision is considered important in determining maternal health inequality but for ongoing issues which need attention, it is recommended that:

a. To continue with the contractual placement of doctors and midwives. This program must be accompanied by incentives which are sufficient to fulfil the health personnel's' needs but also provides close supervision especially in remote areas which are usually uncontrolled. This supervision should be aimed at avoiding health personnel moving to live outside the duty region.
b. To disseminate the standards of procedures to be performed by medical staff providing maternal healthcare. This policy must be accompanied by hierarchical supervision to ensure the appropriate implementation. The supervision must also cover solo-private providers who are at the frontline of maternal health service provision. The service quality is not only determined by technical procedures but also the health personnels' sense of professionalism or bedside manners. In many cases, perceived lack of professionalism is the main reason for patients to avoid accessing health services.
c. Midwives as the frontline providers of maternal healthcare provision should get more recognition. Their welfare must be guaranteed, especially for midwives who work in remote areas, in order to minimize movement of midwives from rural to urban areas. In addition, midwives must have on-the-job training or job placement under high-level supervision.
d. Improving the quality of health personnel must occur simultaneously with the improvement of health infrastructure. Central and local governments must be committed to providing standard equipment and have drugs available at different levels of health facilities.
e. To maximize the effect of free health services, the Government must promote the availability of the program. In addition, the system to access free services

should be made simpler in order to reduce people's reluctance to use free services.

f. To ensure the sustainability of health development at regional level, the central government should put in place regulations which encourage the local government to keep the health sector as a main priority of the development program.

10.2.2 Education and Counselling

An important aspect which appears in this study is the impact of people's behaviour influencing maternal health. The role of behaviour to influence health outcomes is widely accepted since human behaviours can be high risk and harmful or conversely, supportive to maintain mental and physical health. Therefore, health policy should consider shaping people's behaviour, particularly which is not in line with a healthy life style.

Many theories discuss behavioural changes. Ajzen (1991) presents a theory of planned behaviour, which suggests, that beliefs, attitudes and intentions are followed by behaviour. People act based on a logical reason to achieve their goals after considering the subjective norms or opinions about the behaviour. The central role of individual thought on behaviour is also mentioned in the social cognitive theory of self-regulation (Bandura, 1991). Motivation and action result from structural systems explaining self-standards.

Since many people in the research areas of this thesis still associate their traditional beliefs with the causes of illness, the people's priority is to use the traditional healer. The objective to change behaviour must focus on persuading the population that they will have better outcomes by using modern medical care. It is ineffectual to ask people go to a health facility if they do not have a positive perception about using modern health care. However, having good intentions or motivation does not guarantee a change in behaviour. Another theory, posed by Schwarzer (2008), is known as the health action process approach (HAPA). This theory considers the variability that occurs between intention and behaviour since intention is not always easily transferred into action. Action planning and coping planning bridges intention

and action. In the process, some barriers may appear and therefore to make the intention become an action, maintenance of self-efficacy must exist.

Health intervention to shape people's behaviour should not only focus on motivating people but the program must also consider the possibility that people have various conditions as a result of the process to transform intention into behaviour. This situation appears in the research areas. With the provision of health facilities, people are more aware of the importance of modern health care and much evidence shows that the community understands that medical care leads to better outcomes. However, this attitude is not automatically transferred into the utilization of health services. Many people still put traditional care as a priority and consider the professional treatment as the last resort.

For example, many women still prefer to give birth at home rather than go to a health centre or hospital. Women have a positive expectation when using a health facility but cannot maintain self-efficacy, described as one's belief in her/his ability to perform an action or facing a situation (Bandura, 1991). Some evidence indicates that women fail to transfer their intention mainly because of economic reasons. To have a limited budget available for delivery and knowledge that using free services is a complex task would discourage people from accessing a health facility. To some extent, it has been shown that people do not have a plan and strategy to cope with this emerging problem. In this situation, the intervention must count on maintenance self-efficacy.

HAPA (Schwarzer, 2008; Schwarzer & Luszczynska, 2008) also describes a similar process in the stage of action. It means that action needs to be maintained, even though the intention had already transformed into the desired behaviour but it is still possible to regress to the previous stage. People may refuse to continue the behaviour into the future, if they have negative perception based on experience. In the case of maternal care, this aspect is an important consideration as maternal health care is a continuing process. It is not focused only on a short period of time in that it covers care during pregnancy, delivery and the post-natal period. Anecdotal evidence from the focus group discussions indicated that women considered avoiding modern

medical care since based on their previous experience, there was a lack attention from health personnel or they had to go undergo some unexpected procedure.

According to the circumstances in the research areas, the government programs must be concerned with providing education and counselling, both for the population and health personnel, and aimed at making medical care as a first priority in health seeking behaviour. For the population, the program should be focused on promoting:

a. The importance of modern care which is intended for a population still relying on traditional treatment.
b. Birth preparation including budget, transportation, destined facility and assistance in critical times. This preparation is important as a coping strategy which facilitates the transformation of people's intention to use health facility.
c. Information on the process of accessing free cost maternal care. This program is conjointly offered with birth preparation can increase people's accessibility to a health facility especially during delivery.
d. The standard procedure in the health facility including the referral system that avoids inadequate treatment received by patients. On the other hand, it may also avoid misunderstanding about the process of delivering health services so that clients do not have negative perception of modern medical care.

The education and counselling for health personnel is no less important. The program must contain the aspect of civility in the provision health services. Health personnel should communicate with the patient, providing all necessary information, particularly to avoid misunderstandings.

10.2.3 Community Engagements

Social capital is mentioned as a social determinant of health and is an important influence on health inequality (Solar & Irvin, 2010). Social cohesion and social capital bridge the disparity in the community and affect the intermediate determinant of health inequality. Social capital is defined by Putnan (as cited in Kritsotakis and Gamarnikow (2004)) as the accumulation of community networks, people's participation in communal processes, equality within community, mutual help and trust among community members.

Previous research suggests that social capital influences the health status of populations (d'Hombres et al., 2010; Kim et al., 2011). In a more specific case, a mother with a higher level of social capital tends to have less child health problems (Harpham, De Silva & Tuan, 2006). Similarly for maternal health care, women who are more involved in community activity find it easier to access health care and get support when facing maternal or foetal complications (Kritsotakis et al., 2011).

Social capital affects health outcomes through different conduits as mentioned by Rostila (2011) who explains that social capital facilitates the dissemination of social resources through a social network and social trust. People who face obstacles because of limited resources can be helped by the other people in the community. Based on systematic literature review, Pitkin Derose and Varda (2009) find that bonding social capital is associated with health care access and occurs if the norm or belief in the community is conducive for health care.

Another conduit is through health promotion. In a community with strong bonding and trust, the communication between members would also be conducive to making good habits such as a healthy life style easily transferable among community members. It is claimed by Nauenberg, Laporte and Shen (2011) to be the process which links social capital with health outcomes. Similarly, social support can be transferred to health promotion, but intimacy and sense of belonging must exist in the community (Berkman, 1995).

In considering the importance of social support to enhance health outcomes including maternal health, community engagements play an important role in enhancing maternal health. In critical times, as in during childbirth which has no fixed date, birth preparedness and community support will be beneficial in accessing adequate care. This research finds that women often face difficulties in obtaining sufficient resources such as money or transportation which can lead to delays or avoidance of using medical treatment. The involvement of the community in maternal healthcare can reduce maternal mortality because it can help the women obtain appropriate care. In addition, this research also reveals that lack of knowledge and negative perception on health systems or medical treatment triggers some barriers in access to health facilities. Community engagements can reduce this adverse impact by promoting and

sharing information or experiences to improve people's motivation in accessing a health facility.

Being aware of the importance of community engagement to enhance maternal health, the Indonesian Government introduced the "*desa siaga*" (village alert) program, defined as "a village that has the resources, capability and readiness to overcome health problems and to become a "healthy village" (Sundari, 2007). One objective of the "desa siaga" program is to increase the community's comprehension of "the responsibility for awareness of the risks of pregnancy and childbirth, and supporting registered pregnant mothers with funding and transportation for emergency obstetric assistance, and identified blood donors" (Hill et al., 2014). However, there are some obstacles in implementing of the program. For example, in the research areas, a village midwife confessed that it was not easy to get a car to bring the pregnant woman to health facility even though the cars were available in the village. It was so because the car owner was reluctant to rent the car (at a nominal rate) because the car could be used for more lucrative purposes. Therefore, the program on community engagement must be accompanied, or preceded by education and counselling to increase the awareness of the community on the importance of community support for improving maternal health. In addition, the government should provide incentive to the car owner by way of increased rental.

10.2.4 Women's Empowerment

A large body of literature depicts the value of women's empowerment to influence maternal health which can improve usage of maternal health services (Bloom, Wypij & Gupta, 2001; Furuta & Salway, 2006; Hou & Ma, 2013; Kamiya, 2011; Marcie & Anyanwu, 2009; Obermeyer, 1993; Shaikh, Haran & Hatcher, 2008). Women with less liberation tend to have less access to health facility.

A range of different variables are used to illustrate empowerment and involvement in decision making this aspect a key focus in the analysis. Authority in decision making is closely related with the capability to control and access resources which is crucial in overcoming issues of access to prenatal, delivery or post natal care. The decision making process occurs mainly at a household level where the head of the household,

husband or other members determine the women's participation in any decision including her maternal care. Research in Tanzania clearly identifies that the husband and relatives hold the authority for maternal referrals while the women have limited influence (Pembe et al., 2008). This is also the case in Bekasi and Indramayu, especially for those women who live in an extended family.

As previously mentioned, the impact of community support, and an analogy to the head of the household's support can be drawn here, can be a positive effect on women's health. A high quality family relationship influences wellbeing in many ways with indicators such as increased nutritional intake, happiness, communication about sensitive health issues and management of medical care (Allendorf, 2013). Similarly, a key element of this research finds the head of the household's level of education has a considerable effect on maternal mortality. This finding indicates that a better educated head of the household provides more fitting support than a less educated head of the household.

This study also reveals the significance of women's emancipation as determinant of maternal mortality. Therefore, this is one aspect of women's health that must get attention. The government should consider creating a regulation to incorporate gender mainstreaming in health development programs to ensure that women have adequate access and control of resources. To devise the most appropriate regulation a further study should be conducted to understand women's needs. However, the potential negative impacts which may occur with women's increased empowerment must be avoided. To some extent, holding greater authority can reduce the husband's or other family members' support for maternal care (Thapa & Niehof, 2013). Any effort to increase women's empowerment should be hand in hand with the efforts to raise community support for maternal care.

10.2.5 Family Planning

Since reproductive status plays a crucial role in maternal mortality, improvements of maternal health must involve family planning programs as an ongoing concern. Family planning programs can reduce the high risk pregnancy, which in turn minimizes complications. This program is not only beneficial for women's health but

it is valuable in controlling population growth, and hence for economic growth in general.

The emergence of family planning as a vital factor in reducing maternal mortality must regain its priority in the development agenda as, during the era of decentralization, this program has lacked attention. After extensive interventions of the new order era (*orde baru*), family planning has stepped in a new stage during implementation of regional autonomy. In 1999, National Family Planning Coordination Board (NFPCB) was reformed under the Ministry of Women's Empowerment, then two years later has been moved under Ministry of Health (Hull, 2007). As a consequence, the family planning program was decentralized with the authority to provide contraceptive and health services becoming a local government responsibility (Habsjah, 2009).

Studying the impact of decentralization on the family planning program, Habsjah (2009) claims that there is evidence of malpractice and a failure of contraception to halt pregnancies. The present research also documents complaints by contraception users who become pregnant. While the failure may stem from the clients themselves, such as forgetting to take pills regularly, or receiving contraceptive injections past the due date, there is an indication that health personnel also contribute to this condition. The community is not well informed about access to free IUDs or implants, with many women not knowing that the program exists. In addition, there is no counselling on the various contraception methods which can be chosen. The popular choice is injection which is relatively cheap and gives a continuous income to health providers as injections are required every three months. Unfortunately, many women find this schedule difficult and therefore fall pregnant. Dissatisfaction with the failure rate raises concerns in the population and may threaten the sustainability of family planning program.

In the future, the government must strengthen the capacity of NFPCB in order to revitalize the family planning program. This can be achieved by giving greater authority to NFPCB so the central government's commitment to family planning can be implemented at the local government level. Another possible option is by putting

the family planning program on the agenda and under the Ministry of Health where the central government is responsible for implementation, control and evaluation.

10.2.6 Maintain healthy life style

Discussion about maternal health cannot be focused solely on one stage of a woman's life, but should recognize and address women's health problems throughout the life cycle. Winikoff (1988) provides a construction of women's lifecycle which determine the health status. Her framework describes that poor maternal health in pregnancy leads to unhealthy new born baby. Accompanied by the unconducive environment such as lack of resources and inadequate health care the baby would have poor growth and health. If this situation does not change, the female babies would grow as unhealthy girls and give a negative impact including illness during reproduction periods. This is in line with the results of this research which shows women's health status prior to pregnancy is significant in affecting maternal death.

Solar and Irvin (2010) describes life course perspectives which "recognize the importance of time and timing in understanding causal links between exposures and outcomes within an individual life course, across generations, and in population-level diseases trends". Therefore using life course approach for health intervention should include broader aspects of women's lives as current health status is affected by conditions from the past. Evidence from a cohort study in the Netherlands illustrates a scenario where women were exposed to an acute famine during pregnancy which had an indirect impact on the birth weight of the second generation of offspring (Stein & Lumey, 2000). Similarly, Barker as cited in Rich-Edwards (2002) claims that nutritional intake during pregnancy determines the adult health outcomes of offspring.

The life course approach also focuses on a prospective study as future health status can be determined by the current condition. Some studies indicate that women who suffer from pregnancy complications have a greater chance to experience chronic disease (Rich-Edwards, 2002). Women's health status during reproduction can be used as a predictor for acquiring chronic diseases even after the age of childbearing. For example, a study conducted by George Davey, Harding and Rosato (2000)

describes women who give birth to lower birth weight babies have a higher risk of cardiovascular mortality.

Previous research shows how factors in her lifecycle can determine a woman's health. Therefore improving maternal health must consist of interventions which cover all phases of women's lives. Women must have access to adequate resources such as nutrient and health services before the start of gestation. A standard of living to maintain healthy life style must be available for all women. It can be accomplished if there is no inequality across population.

10.3 Conclusion and Future Research

Health provision is an important determinant which influences maternal health inequality. Its significance is obvious at macro level analysis. The availability of health facility appears as a crucial factor to support maternal health status. Similarly, the quality of health services which is indicated by the accessibility and capability of health personnel especially GP incorporated with the availability of standard infrastructure also emerges as an important aspect to affect the maternal health status in Bekasi and Indramayu. In contrast, maternal health care does not appear as a significant factor to affect maternal survival. This anomaly can be explained by people's health seeking behaviour and health personnel's adjudication during maternal care leading to delays in getting adequate treatment for pregnant women who accessed health services.

Economic condition appears as another determinant of maternal health inequality in this study. Some regional conditions such as poverty level and urbanization are meaningful to explain the regional inequality in maternal health status. Economic status of household is also a determinant of maternal health. It is showed from the incident of maternal deaths which are clustered in the lower economic status of household. This finding is consistent with the information from focus group discussion which reveals that financial aspect is one main consideration to utilize modern health care.

This study also depicts the importance of education to determine maternal health inequality. Education can be said as one powerful determinant because this factor is

consistently significant to influence maternal health at districts level, household level or case-control study analysis. To have a higher educational level present a positive impact for improving maternal health.

The other finding of this study is that the women's characteristics such as women's empowerment, parity and health status prior and during giving birth determine the incident of maternal deaths. This finding implies that improving maternal health must focus on enhancing women's wellbeing including their health status, educational level and right to involve in decision making.

Based on the findings of this research, it is recommended that

1. The government should put attention on the distribution of GP, especially in rural and remote areas. This program should be incorporated with the improvement of capability of village midwife that is already available in almost all villages.
2. Technical skills of health personnel must be accompanied by the communication skills which can improve the interpersonal relation between patient and health personnel which can also reduce the social distance between them. It would also encourage the utilisation of healthcare.
3. The quality of antenatal care should be improved to screen and recognize any potential complications in the beginning of pregnancy. Urine test (protein urea) and STI test which are important to detect some complications are rarely conducted in antenatal care in the research areas.
4. The procedure to access free health care such as *jamkesmas* and *jampersal* must be made as simple as possible which can encourage the eligible patients to access the available free health service.
5. The implementation of "*suami siaga*" must be accompanied by the improvement women's empowerment. This study indicates that husband or family have significant impact on maternal care even in situations which show a low level of women's empowerment. The incorporation of those aspects can boast the women health status.
6. The implementation of "*desa siaga*" program can be optimized by providing more incentives to members of the community who contribute in ensuring that the women get adequate care and timely transportation to a health

facility. Such incentives might include the provision of prevailing rents to car owners who lend their cars to transport the pregnant women to a health facility.

7. Incorporate the family planning in maternal health care program with the emphasis in providing more variety of contraceptives and educating the users to have sufficient information on how to use each method properly. This is important because many pregnant women reported that they were using a contraceptive, yet they became pregnant. Further, they realised they were pregnant only after four or five months of the onset of pregnancy. Failure to recognise a pregnancy and getting proper antenatal care from the beginning can lead to harmful impact on maternal health.

These recommendations are meant to improve both sides of the coin – the maternal healthcare users and the maternal healthcare providers through education and counselling with a common platform of improved infrastructure and simplified administrative procedures. These would lead not only to improvements in maternal health and maternal survival but also in reducing the inequalities in maternal health.

There are some limitations in this study such as:

1. An issue on the validity and reliability of data for which the sources are proxy respondents like husband or head household of the deceased women.
2. The design of case control study which is not based on cause-specific of maternal death in pairing case and control. This condition may influence the insignificance of health care variables to determine maternal death.
3. The focus of analysis in the two districts does not enable us to conduct multilevel analysis which is useful to assess the direct and indirect impact as well as the gross and net effects of the many variables.

Considering the limitation of study, there are some suggestions for future research.

1. The data improvement can be done by involving health personnel who assist the delivery of deceased women as proxy respondent or by using open ended questionnaire asking about the women's circumstances which is similar to verbal social autopsy.
2. To conduct the case control study which pair the deceased and surviving women who have the same complication during giving birth.

3. To include all districts in comparison so the multilevel analysis can be conducted. In this sense the number of cases will be also larger to enable multilevel analysis

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APPENDIX

Appendix 1 Adjustment of Mortality Data

General Growth Balance (GGB) is generated from balancing equation (Bhat, 2002; Hill, Barker & Vos, 2007; Hill et al., 2009; Hill, Stanton & Gupta, 2001). The natural rate of growth rate of a population aged a and over, $r_{a+,}$is given by:

$$r_{a+} = b_{a+} - d_{a+} \quad (1)$$

where, b_{a+}, r_{a+} and d_{a+} are calculated as follows (Hill, Barker & Vos, 2007):

$$b_{a+} = (({}_5N1_{a-5} \times {}_5N2_a)\text{^}0{,}5) / 5*\sum(({}_5N1_a \times {}_5N2_a)\text{^}0{,}5) \quad (2)$$

$$r_{a+} = r^0_{a+} + ((1/t) \times \ln (k_1/k_2)) \quad (3)$$

$$d_{a+} = (((k_1 x k_2)/c)\text{^}0{,}5) \times (\sum{}_5D_a / (5 \times \sum({}_5N1_a \times {}_5N2_a)\text{^}0{,}5) \quad (4)$$

N1 and N2 represent person years of life from the first and second censuses respectively. The growth rate between two censuses for a population aged a and over is calculated as r^0_{a+}. The notations k1, k_2 and c are constant values. By using equations (2), (3) and (4), the completeness of mortality data can be assessed through a fitted line between b_{a+}, r^0_{a+} and d_{a+}. The intercept of the fitted line is represented by $((1/t) \times \ln (k_1/k_2))$ which indicates the change of coverage between the two censuses. The slope represents the completeness of recorded data.

This equation represents a linear relationship between birth rate and death rate with growth rate as the intercept. Therefore, the slope of the fitted line between b_{a+} and d_{a+} illustrates the completeness mortality data. However, this approach might provide inaccurate estimates of incompleteness of recorded data because mortality and fertility are not constant in the population (Hill, Stanton & Gupta, 2001). This shortcoming can be avoided by using data from consecutive censuses.

The Synthetic Extinct Generation (SEG) method to evaluate data on deaths is developed from the method developed by Preston and his colleagues which estimates age distribution of the population through the age distribution of deaths (Bennett &

Horiuchi, 1981). The logical basis of this method is that the population at age a ($N_{(a)}$) can be calculated from the summation of population death at age a+ weighted by the exponential of summed age-specific growth rate (Bennett & Horiuchi, 1981; Hill, You & Choi, 2009). This expression can be seen in the equation (5). D*(x) represents the true number of mortality. If a constant value, k, indicates the completeness of reported mortality data (D(x)), then $\widehat{N_{(a)}}$ is calculated by formula (6). N(a) represents the observed population, while $\widehat{N_{(a)}}$ is the estimated population based on the reported mortality data. The mortality data completeness, k, can be estimated by formula (7).

$$N_{(a)} = \int_a^{\infty} D^*(x) \exp[\int_a^x r(u)du]\, dx \quad (5)$$

$$\widehat{N_a} = \int_a^{\infty} D(x) \exp[\int_a^x r(u)du]\, dx \quad (6)$$

$$k = \widehat{N_a}/N_a \quad (7)$$

Appendix 2 Application of P/F Ratio Method (UN Manual X Version) for Inter-survey Interval of About 10 Years

Age Group x,x+4	30/06/2000				15/05/2010				Parity Change	Synthetic Cohort Parity	Age-Specific Fertility Rates	Cumulated Fertility to Age x	Parity Equivalent F	Ratio P/F
	Number of Women	Children Ever Born Alive	Children Born in last year	Average Parity P	Number of Women	Children Ever Born Alive	Children Born in last year	Average Parity P						
15-19	1,815,782	72,588	0	0.040	1884478	101574	39945	0.054	0.054	0.054	0.0212	0.000	0.033	1.636
20-24	1,849,202	1,230,555	0	0.665	1786560	915996	177532	0.513	0.513	0.513	0.0994	0.106	0.398	1.289
25-29	1,715,795	2,453,687	0	1.430	1940773	2301719	223687	1.186	1.146	1.200	0.1153	0.603	0.955	1.256
30-34	1,435,469	3,281,827	0	2.286	1808273	3469911	177807	1.919	1.253	1.766	0.0983	1.179	1.488	1.187
35-39	1,279,978	3,931,950	0	3.072	1677663	4184944	107338	2.495	1.064	2.264	0.0640	1.671	1.878	1.206
40-44	1,025,156	3,751,008	0	3.659	1448269	4259677	35524	2.941	0.655	2.421	0.0245	1.991	2.071	1.169
45-49	765,852	3,104,686	0	4.054	1211306	3955190	7831	3.265	0.193	2.458	0.0065	2.113	2.135	1.151
Total	**9887234**	**17826301**	**0**		**11757322**	**19189011**	**769664**				**2.145640552**			**1.221**

1.221 = (1.289+ 1.256 + 1.187 + 1.206 + 1.169)/5

FINAL APPROVAL NOTICE

Project No.:	**5854**
Project Title:	Inequalities in maternal health in West Java, Indonesia
Principal Researcher:	Mr Teguh Sugiyarto
Email:	tegu0001@flinders.edu.au
Address:	School of Environment 1 Brookside Road Darlington SA 5047
Approval Date:	20 November 2012
Ethics Approval Expiry Date:	**30 June 2015**

The above proposed project has been **approved** on the basis of the information contained in the application, its attachments and the information subsequently provided.

RESPONSIBILITIES OF RESEARCHERS AND SUPERVISORS

1. Participant Documentation

Please note that it is the responsibility of researchers and supervisors, in the case of student projects, to ensure that:

- all participant documents are checked for spelling, grammatical, numbering and formatting errors. The Committee does not accept any responsibility for the above mentioned errors.
- the Flinders University logo is included on all participant documentation (e.g., letters of Introduction, information Sheets, consent forms, debriefing information and questionnaires – with the exception of purchased research tools) and the current Flinders University letterhead is included in the header of all letters of introduction. The Flinders University international logo/letterhead should be used and documentation should contain international dialling codes for all telephone and fax numbers listed for all research to be conducted overseas.
- the SBREC contact details, listed below, are included in the footer of all letters of introduction and information sheets.

This research project has been approved by the Flinders University Social and Behavioural Research Ethics Committee (Project Number 'INSERT PROJECT No. here following approval'). For more information regarding ethical approval of the project the Executive Officer of the Committee can be contacted by telephone on 8201 3116, by fax on 8201 2035 or by email human.researchethics@flinders.edu.au.

2. Annual Progress / Final Reports

In order to comply with the monitoring requirements of the *National Statement on Ethical Conduct in Human Research (March 2007)* an annual progress report must be submitted each year on the **20 November** (approval anniversary date) for the duration of the ethics approval using the annual progress / final report pro forma. *Please retain this notice for reference when completing annual progress or final reports.*

If the project is completed *before* ethics approval has expired please ensure a final report is submitted immediately. If ethics approval for your project expires please submit either (1) a final report; or (2) an extension of time request and an annual report.

Your first report is due on **20 November 2013** or on completion of the project, whichever is the earliest.

3. Modifications to Project

Modifications to the project must not proceed until approval has been obtained from the Ethics Committee. Such matters include:

- proposed changes to the research protocol;
- proposed changes to participant recruitment methods;
- amendments to participant documentation and/or research tools;
- extension of ethics approval expiry date; and
- changes to the research team (addition, removals, supervisor changes).

To notify the Committee of any proposed modifications to the project please submit a Modification Request Form to the Executive Officer. Please note that extension of time requests should be submitted prior to the Ethics Approval Expiry Date listed on this notice.

Change of Contact Details

Please ensure that you notify the Committee if either your mailing or email address changes to ensure that correspondence relating to this project can be sent to you. A modification request is not required to change your contact details.

4. Adverse Events and/or Complaints

Researchers should advise the Executive Officer of the Ethics Committee on 08 8201-3116 or human.researchethics@flinders.edu.au immediately if:

- any complaints regarding the research are received;
- a serious or unexpected adverse event occurs that effects participants;
- an unforseen event occurs that may affect the ethical acceptability of the project.

KEMENTERIAN DALAM NEGERI
REPUBLIK INDONESIA

REKOMENDASI PENELITIAN
NOMOR 070/ 3482.DI

a. Dasar : 1. Peraturan Menteri Dalam Negeri Nomor 41 Tahun 2010 tentang Organisasi dan Tata Kerja Kementerian Dalam Negeri (Berita Negara Republik Indonesia Tahun 2010 Nomor 316), sebagaimana telah diubah dengan Peraturan Menteri Dalam Negeri Nomor 14 Tahun 2011 tentang Perubahan Atas Peraturan Menteri Dalam Negeri Nomor 41 Tahun 2010 tentang Organisasi dan Tata Kerja Kementerian Dalam Negeri (Berita Negara Republik Indonesia Tahun 2011 Nomor 168);

2. Peraturan Menteri Dalam Negeri Nomor 64 Tahun 2011 tentang Pedoman Penerbitan Rekomendasi Penelitian.

b. Menimbang : Surat Mahasiswa S3 School of the Environment Flinders University of SA Tanggal 3 Oktober 2012 Perihal Permohonan Ijin Penelitian.

MENTERI DALAM NEGERI, memberikan rekomendasi kepada:

a. Nama/Obyek : Teguh Sugiyarto, dkk.

b. Jabatan/Tempat/ Identitas : Mahasiswa / Jl. Salak 1 No. 410 Padang Sumatera Barat / No. KTP 1371091704770009, Telp. 021-82012429, 415691923 ;

c. Untuk :
1) Melakukan penelitian, dengan proposal berjudul Disparitas Dalam Kesehatan Ibu ;
2) Lokasi penelitian: Provinsi Jawa Barat (1 provinsi) ;
3) Waktu/Lama penelitian: November 2012 s.d. Mei 2013 (5 bulan) ;
4) Anggota tim peneliti: -

Demikian rekomendasi ini dibuat untuk digunakan seperlunya.

Jakarta, 15 Oktober 2012
a.n. MENTERI DALAM NEGERI
DIREKTUR JENDERAL
KESATUAN BANGSA DAN POLITIK

A. TANRIBALI L.

PEMERINTAH PROVINSI JAWA BARAT
BADAN KESATUAN BANGSA, POLITIK
DAN PERLINDUNGAN MASYARAKAT DAERAH
Jalan Supratman No. 44 Telp. 720674 – 7106286
B A N D U N G
Kode Pos 40121

SURAT KETERANGAN

Nomor : 070/1430/MHS/PPJ/HAL

1. Yang bertanda tangan di bawah ini :

   Kepala Badan Kesatuan Bangsa, Politik dan Perlindungan Masyarakat Daerah Provinsi Jawa Barat.

   Berdasarkan surat dari : Direktur Jendral Kesatuan Bangsa dan Politik Nomor : 070/3482.DI
   Tanggal 15 Oktober 2012 :

   Menerangkan bahwa :

a.	N a m a	:	**TEGUH SUGIYARTO**
b.	HP/TLP.	:	Tg-surg@yahoo.com
c.	Tempat/tgl lahir	:	Salatiga, 17 April 1977
d.	Agama	:	Islam
e.	Pekerjaan	:	PNS
f.	Alamat	:	Jl.Salk I No. 410 Perum Belimbing Permai Kel. Kuranji Kec. Kuranji Padang
g.	Peserta	:	-
h.	Maksud	:	Penelitian
i.	Untuk Keperluan	:	Penelitian dengan judul "Disparistas Dalam Kesehatan Ibu di Provinsi Jawa Barat"
j.	Lokasi	:	Kabupaten Bekasi dab Kabupaten Indramayu
k	Lembaga/Instansi Yang Dituju	:	Badan/Kantor Kesbangpo, Linmas Kabupaten Bekasi dan Kabupaten Indramayu.

2. Sehubungan dengan maksud tersebut, diharapkan agar pihak yang terkait dapat memberikan bantuan/ fasilitas yang diperlukan
3. Demikian Surat Keterangan ini dibuat untuk dipergunakan sebagaimana mestinya, dan berlaku sampai dengan Tanggal 30 Maret **2013.**

Bandung, 27 Desember 2012

a.n. KEPALA BADAN KESATUAN BANGSA, POLITIK
DAN PERLINDUNGAN MASYARAKAT DAERAH
PROVINSI JAWA BARAT
Kepala Bidang Hubungan Antar Lembaga

PEMERINTAH PROVINSI JAWA BARAT
BADAN KESBANGPOLINMAS

H. MOERJONO, SH.
NIP.19610126 199103 1003

PEMERINTAH KABUPATEN BEKASI
KANTOR KESATUAN BANGSA DAN POLITIK

Komplek Perkantoran Pemda Kabupaten Bekasi
Desa Sukamahi Kecamatan Cikarang Pusat
Telp. 021-89970065, 021-89970129 Fax. 021 89970064
B E K A S I

Cikarang Pusat, 28 Februari 2013

Nomor : 070/178 /Kesbangpol/2013
Sifat : Biasa
Lampiran : -
Perihal : **Mohon Izin Penelitian**

Kepada
Yth. **1. KEPALA DINAS KESEHATAN KAB. BEKASI**
2. CAMAT SE-KABUPATEN BEKASI
DI-
B E K A S I

Dengan hormat,

Menindaklanjuti surat Keterangan dari Kepala Badan Kesatuan Bangsa, Politik dan Perlindungan Masyarakat Daerah Provinsi Jawa Barat Nomor: 070/1430/MHS/PPJ/HAL tanggal 27 Desember 2012 dan surat dari Direktur Jenderal Kesatuan Bangsa dan Politik Nomor: 070/3482.DI tanggal 15 Oktober 2012 perihal Surat Keterangan Rekomendasi Penelitian, dengan ini menerangkan bahwa :

N a m a	:	**TEGUH SUGIYARTO**
Tempat/ tgl Lahir	:	Salatiga, 17 April 1977
No. KTP	:	1371091704770009
Agama	:	Islam
Pekerjaan	:	PNS
Jurusan/ Program Studi	:	Population Studies/ Doktor (S-3)
Fakultas	:	Geografi
Perguruan Tinggi	:	School of the Environment Flinders University of SA
Alamat Rumah	:	Jl. Salak I No. 410 Perum Belimbing Permai Kel. Kuranji Kec. Kuranji Padang. Telp. 085352990959

Bermaksud akan mengadakan Kegiatan Penelitian ke Dinas/Instansi yang Bapak/Ibu pimpin dalam rangka pengumpulan data dan keterangan guna penyusunan Disertasi Strata 3 (S-3) dengan judul penelitian **"DISPARISTAS DALAM KESEHATAN IBU DI PROVINSI JAWA BARAT".** yang akan dilaksanakan dari tanggal **01 Maret s/d 31 Mei 2013.**

Memperhatikan maksud dan tujuan, apabila situasi dan kondisi memungkinkan mohon kiranya yang bersangkutan untuk dapat diberikan kemudahan dalam pelaksanaan kegiatan dimaksud.

Demikian agar maklum atas kerjasamanya kami haturkan terimakasih.

KEPALA KANTOR KESATUAN BANGSA DAN POLITIK
KABUPATEN BEKASI

KANTOR KESATUAN BANGSA DAN POLITIK

Drs. H. BENI SAPUTRA
Pembina
NIP. 19759720 199503 1 002

Tembusan : disampaikan kepada :
1. Yth. Bupati Bekasi (sebagai laporan);
2. Yth. Kepala Badan Kesbangpol dan Linmasda Provinsi Jawa Barat;
3. Yth. Direktur Jenderal Kesatuan Bangsa dan Politik;
4. Yth. School of the Environment Flinders University of SA;
5. Yth. Yang bersangkutan.

PEMERINTAH KABUPATEN INDRAMAYU
BADAN KESATUAN BANGSA, POLITIK DAN PERLINDUNGAN MASYARAKAT
Jl. Jend. Sudirman No. 9 Telp. (0234) 272876
INDRAMAYU

Indramayu, 27 Nopember 2012

Nomor : 070 / 503 – Bakesbanglinmas.
Lampiran : -
Perihal : Rekomendasi Survey/Penelitian

Kepada
Yth. 1. Ka. Dinas Kesehatan Kab. Indramayu
2. Ka. BPS Kab. Indramayu
3. Camat se Kab. Indramayu
Di –
INDRAMAYU

Memperhatikan Surat Kepala Badan Kesatuan Bangsa, Politik dan Perlindungan Masyarakat Daerah Provinsi Jawa Barat Nomor 070/1340/MHS/HAL Tanggal 19 Nopember 2012 Perihal Penelitian.

Dengan ini kami beritahukan bahwa :

Nama	:	**TEGUH SUGIYARTO**
Alamat	:	Jl. Salk I No.410 Perum Belimbing Kuranji Permai Kel. Kuranji Kecamatan Kuranji Padang
Pekerjaan	:	PNS
Maksud	:	Penelitian/Survey untuk penyusunan Tesis
Waktu	:	Tanggal 19 Nopember 2012 s/d 19 Mei 2013
Judul Penelitian	:	Disparitas Dalam Kesehatan Ibu di Provinsi Jawa Barat.

Sesuai dengan Peraturan Menteri Dalam Negeri Republik Indonesia Nomor 64 Tahun 2011 tentang Pedoman Penerbitan Rekomendasi Penelitian. Kami Lanjutkan kepada saudara dan apabila situasi / kondisi memungkinkan Kami tidak keberatan untuk dilaksanakan.

A.n KEPALA BADAN KESATUAN BANGSA, POLITIK
DAN PERLINDUNGAN MASYARAKAT
KABUPATEN INDRAMAYU
Kasubid. Hubungan Antar Lembaga,

BADAN KESBANG POL & LINMAS

FERI BUDIYANTO, S.Sos
Penata
NIP. 19650116 199302 1 001

Tembusan disampaikan Kepada Yth :
1. Bupati Indramayu (sebagai laporan);
2. Kepala Badan Kesbangpol dan Linmasda Prov. Jabar;
3. Flinders University Australia.

Appendix 4 Questionnaire of Health Facility Survey

BLOK I: IDENTITY

1. District : ……..
2. Sub-District : ……..
3. Name of health Facility : ……..
4. Address of health facility : ……..
5. Name of interviewees
   a. …… c. ……..
   b. …… d. ……..
6. Date of enumeration : ……

BLOK II BASIC INFRASTUCTURE OF THE HEALTH FACILITY

1.	Is electricity continuously available?	Y	N
2.	Is there a back-up power supply?	Y	N
3.	Is running water continuously available?	Y	N
4.	Is the obstetrical outpatient separate from the general outpatient department?	Y	N
	IF HOSPITAL OR PUSKESMAS PERAWATAN CONTINUE, ELSE GO TO BLOK III		
5.	Does the health facility have a separate outpatient department?	Y	N
6.	Does the health facility have a separate emergency department?	Y	N
7.	Does the health facility have a ward for admitting obstetrics patient?	Y	N
8.	Does the health facility have a theatre to perform caesarean section?	Y	N

BLOK III STAFFING

1. Obgyn : ……..
2. Doctors : ……..
3. Medical assistants or Resident : ……..
4. Midwife : ……
5. Nurses : ……..
6. Auxiliary staff: ……..

BLOK IV DRUG AVAILAIBILITY (put the check for available drug)

1.	General anesthetics & Oxygen	9.	Antibacterial
2.	Local anesthetics	10.	Anti tuberculosis
3.	Preoperative medications & sedation for short term procedures	11.	Anti-pneumocystis& anti toxoplasmosis
4.	Analgesics, non steroidal, antipyretics, anti-inflammatory drugs	12.	Medicine affecting the blood
5.	Anti allergies	13.	Antifungal
6.	Antidotes	14.	Antiviral
7.	Anticonvulsants and antiepileptic	15.	Antiretroviral
8.	Anti-infective medicines	16.	Anti malarial

1.	Blood products & plasma substances	24.	Immunological
2.	Cardiovascular medicines	25.	Vaccines
3.	Dermatological medicines	26.	Muscle relaxants
4.	Disinfectants & antiseptics	27.	Ophthalmological preparations
5.	Oral rehydration	28.	Oxytocics and anti oxytocics
6.	Medicine for diarrhea	29.	Electrolyte
7.	Insulin/ant diabetic agents	30.	Vitamins and minerals

BLOK V EQUIPMENT AND SUPPLY (put the check for available equipment)

1.	Adequate lighting	18.	Sterile gloves
2.	Refrigerator with thermometer	19.	Sterile gauze
3.	Wall thermometer	20.	Feotal stethoscope
4.	Wall clock	21.	Sphygmomanometer
5.	Heat source	22.	Infusion sets
6.	Towel	23	Infusion pump/dosimeter
7.	Heating lamp	24	catheters
8.	Oxygen sources	25	Syringes
9.	Flow meter for oxygen	26	Needles
10.	Nasal prong, catheters and mask	27	Suturing sets (scissors/needles holder)
11.	Self inflating bags for respiratory	28	Suturing materials
12.	Bags and masks	29	Balance for baby
13.	Incubator	30	Cord cutting
14.	Normal thermometer	31	Vacuum extractor
15.	Thermometer below 35 c	32	Forceps
16.	Phototherapy lamp	33	Beds (functional/regular/delivery bed)
17.	Sterilizer	34	Ultrasound machine

BLOK VI CASE MANAGEMENT PROCEDURE

Status : Doctor/Nurse/midwife **Age : …….** **Sex : …….**
Experiences : ……. Years **Training in maternal care : Yes/No**

Enumerator asks the respondents to describe and explain their procedure to conduct prenatal care, normal labour and manage maternal complications. Please give a check in the related item based on respondent's information.

PRENATAL CARE

Status & foetal growth		Check blood pressure	
Foetal hearth tone		Urin test (proteinuria)	
movement/presentation/size foetal		Check anemia	
Fundal height		Check sexual transmitted infection (STI)	
Weight gain		Mental health (stess/depression)	
Estimate date birth		Identify diabetes/hearth problem	

Check urinary track infection	☐	Dangerous substance counselling	☐
Vaccine tetanous toxoid	☐	Danger sign of complication counselling	☐
Provide iron	☐	Nutrition intake counselling	☐
Provide folate	☐	Psychology counselling	☐
Birth preparation counselling	☐	Activity counselling	☐

NORMAL LABOUR AND VAGINAL DELIVERY

- Women's privacy is respected ☐
- Staff washing their hand before assisting with delivery ☐
- Staff using sterile gloves and instruments ☐
- Family members are allowed to remain with the women constantly during labor ☐
- There is at least one professional staff during labour and birth ☐
- Partogram is properly used and recorded ☐
- Women receive support:
  - Explaining Labour progress verbally ☐
  - Encouraging and helping into comfortable position ☐
  - Offering oral fluid and light food ☐
  - Helping with relaxation technique ☐
  - Explaining breathing technique ☐
- Labour care in the first stage
  - Enema is not perform routinely ☐
  - Vagina is not swabbed with antiseptic during labour ☐
  - Women are free to walk and choose position ☐
- Labour care in the second stage
  - Foetal heart rate is controlled adequately ☐
  - Women are not routinely forced to push during delivery ☐
  - Duration 2nd stage is not limited unless foetal distress ☐
  - No pressure on abdomen ☐
  - Episiotomy is not performed only if foetal distress/operative delivery ☐
  - Anaesthesia is given for episiotomy ☐
- Labour care in the third stage
  - Active management is performed unless women choice is different ☐
  - Women is informed about the risk and benefit ☐
- Care after delivery
  - Minor tears are not stitched if not bleeding ☐
  - Disinfectant is not put on the perineum ☐
  - Ice is not placed on the mother abdomen ☐
  - Bladder catheterisation is not routinely performed ☐
  - Cervix is not routinely checked ☐

MANAGEMENT FOR MATERNAL COMPLICATION

Bleeding during pregnancy/delivery

Identification

- Vaginal bleeding/retain in the uterus ☐
- Severe abdominal pain ☐

General management

- Commence IV fluid immediately ☐
- Empty uterus/deliver fetus ☐
- Remove placenta/retain product of conception ☐
- Give oxytocics ☐
- Bimanual compression of uterus ☐
- Compression of the aorta ☐
- Repair genital tract injury ☐
- Laparotomy with repair of rupture uterus ☐

Bleeding after delivery

Identification

- Pads/cloth soaked in less than 5 minutes ☐
- Constant trickling of blood ☐
- Bleeding more than 500 ml ☐

General Management

- Massage uterus till hard and give oxytocin 10 unit IM ☐
- Give IV fluid with 20 unit oxytocin at 60 drops/minutes ☐
- Empty bladder/use catheter if necessary ☐
- Check and record blood pressure per 15 minutes ☐
- Diagnosis the cause of bleeding and give the treatments ☐

Pre-eclampsia

Identification

- Blood pressure more than 140/90 ☐
- Proteinuria 20+ or more ☐
- Headache, Blurred vision ☐
- Upper abdominal pain ☐
- Hyperreflexia , jittery ☐
- Breathlessness ☐
- Reduced urine output (less than 24 ml/hour) ☐

General Management

- Treat hypetension by giving antihypertensive ☐
- Delivery the fetus and placenta if the hypertensive is managed ☐
- Consider MgSO4 ☐

Eclampsia

Identification

- High blood pressure ☐
- Convulsion like epilepsy ☐

General Management

- Do not lease women on her own ☐
- Place women into the left lateral position ☐
- Maintain airway at all the times ☐
- Insert IV cannula and give fluid slowly ☐
- Start MgSO4 ☐

Sepsis/postpartum sepsis

Identification

- Fever Temperature > 38 ☐
- Warn Extremities ☐
- Fast Breathing, confused, restless ☐
- Increased heart rate; mother and fetus ☐
- Low blood pressure ☐
- Septic shock ☐

General Management

- Start IV fluid ☐
- If women conscious increase fluid intake ☐
- Use fan/tepid sponging to reduce temperature ☐
- Give antibiotic if shock is suspected ☐
- Identify the cause and treat it ☐

BLOK VII EMERGENCY CAESAREAN SECTION&EMERGENCY OBSTETRIC CARE

For Health Facility provide caesarean services and emergency department

Emergency caesarean section

- Anesthesiologist is immediately available ☐
- Surgeon is immediately available ☐
- Operating theatre staff and equipment is immediately available ☐
- Emergency CS can be perform in less than 15/30 minutes ☐
- Laboratory and blood test result is immediately available ☐
- Blood for transfusion is immediately available ☐
- A protocol for emergency CS stating is available ☐

Emergency Obstetric care

- Women are assessed (triaged) immediately on arrival ☐
- A qualified staff is designated to carry out triage ☐
- A health professional is immediately available for an emergency condition ☐
- A clear protocol for identifying patient by severity condition ☐
- Essential drug, blood and lab test equipment are available ☐

BLOK VIII NOTES

Appendix 5 Questionnaire of Household Survey (Surviving Women)

BLOK I IDENTITY

1. District : .....
2. Sub district :.....
3. Village :.....
4. Block census :.....
5. Physical building :.....
6. Census building :.....
7. Home address :.....
8. Name of respondent :.....

BLOK II HOUSEHOLD MEMBER

NO	Name	Relation-ship with head of household	Sex	age	Age more than 10 years			
					Finished educa-tion	Activity	Work-ing status	Employ-ment sector
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

- Code for column 3 : 1 head of household 2 husband/wife
  3 Son/daughter 4 relatives 5 others
- **Code for column 4 : 1 Male 2 Female**
- Code for column 6 : 1 Elementary school 2 junior high school
  3 Senior high school 4 diploma/university
- **Code for column 7 : 1 employed 2 unemployed**
- Code for column 8 : 1 self-employed
  2 Employer with permanent worker
  3 Employer with non-permanent worker
  4 Employees
  5 Unpaid worker/ family worker
- **Code for column 9 : 1 Agriculture 2 manufacture 3 services**

BLOK III IDENTIFICATION OF SURVIVING WOMEN

I. Match the name of survived women in the sampling frame with the household member. If the survived women still in the list then go to Blok IV

II. If the survived women is not in the list of household member ask:

a. Is there any woman who gives births during January 2009 and May 2010? Y N

If Yes continue, If No go to step III

a. Who is the name? (Match with the sample)
If match continue if not match stop

b. Do you know much about her? Y N
If Yes go to BLOK IV, If No Stop.

II. Do you know about (mention the survived women)? Y N
If No Stop, If Yes continue

a. Did she live in this household during 2009-2010? Y N
If Yes continue, If No Stop

b. Did she give birth during 2009-2010? Y N
If yes continue, if No stop

c. Do you know much about her pregnancy and delivery? Y N
If Yes go to BLOK IV, If No Stop.

BLOK IV REPRODUCTIVE STATUS OF SURVIVING WOMEN

1. What is your the marital status?
   a. Married b. Widow c. Divorced ☐
2. When is the first marriage?
   Date: …… Age ☐☐
3. Do you have any sons and daughter to whom you have given birth who are now living with you? Yes No **(go to question 5)**
4. If yes How many?
   Son ☐☐ Daughter ☐☐
5. Do you have any sons and daughter to whom you have given birth but do not live with you?
   Yes No **(go to question 7)**
6. If yes How many?
   Son ☐☐ Daughter ☐☐
7. Have you ever given birth to a boy or girl who was born alive but later died?
   Yes No **(go to question 9)**
8. If yes How many?
   Son ☐☐ Daughter ☐☐
9. Now, I would record all birth that you had. It will be stated from the first delivery to the latest.

No	Name	Sex	Birth day	Is (name) Still alive?	**If alive** How old is (name)	**If Alive** Is (name) live with you now?	**If dead** How old was (name) when she/he died?
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

BLOK V HEALTH STATUS OF SURVIVING WOMEN

1. Do you have any health problem before pregnancy? Y N
2. If Yes, Can you mention what is the health problem?
   a. Hypertensive disease
   b. Anaemia
   c. Heart disease
   d. Asthma
   e. Diabetes mellitus
   f. Others, ……..
3. Do you have any pregnancy complications? Y N
4. If Yes, Can you mention what is it?
   a. Bleeding
   b. Labor before 9 months
   c. High Fever
   d. Other .....
5. Do you have complication during delivery? Y N
6. If yes, Can you mention what is it?
   a. Vaginal bleeding
   b. Fever
   c. Convulsion
   d. Water broke more than 6 hours before birth
   e. Others, ……..
7. Comparing between pregnancy and before pregnancy period, how do you rate your food intake during pregnancy?
   a. Significantly better in term quantity and quality
   b. The same or Similar or not much different
   c. Significantly worse in term quantity and quality
8. Do you have any prohibitions to take some kind of food during pregnancy? Y N
9. If yes, can you mention it? .....
10. Do you take any food supplement during pregnancy? Y N
11. If yes, can you mention it?
    a. Folic acid
    b. Calcium
    c. Iron tablet
    d. Other, ……..

BLOK VI HEALTH SEEKING BEHAVIOUR OF SURVIVING WOMEN

1. ANTENATAL CARE

1.1. During pregnancy do you check you health condition to health personnel? Y N

1.2. If No, what is the reason? (can more than one reasons)
   a. Do not know where to go
   b. Do not know if it is importance
   c. Cannot afford the cost
   d. The distance is too far
   e. There is no transportation
   f. prefer to use TBA
   g. else, ……

1.3. If yes, to whom you go most frequently?
   a. General practitioner/Obgyn
   b. Midwife
   c. Nurse or the other paramedic

1.4. Where do you go for medical check during pregnancy?
   a. Name: .....I..... address: .....
   b. Name: .....II..... address: .....
   c. Name: .....III..... address: .....

1.5. Transportation to health facility:

	I	II	III
a. Distance	…….	…….	…….
b. Transportation tools	…….	…….	…….
c. Time to travel	…….	…….	…….
d. Estimated cost	…….	…….	…….

1.6. When is the first medical check during pregnancy? ..... month of pregnancy

1.7. How many did you do medical check during pregnancy?

a. First trimester : .....
b. Second trimester : .....
c. Third trimester : .....

1.8. What is the treatment that you got during antenatal care:

a. Status & foetal growth
b. Check anemia
c. Foetal hearth tone
d. Check sexual transmitted infection (STI)
e. movement/presentation/size foetal
f. Mental health (stess/depression)
g. Fundal height
h. Identify diabetes/hearth problem)
i. Weight gain
j. Check urinary track infection
k. Estimate date birth
l. Vaccine tetanous toxoid
m. Check blood pressure
n. Provide iron
o. Urin test (proteinuria)
p. Provide folate

1.9. Do you receive some advices during antenatal care:

a. Labor preparation
b. Cessation of harmful substances
c. Exercises/activity
d. Nutrition/ healthy diet
e. Physiologic changes
f. Danger signs of complication

1.10. Have you discussed with husband/family about:

a. Prepare cost for delivery
c. Decide delivery assistance
b. Decide place of delivery
d. Prepare transportation

1.11. Did your husband accompany you during antenatal care? Y N

1. DELIVERY CARE

2.1 Where did you give birth?

a. health facility
b. Home
c. Others

(If a continue, else go to question 2.3)

2.2. Name of health facility : .....
Address : .....
Distance : .....
Transportation tool : .....
Time to travel : .....
Cost : ..... **go to question 2.5**

2.3 If not in health facility, what is the reason?

a. Distance to health facility
e. Feel safe and comfortable at home
b. Unavailable transportation
f. Doubt with health treatment in health facility
c. Consider the cost
g. Other, ...
d. Family/husband that decided

2.4. Do you know where the nearest health facility to perform delivery?

Name of health facility : .....
Address : .....
Distance : .....
Transportation tool : .....
Time to travel : .....
Cost : .....

2.5 Who assist you during delivery?

a. Doctor/Obgyn b. Midwife
c. Nurse d. Traditional Birth attendance
e. Family/relatives/others **(if the answer d or e go to question 2.8)**

2.6 When you arrived at health facility, do you have some experiences to wait a long time before received adequate treatments because:

a. Long queue to received treatment
b. need to finish administration (paper work)
c. Wait the health personnel
d. The equipment is unavailable
e. The drug is unavailable
f. Need to pay the cost before get the treatment

2.7 If the delivery in health facility, what do you receive this support?

a. Explaining Labour progress verbally
b. Encouraging and helping into comfortable position
c. Offering oral fluid and light food
d. Helping with relaxation technique
e. Explaining breathing technique

2.8 Why you are not assisted by health personnel during delivery?

a. Do not have money to pay
b. The distance of health personnel house
c. Feel more comfortable with TBA
d. Family decision
e. Do not need to be assisted by health personnel
f. TBA is more accessible

BLOK VII HOUSING CONDITION AND ASSET

1. What the material of floor?
   a. Tile/ceramics c. wood/bamboo
   b. Brick/cement d. dirt/others
2. Availability of o toilet
   a. Private toilet with septic Tank c. Public toilet
   b. Private toilet without septic tank d. Others
3. Source of drinking water
   a. Bottled water d. unhygienic well
   b. Piped water e. piped spring water
   c. Hygienic well f. Rain water/river/lake/others

1. Please, check any assets available in the household (at least the value of each item is no less than one million rupiahs or AUD$ 105).

a.	Car/Boat	e.	Gold/Jewellery
b.	Motorcycle	f.	Cattle
c.	Electronic devise	h.	Furniture
d.	Saving money	i.	Land

BLOK VIII DECISION MAKING

Who in your family usually has the final say on the following decisions?

a.	Health treatments for household member	1	2	3	4	5	6
b.	Making large household purchases	1	2	3	4	5	6
c.	Making daily household purchases	1	2	3	4	5	6
d.	Visit families/friends/relatives	1	2	3	4	5	6
e.	Food to be cooked every day	1	2	3	4	5	6

Code	1	Husband	4	Husband and someone else
	2	Wife	5	Wife and someone else
	3	Husband and wife	6	Jointly husband, wife and someone else

BLOK IX NOTE

Appendix 6 Questionnaire of Household Survey (Deceased Women

BLOK I IDENTITY

1. District : …….
2. Sub district :…….
3. Village :…….
4. Block census :…….
5. Physical building :…….
6. Census building :…….
7. Home address :…….
8. Name of respondent :…….

BLOK II HOUSEHOLD MEMBER

NO	Name	Relation-ship with head of household	Sex	age	Age more than 10 years			
					Finished educa-tion	Activity	Work-ing status	Employ-ment sector
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

- Code for column 3 : 1 head of household 2 husband/wife
  3 Son/daughter 4 relatives 5 others
- **Code for column 4 : 1 Male 2 Female**
- Code for column 6 : 1 Elementary school 2 junior high school
  3 Senior high school 4 diploma/university
- **Code for column 7 : 1 employed 2 unemployed**
- Code for column 8 : 1 self-employed
  2 Employer with permanent worker
  3 Employer with non-permanent worker
  4 Employees
  5 Unpaid worker/ family worker
- **Code for column 9 : 1 Agriculture 2 manufacture 3 services**

BLOK III IDENTIFICATION OF DESEACED WOMEN

I. Is there any woman age more than 10 years dies during January 2009 to May 2010? Y/N
If No go to step III

II. If yes, did she die in this period?
   a. Pregnancy b. delivery c. 2 months after delivery

If the answer a/b/c continues the interview to block IV, else go to step stop

I. Are there any household member who died during 2009-2010 ? Yes No

If yes complete the box below

No	Name	Sex	Age when he/she dies	Woman age > 10 years		
				Pregnancy	Delivery	2 months after delivery
(1)	(2)	(3)	(4)	(5)	(6)	(7)

If there is an answer in column 5-7 continues to BLOK IV, else stop.

BLOK IV REPRODUCTIVE STATUS OF DESEASED WOMEN

1. What isher marital status before she dies?
   a. Married b. Widow c. Divorced
2. When isher first marriage?
   Date: …… Age
3. Does she have any sons and daughter who are now living in this household?
   Yes No **(go to question 5)**
4. If yes How many?
   Son Daughter
5. Does she have any sons and daughter but now not living in this household?
   Yes No **(go to question 7)**
6. If yes How many?
   Son Daughter
7. Has she ever given birth to a boy or girl who was born alive but later died?
   Yes No **(go to question 9)**
8. If yes How many?
   Son Daughter
9. Now, I would record all birth that she had. It will be stated from the first delivery to the latest.

No	Name	Sex	Birth day	Is (name) Still alive?	**If alive** How old is (name)	**If Alive** Is (name) live with you now?	**If dead** How old was (name) when she/he died?
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

BLOK V HEALTH STATUS OF DESEASED WOMEN

1. Did she ever have any health problem before her last pregnancy? Y N
2. If Yes, Can you mention what is the health problem?
   a. Hypertensive disease d. Asthma
   b. Anaemia e. Diabetes mellitus
   c. Heart disease f. Others, ……..
3. Did she ever have complication during her last pregnancy? Y N
4. If Yes, Can you mention what is it?
   a. Bleeding C. High fever
   b. Labor before 9 months d. Other .....

IF BLOK III POINT VI THE ANSWER IS a, THEN GO TO QUESTION 7

5. Did she have complication during delivery? Y N
6. If yes, Can you mention what is it?
   a. Vaginal bleeding d. Water broke more than 6 hours before birth
   b. Fever e. Others, ……..
   c. Convulsion
7. Comparing between pregnancy and before pregnancy period, how do you rate her food intake during pregnancy?
   a. Significantly better in term quantity and quality
   b. The same or Similar or not much different
   c. Significantly worse in term quantity and quality
8. Did she have any prohibitions to take some kind of food during pregnancy? Y N
9. If yes, can you mention it? .....
10. Did she take any food supplement during pregnancy? Y N
11. If yes, can you mention it?
    a. Folic acid c. Iron tablet
    b. Calcium d. Other .....

BLOK VI HEALTH SEEKING BEHAVIOUR OF DESEASED WOMEN

1. ANTENATAL CARE

1.1. During pregnancy did she checked her health condition to health personnel? Y N

1.2. If No, what is the reason? (can more than one reasons)

a. Do not know where to go e. There is no transportation
b. Do not know if it is importance f. prefer to use TBA
c. Cannot afford the cost g. else, ……
d. The distance is too far

1.3. If yes, to whom she went most frequently?

a. General practitioner/Obgyn b. Midwife
c. Nurse or the other paramedic

1.4. Where did she went for medical check during pregnancy?

a. Name: .....I..... address: .....
b. Name: .....II..... address: .....

c. Name: .....III..... address: .....

1.5. Transportation to health facility:

	I	II	III
a. Distance	…….	…….	…….
b. Transportation tools	…….	…….	…….
c. Time to travel	…….	…….	…….
d. Estimated cost	…….	…….	…….

1.6. When was the first medical check during pregnancy? ..... month of pregnancy

1.7. How many did she do medical check during pregnancy?

a. First trimester : .....
b. Second trimester : .....
c. Third trimester : .....

1.8. What is the treatment that she got during antenatal care:

a. Status & foetal growth
b. Check anemia
c. Foetal hearth tone
d. Check sexual transmitted infection (STI)
e. movement/presentation/size foetal
f. Mental health (stress/depression)
g. Fundal height
h. Identify diabetes/hearth problem)
i. Weight gain
j. Check urinary track infection
k. Estimate date birth
l. Vaccine tetanus toxoid
m. Check blood pressure
n. Provide iron
o. Urine test (proteinuria)
p. Provide folate

1.9. Did she receive some advices during antenatal care:

a. Labor preparation
b. Cessation of harmful substances
c. Exercises/activity
d. Nutrition/ healthy diet
e. Physiologic changes
f. Danger signs of complication

1.10. Has she discussed with her husband/family about:

a. Prepare cost for delivery
c. Decide delivery assistance
b. Decide place of delivery
d. Prepare transportation

1.11. Did her husband accompany you during antenatal care? Y N

1. DELIVERY CARE (IF BLOK III THE ANSWER IS a, THEN GO TO BLOK VII)

2.1 Where did she give birth?

a. health facility b. Home c. Others

(If a continue, else go to question 2.3)

2.2. Name of health facility : .....
Address : .....
Distance : .....
Transportation tool : .....
Time to travel : .....
Cost : ..... **go to question 2.5**

2.3 If not in health facility, what is the reason?

a. Distance to health facility
e. Feel safe and comfortable at home
b. Unavailable transportation
f. Doubt with health treatment in health facility
c. Consider the cost
g. Other, ...
d. Family/husband that decided

2.4. Do you know where the nearest health facility to perform delivery is?

Name of health facility : .....
Address : .....
Distance : .....
Transportation tool : .....
Time to travel : .....
Cost : .....

2.5 Who assist her during delivery?

a. Doctor/Obgyn b. Midwife
c. Nurse d. Traditional Birth attendance
e. Family/relatives/others **(if the answer d or e go to question 2.8)**

2.6 When she arrived at health facility, did she have some experiences to wait a long time before received adequate treatments because:

a. Long queue to received treatment
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c. Wait the health personnel
d. The equipment is unavailable
e. The drug is unavailable
f. Need to pay the cost before get the treatment

2.7 If the delivery in health facility, what did she receive this support?

a. Explaining Labour progress verbally
b. Encouraging and helping into comfortable position
c. Offering oral fluid and light food
d. Helping with relaxation technique
e. Explaining breathing technique

2.8 Why she was not assisted by health personnel during delivery?

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b. The distance of health personnel house
c. Feel more comfortable with TBA
d. Family decision
e. Do not need to be assisted by health personnel
f. TBA is more accessible

BLOK VII HOUSING CONDITION AND ASSET

1. What the material of floor?
   a. Tile/ceramics c. wood/bamboo
   b. Brick/cement d. dirt/others
2. Availability of o toilet
   a. Private toilet with septic Tank c. Public toilet
   b. Private toilet without septic tank d. Others
3. Source of drinking water
   a. Bottled water d. unhygienic well
   b. Piped water e. piped spring water
   c. Hygienic well f. Rain water/river/lake/others

1. Please, check any assets available in the household (at least the value of each item is no less than one million rupiahs or AUD$ 105).

a.	Car/Boat	e.	Gold/Jewellery
b.	Motorcycle	f.	Cattle
c.	Electronic devise	h.	Furniture
d.	Saving money	i.	Land

BLOK VIII DECISION MAKING

Who in your family usually has the final say on the following decisions?

a. Health treatments for household member	1	2	3	4	5	6
b. Making large household purchases	1	2	3	4	5	6
c. Making daily household purchases	1	2	3	4	5	6
d. Visit families/friends/relatives	1	2	3	4	5	6
e. Food to be cooked every day	1	2	3	4	5	6

Code	1	Husband	4	Husband and someone else
	2	Wife	5	Wife and someone else
	3	Husband and wife	6	Jointly husband, wife and someone else

BLOK IX NOTE

Appendix 7 Factor Analysis to build Maternal Health Index

Correlation Matrix

		MMR	Eo female	TFR	<= 16 married	persalinan oleh dokter	% pakai mop mow iud susuk	cakupan K4
Correlation	MMR	1.000	-.443	.340	.669	-.459	-.514	-.425
	Eo female	-.443	1.000	-.723	-.609	.685	.442	.406
	TFR	.340	-.723	1.000	.587	-.691	-.423	-.278
	<= 16 married	.669	-.609	.587	1.000	-.618	-.664	-.402
	Birth assisted by GP	-.459	.685	-.691	-.618	1.000	.507	.295
	Contraception	-.514	.442	-.423	-.664	.507	1.000	.252
	Antenatal care K4	-.425	.406	-.278	-.402	.295	.252	1.000

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.855
Bartlett's Test of Sphericity	Approx. Chi-Square	80.639
	df	21
	Sig.	.000

Communalities

	Initial	Extraction
MMR	1.000	.517
Eo female	1.000	.681
TFR	1.000	.608
<= 16 married	1.000	.755
Birth assisted by GP	1.000	.673
Contraception	1.000	.520
Antenatal care K4	1.000	.287

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.042	57.737	57.737	4.042	57.737	57.737
2	.927	13.242	70.979			
3	.780	11.142	82.120			
4	.438	6.260	88.381			
5	.314	4.488	92.869			
6	.270	3.860	96.729			
7	.229	3.271	100.000			

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component
	1
MMR	-.719
Eo female	.825
TFR	-.780
<= 16 married	-.869
Birth assisted by GP	.820
Contraception	.721
Antenatal care K4	.536

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Component Score Coefficient Matrix

	Component
	1
MMR	-.178
Eo female	.204
TFR	-.193
<= 16 married	-.215
Birth assisted by GP	.203
Contraception	.178
Antenatal care K4	.133

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
Component Scores.

Appendix 8 Calculation of Gini Ratio

Districts	F (Maternal healthn Index)	Shifted F	Fn	P	Pn	Fn x Pn	∑ Pn	Fn x ∑Pn
Kab. Garut	-1.24	0.00	0.0000	2404121	0.056	0.0000	0.0558	0.000
Kab. Sukabumi	-1.23	0.01	0.0003	2341409	0.054	0.0000	0.1102	0.000
Kab. Cianjur	-1.15	0.09	0.0026	2171281	0.050	0.0001	0.1607	0.000
Kab. Tasikmalaya	-1.14	0.10	0.0030	1675675	0.039	0.0001	0.1996	0.001
Kab. Indramayu	-1.08	0.16	0.0051	1663737	0.039	0.0002	0.2382	0.001
Kab. Majalengka	-1.05	0.19	0.0058	1166473	0.027	0.0002	0.2653	0.002
Kab. Ciamis	-0.72	0.52	0.0162	1532504	0.036	0.0006	0.3009	0.005
Kab. Purwakarta	-0.66	0.58	0.0180	852521	0.020	0.0004	0.3207	0.006
Kab. Bogor	-0.62	0.62	0.0191	4771932	0.111	0.0021	0.4315	0.008
Kab. Subang	-0.32	0.92	0.0284	1465157	0.034	0.0010	0.4656	0.013
Kota Tasikmalaya	-0.32	0.92	0.0286	635464	0.015	0.0004	0.4803	0.014
Kab. Bandung Barat	-0.32	0.93	0.0287	1510284	0.035	0.0010	0.5154	0.015
Kab. Cirebon	-0.22	1.02	0.0317	2067196	0.048	0.0015	0.5634	0.018
Kab. Sumedang	-0.19	1.05	0.0325	1093602	0.025	0.0008	0.5888	0.019
Kota Banjar	-0.12	1.12	0.0348	175157	0.004	0.0001	0.5929	0.021
Kab. Karawang	0.02	1.26	0.0390	2127791	0.049	0.0019	0.6423	0.025
Kab. Bandung	0.16	1.40	0.0435	3178543	0.074	0.0032	0.7161	0.031
Kab. Kuningan	0.22	1.46	0.0454	1035589	0.024	0.0011	0.7402	0.034
Kota Sukabumi	0.48	1.72	0.0533	298681	0.007	0.0004	0.7471	0.040
Kab. Bekasi	0.54	1.78	0.0553	2630401	0.061	0.0034	0.8082	0.045
Kota Cirebon	0.66	1.90	0.0589	296389	0.007	0.0004	0.8151	0.048
Kota Bogor	1.14	2.38	0.0738	950334	0.022	0.0016	0.8372	0.062
Kota Depok	1.61	2.85	0.0883	1738570	0.040	0.0036	0.8776	0.077
Kota Bekasi	1.66	2.90	0.0901	2334871	0.054	0.0049	0.9318	0.084
Kota Cimahi	1.78	3.02	0.0936	541177	0.013	0.0012	0.9444	0.088
Kota Bandung	2.11	3.35	0.1039	2394873	0.056	0.0058	1.0000	0.104
		32.25		43053732		0.0360		0.760

Gini ratio **0.48**

Appendix 9 Canonical Correlation Analysis for Socio Economic factor

* * * * * * * * * * * * * * * * * * A n a l y s i s o f V a r i a n c e -- Design 1 * * * * * * * * * * * * * * * * * *

EFFECT .. WITHIN CELLS Regression
Multivariate Tests of Significance (S = 6, M = 0, N = 5 1/2)

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	2.62895	2.00535	42.00	108.00	.002
Hotellings	13.81865	3.72884	42.00	68.00	.000
Wilks	.00795	2.76630	42.00	64.43	.000
Roys	.90883				

- -

Eigenvalues and Canonical Correlations

Root No.	Eigenvalue	Pct.	Cum. Pct.	Canon Cor.	Sq. Cor
1	9.96850	72.13801	72.13801	.95333	.90883
2	2.31047	16.71996	88.85797	.83542	.69793
3	.68606	4.96472	93.82269	.63789	.40690
4	.48773	3.52953	97.35221	.57257	.32784
5	.31657	2.29089	99.64311	.49036	.24045
6	.04932	.35689	100.00000	.21680	.04700

- -

Dimension Reduction Analysis

Roots	Wilks L.	F	Hypoth. DF	Error DF	Sig. of F
1 TO 6	.00795	2.76630	42.00	64.43	.000
2 TO 6	.08717	1.62475	30.00	58.00	.057
3 TO 6	.28857	1.15237	20.00	50.70	.332
4 TO 6	.48655	1.11167	12.00	42.62	.376
5 TO 6	.72385	.99378	6.00	34.00	.445
6 TO 6	.95300	.44386	2.00	18.00	.648

- -

Standardized canonical coefficients for DEPENDENT variables

Variable	Function No. 1	2	3	4	5	6
y1	-.12180	-.00526	1.28682	-.35254	.22832	.00935
y2	-.14625	-.47638	-.03637	-.59300	-.40923	-1.38985
y3	.19452	-.07606	-.03736	.21667	-.06106	-.79522
y4	-.74305	-.87418	-.69312	.50214	.77054	-.31018
y5	.27089	-.12946	.45745	.78724	.64303	-.56108
y6	.20026	-.99060	-.05750	.28222	.22767	.70575
y7	.05498	.24707	-.06512	-.47441	1.00182	.11946

- -

Correlations between DEPENDENT and canonical variables

Variable	Function No. 1	2	3	4	5	6
y1	-.74205	.01178	.64583	-.01273	.04332	.06080
y2	.49869	-.52231	-.02123	-.55039	-.08819	-.34632
y3	-.44573	.42421	-.11578	.42373	.05728	-.25251
y4	-.94701	-.03314	-.07453	.24819	.16616	-.03664
y5	.79524	-.16524	.21045	.30461	.22743	-.24965
y6	.63472	-.71424	-.00576	-.16268	.02984	.24131
y7	.41936	.10369	-.23936	-.54553	.67522	-.03713

Variance in dependent variables explained by canonical variables

CAN. VAR.	Pct Var DEP	Cum Pct DEP	Pct Var COV	Cum Pct COV
1	44.37097	44.37097	40.32566	40.32566
2	14.31709	58.68806	9.99230	50.31796
3	7.68734	66.37540	3.12798	53.44594
4	13.72992	80.10531	4.50117	57.94711
5	7.84397	87.94928	1.88609	59.83320
6	4.43812	92.38741	.20859	60.04179

Standardized canonical coefficients for COVARIATES

	CAN. VAR.					
COVARIATE	1	2	3	4	5	6
X11	-.58695	.26024	-.85341	.31359	1.11562	.14215
x13	.07586	.80266	-.60059	-.90603	.28566	.13243
x14	.11357	-.21867	.29969	.36090	.91077	.82701
x15	-.15084	.47152	1.11604	.19775	.18252	-.02875
x16	-.00405	-.46080	.36514	.38708	.69897	-.86156
x17	.44792	.64156	-.08996	.80178	.57676	.21488

Correlations between COVARIATES and canonical variables

	CAN. VAR.					
Covariate	1	2	3	4	5	6
X11	-.90873	.15743	-.25426	.26930	.10862	.02142
x13	.46267	.26312	.00975	-.72810	.41103	-.13242
x14	.33567	-.44993	.22618	-.28997	.46223	.57965
x15	-.62314	.50747	.59500	.00462	.00856	-.00731
x16	.43187	-.27161	.10921	-.20896	.51529	-.64699
x17	.67235	.44425	-.19082	.54939	-.03694	-.10478

Variance in covariates explained by canonical variables

CAN. VAR.	Pct Var DEP	Cum Pct DEP	Pct Var COV	Cum Pct COV
1	33.01161	33.01161	36.32320	36.32320
2	9.59785	42.60946	13.75191	50.07512
3	3.51468	46.12414	8.63769	58.71280
4	5.64017	51.76431	17.20423	75.91704
5	2.65040	54.41471	11.02264	86.93968
6	.61384	55.02855	13.06032	100.00000

Appendix 10 Canonical Correlation Analysis for Health Resources factor

* * * * * * * * * * * * * * * * * * A n a l y s i s o f V a r i a n c e -- Design 1 * * * * * * * * * * * * * * * * * *

EFFECT .. WITHIN CELLS Regression
Multivariate Tests of Significance (S = 6, M = 0, N = 5 1/2)

Test Name	Value	Approx. F	Hypoth. DF	Error DF	Sig. of F
Pillais	2.50313	1.84069	42.00	108.00	.006
Hotellings	14.57729	3.93355	42.00	68.00	.000
Wilks	.00869	2.68565	42.00	64.43	.000
Roys	.91677				

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Eigenvalues and Canonical Correlations

Root No.	Eigenvalue	Pct.	Cum. Pct.	Canon Cor.	Sq. Cor
1	11.01438	75.55850	75.55850	.95748	.91677
2	2.16505	14.85219	90.41069	.82707	.68405
3	.80759	5.54005	95.95074	.66841	.44678
4	.41020	2.81396	98.76470	.53933	.29088
5	.10868	.74551	99.51022	.31309	.09802
6	.07140	.48978	100.00000	.25815	.06664

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Dimension Reduction Analysis

Roots	Wilks L.	F	Hypoth. DF	Error DF	Sig. of F
1 TO 6	.00869	2.68565	42.00	64.43	.000
2 TO 6	.10435	1.46828	30.00	58.00	.105
3 TO 6	.33027	1.00533	20.00	50.70	.473
4 TO 6	.59699	.76468	12.00	42.62	.682
5 TO 6	.84187	.50930	6.00	34.00	.797
6 TO 6	.93336	.64257	2.00	18.00	.538

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Standardized canonical coefficients for DEPENDENT variables

Variable	Function No. 1	2	3	4	5	6
y1	-.14002	.40405	-.22261	-.24895	-.96607	.58697
y2	-.24229	.36496	-.57549	-.40976	-.47145	-1.33926
y3	-.34693	1.24128	-.87108	.07731	.34323	-.21455
y4	-.33976	-.22759	.98625	-.84163	.83955	-.68129
y5	.21270	.80057	.98808	-.41175	-.16085	-.07346
y6	.33888	.21648	-.57866	-.64207	.89859	.67778
y7	.11158	.04730	.34085	.54312	.05383	-.00198

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Correlations between DEPENDENT and canonical variables

Variable	Function No. 1	2	3	4	5	6
y1	-.69018	-.01820	.00834	-.32824	-.43175	.37941
y2	.64895	-.05166	-.26834	-.24427	-.23637	-.59853
y3	-.77405	.47969	-.06467	.26200	.28033	.11696
y4	-.88515	-.13523	.24125	-.26114	.21165	.03092
y5	.75004	.50179	.35435	-.12780	-.10591	-.08074
y6	.82788	-.01591	-.27665	-.39034	.19703	.02269
y7	.45912	.03646	.12602	.50617	.06447	-.28076

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Variance in dependent variables explained by canonical variables

CAN. VAR.	Pct Var DEP	Cum Pct DEP	Pct Var COV	Cum Pct COV
1	53.41245	53.41245	48.96674	48.96674
2	7.21097	60.62342	4.93266	53.89940
3	5.03483	65.65826	2.24945	56.14884
4	10.41643	76.07468	3.02993	59.17878
5	5.99789	82.07258	.58793	59.76671
6	8.60985	90.68242	.57375	60.34046

Standardized canonical coefficients for COVARIATES
CAN. VAR.

COVARIATE	1	2	3	4	5	6
x21	.52317	-.28920	-.59311	-.65444	.57323	.97057
x23	.09028	-.54635	-.26171	.07023	-1.03814	-.30002
x24	-.00472	-.07916	.39303	-1.10621	.51845	.15642
x25	.47506	-.21282	1.32491	.94003	-.35856	-.08384
x26	.13173	.68094	-.67315	-.83305	.24453	-.89753
x27	-.18083	1.10620	.10558	-.29495	-.15585	.22206

Correlations between COVARIATES and canonical variables
CAN. VAR.

Covariate	1	2	3	4	5	6
x21	.87506	.06960	-.24783	-.04809	-.01882	.40662
x23	.19259	-.20344	-.04751	-.40346	-.86847	.04742
x24	-.30784	-.29349	.55362	-.71337	-.05014	-.03460
x25	.89986	.14897	.37883	.07697	-.05424	-.12524
x26	.74781	.24595	-.16056	-.09549	.13493	-.57201
x27	.01465	.67797	.12308	-.18931	-.53093	.45526

Variance in covariates explained by canonical variables

CAN. VAR.	Pct Var DEP	Cum Pct DEP	Pct Var COV	Cum Pct COV
1	34.63498	34.63498	37.77951	37.77951
2	7.69205	42.32704	11.24489	49.02440
3	4.12975	46.45679	9.24342	58.26782
4	3.51416	49.97095	12.08114	70.34895
5	1.73197	51.70292	17.66899	88.01795
6	.79847	52.50139	11.98205	100.00000

Appendix 11 Principal Component Analysis to build Wealth Index

Communalities

	Initial	Extraction
ceramic / tiles	1.000	.903
brick/cements	1.000	.939
wood/bamboo/others	1.000	.648
Bottled/piped water	1.000	.813
pump/protected well	1.000	.972
unprotected well	1.000	.789
others	1.000	.745
unemployed	1.000	.989
rice/staple food farming corps	1.000	.739
the others agriculture	1.000	.731
mining and industry	1.000	.974
trade and hotel	1.000	.971
communication and transportation	1.000	.962
services	1.000	.914
others	1.000	.967
availability of toilet	1.000	.276
avalilability of electricity	1.000	.131

Extraction Method: Principal Component Analysis.

Total Variance Explained

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.522	14.835	14.835	2.522	14.835	14.835	2.221	13.067	13.067
2	1.696	9.978	24.814	1.696	9.978	24.814	1.695	9.972	23.039
3	1.341	7.888	32.702	1.341	7.888	32.702	1.547	9.101	32.140
4	1.240	7.295	39.997	1.240	7.295	39.997	1.228	7.224	39.363
5	1.190	6.998	46.995	1.190	6.998	46.995	1.209	7.112	46.475
6	1.161	6.832	53.827	1.161	6.832	53.827	1.163	6.842	53.318
7	1.155	6.793	60.621	1.155	6.793	60.621	1.154	6.786	60.104
8	1.093	6.428	67.049	1.093	6.428	67.049	1.122	6.597	66.701
9	1.041	6.122	73.171	1.041	6.122	73.171	1.096	6.449	73.150
10	1.023	6.018	79.190	1.023	6.018	79.190	1.027	6.040	79.190
11	.978	5.756	84.945						
12	.889	5.227	90.172						
13	.868	5.105	95.277						
14	.803	4.723	100.000						
15	-3.031E-15	-1.783E-14	100.000						
16	-3.733E-15	-2.196E-14	100.000						
17	-1.913E-14	-1.125E-13	100.000						

Extraction Method: Principal Component Analysis.

Component Matrix[a]

	Component									
	1	2	3	4	5	6	7	8	9	10
ceramic / tiles	.828	-.001	-.442	-.070	-.096	-.042	.046	.061	.004	.003
brick/cements	-.321	-.193	.834	.135	.148	.125	-.129	-.053	-.161	-.044
wood/bamboo/others	-.724	.183	-.237	-.040	-.021	-.066	.064	-.026	.147	.037
bottled/piped water	.489	.685	.223	.043	.080	-.106	-.096	.010	-.158	-.021
pump/protected well	.005	-.972	-.131	-.031	.036	.038	.040	-.049	.038	.026
unprotected well	-.272	.184	.073	-.074	.045	-.496	-.240	.075	.575	.169
others	-.456	.370	-.158	.042	-.190	.441	.242	.004	-.261	-.131
unemployed	.024	.010	.040	.081	.508	-.394	.720	-.171	-.089	-.105
rice/staple food farming corps	-.493	-.032	-.386	-.055	.035	-.125	-.374	.040	-.419	-.092
the others agriculture	-.169	.104	-.010	.059	-.110	.518	.355	.001	.472	.243
mining and industry	.145	-.010	.299	-.829	-.395	-.022	.031	-.121	.020	-.065
trade and hotel	.150	-.063	.093	.703	-.610	-.201	-.053	-.137	.068	-.059
communication and tranportation	.062	-.052	.080	.052	.154	.086	-.008	.943	.080	-.138
services	.248	.082	-.111	.080	.534	.397	-.457	-.341	.237	-.061
others	.051	.008	.025	.017	.055	-.010	-.015	.072	-.301	.930
availability of toilet	.488	-.032	.066	.025	-.010	.156	.086	.007	-.008	.000
availability of electricity	.256	-.119	.157	.042	-.025	.133	-.028	.049	-.062	-.003

Extraction Method: Principal Component Analysis.

a. 10 components extracted.

Rotated Component Matrix[a]

	Component									
	1	2	3	4	5	6	7	8	9	10
ceramic / tiles	.547	.057	-.767	-.009	-.013	.000	.047	-.093	.000	.008
brick/cements	.111	-.037	.960	-.016	-.013	-.001	.006	-.045	.018	.010
wood/bamboo/others	-.783	-.035	.047	.026	.028	.001	-.064	.158	-.017	-.020
bottled/piped water	.323	.824	-.075	.009	.013	-.052	.055	-.128	-.022	.040
pump/protected well	.202	-.957	.012	.015	.012	-.030	.072	-.089	-.019	.011
unprotected well	-.460	.145	.029	-.041	-.040	.056	.732	.092	.062	-.012
others	-.386	.193	.060	-.004	-.005	.072	-.702	.231	.012	-.060
unemployed	-.024	.014	.001	.082	.082	-.985	.012	-.015	-.059	-.035
rice/staple food farming corps	-.540	-.130	-.023	.128	.104	.231	-.243	-.536	.003	.055
the others agriculture	-.088	-.056	-.004	.038	.029	.062	-.116	.836	.011	.042
mining and industry	.143	.031	.011	-.925	.196	.148	.067	.008	-.155	-.092
trade and hotel	.148	.020	.005	.169	-.935	.130	.055	.010	-.138	-.082
communication and tranportation	.118	.007	.016	.086	.090	.065	.040	.015	.961	-.050
services	.259	.098	-.006	.554	.514	.277	.159	.072	-.342	-.202
others	.052	.024	.006	.040	.043	.033	.029	.029	-.041	.978
availability of toilet	.495	.060	-.139	-.006	.001	-.025	-.029	.082	.001	.000
availability of electricity	.345	-.029	.063	-.008	-.024	.059	-.030	-.002	.047	.019

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 9 iterations.

Component Transformation Matrix

Component	1	2	3	4	5	6	7	8	9	10
1	.862	.192	-.431	-.016	-.017	-.041	.163	-.074	-.035	.003
2	-.243	.943	-.127	.019	.055	.014	-.096	.145	-.035	-.008
3	.330	.219	.834	-.284	-.097	-.079	.199	.090	.058	.010
4	.077	.046	.140	.755	-.622	-.076	-.064	.065	.040	.012
5	.037	.025	.160	.516	.694	-.416	.181	-.118	.065	.016
6	.265	-.080	.133	.170	.323	.421	-.570	.517	-.006	-.057
7	.015	-.087	-.125	-.221	-.120	-.778	-.319	.445	.084	.027
8	-.003	.030	-.074	-.027	.002	.110	.008	-.022	.984	.113
9	-.105	-.082	-.129	.057	.004	.105	.647	.643	.031	-.343
10	-.033	-.033	-.040	.025	.022	.083	.206	.261	-.113	.930

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Component Score Coefficient Matrix

	Component									
	1	2	3	4	5	6	7	8	9	10
ceramic / tiles	.157157	-.014	-.452	-.012	-.010	.011	-.012	-.047	.020	.007
brick/cements	.180608	.026	.677	.004	.001	.001	-.006	-.062	-.001	.008
wood/bamboo/others	-.365136	-.008	-.077	.011	.012	-.015	.020	.117	-.024	-.017
bottled/piped water	.120405	.486	.037	.012	.007	-.037	.012	-.134	-.005	.038
pump/protected well	.112517	-.573	-.010	.015	.022	-.023	.042	-.034	-.028	.009
unprotected well	-.284441	.095	-.038	-.030	-.041	.052	.696	.104	.054	-.010
others	-.116337	.119	-.007	-.016	-.012	.044	-.576	.150	.009	-.055
unemployed	-.030526	.006	.002	.062	.066	-.848	-.003	-.019	-.059	-.040
rice/staple food farming corps	-.249840	-.046	-.076	.094	.079	.182	-.193	-.504	-.002	.053
the others agriculture	-.007022	-.064	-.040	.032	.026	.055	-.048	.748	.006	.047
mining and industry	.056665	.011	.018	-.747	.151	.125	.038	.011	-.136	-.087
trade and hotel	.056683	.015	.020	.128	-.769	.113	.040	.014	-.125	-.081
communication and tranportation	.069778	.013	.012	.072	.079	.065	.028	.017	.879	-.055
services	.130720	.042	.055	.468	.438	.248	.136	.082	-.307	-.191
others	.023168	.012	.012	.035	.040	.036	.023	.035	-.044	.953
availability of toilet	.226317	.014	-.030	-.001	.007	-.012	-.065	.087	.009	-.001
availability of electricity	.181022	-.021	.087	-.001	-.013	.057	-.056	.006	.045	.018

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Component Score Covariance Matrix

Component	1	2	3	4	5	6	7	8	9	10
1	1.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
2	.000	1.000	.000	.000	.000	.000	.000	.000	.000	.000
3	.000	.000	1.000	.000	.000	.000	.000	.000	.000	.000
4	.000	.000	.000	1.000	.000	.000	.000	.000	.000	.000
5	.000	.000	.000	.000	1.000	.000	.000	.000	.000	.000
6	.000	.000	.000	.000	.000	1.000	.000	.000	.000	.000
7	.000	.000	.000	.000	.000	.000	1.000	.000	.000	.000
8	.000	.000	.000	.000	.000	.000	.000	1.000	.000	.000
9	.000	.000	.000	.000	.000	.000	.000	.000	1.000	.000
10	.000	.000	.000	.000	.000	.000	.000	.000	.000	1.000

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Appendix 12 Probit Regression

Data Information

		N of Cases
Valid		8
Rejected	Missing	0
	Number of Responses > Number of Subjects	0
Control Group		12

Parameter Estimates

	Parameter	Estimate	Std. Error	Z	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
PROBIT[a]	head of household education	.054	.019	2.885	.004	.017	.090
	age group (median)	-.176	.021	-8.242	.000	-.218	-.134
	household member	.131	.021	6.160	.000	.089	.172
	Intercept	3.092	.018	169.815	.000	3.074	3.110

a. PROBIT model: PROBIT(p) = Intercept + BX

Covariances and Correlations of Parameter Estimates

		head of household education	age group (median)	household member
PROBIT	head of household education	.000	.113	.084
	age group (median)	.000	.000	-.478
	household member	.000	.000	.000

Covariances (below) and Correlations (above).

Chi-Square Tests

		Chi-Square	df[a]	Sig.
PROBIT	Pearson Goodness-of-Fit Test	871.761	4	.000

a. Statistics based on individual cases differ from statistics based on aggregated cases.

Appendix 13 Logistic Regression output showing the effects of socio-economic factors on maternal mortality

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	1043246	100.0
	Missing Cases	0	.0
	Total	1043246	100.0
Unselected Cases		0	.0
Total		1043246	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
households having maternal death	0
household without maternal death	1

Categorical Variables Codings

			Parameter coding			
		Frequency	(1)	(2)	(3)	(4)
wealth index quantiles	the poorest	212413	.000	.000	.000	.000
	poor	221343	1.000	.000	.000	.000
	middle	216920	.000	1.000	.000	.000
	wealth	192488	.000	.000	1.000	.000
	the wealtiest	200082	.000	.000	.000	1.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	18741.730[a]	.000	.004

a. Estimation terminated at iteration number 10 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	.000	3	1.000

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	x22			75.581	4	.000			
	x22(1)	-.186	.079	5.524	1	.019	.830	.710	.970
	x22(2)	.266	.089	8.855	1	.003	1.304	1.095	1.554
	x22(3)	.446	.098	20.871	1	.000	1.562	1.290	1.891
	x22(4)	.415	.096	18.863	1	.000	1.514	1.256	1.826
	Constant	6.609	.059	12475.146	1	.000	741.703		

a. Variable(s) entered on step 1: x22.

Model if Term Removed[a]

Variable		Model Log Likelihood	Change in -2 Log Likelihood	df	Sig. of the Change
Step 1	x22	-9409.119	76.508	4	.000

a. Based on conditional parameter estimates

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	1043246	100.0
	Missing Cases	0	.0
	Total	1043246	100.0
Unselected Cases		0	.0
Total		1043246	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
households having maternal death	0
household without maternal death	1

Categorical Variables Codings

		Frequency	Parameter coding (1)	(2)	(3)	(4)
wealth index quantiles	the poorest	212413	.000	.000	.000	.000
	poor	221343	1.000	.000	.000	.000
	middle	216920	.000	1.000	.000	.000
	wealth	192488	.000	.000	1.000	.000
	the wealtiest	200082	.000	.000	.000	1.000
household member	<= 4	566740	.000			
	> 4	476506	1.000			
age group (median)	<= median	544437	.000			
	> median	498809	1.000			
head of household education	<= elementary school	480501	.000			
	> elementary school	562745	1.000			

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	18254.043[a]	.001	.030
2	17852.965[a]	.001	.052
3	17702.305[a]	.001	.060
4	17685.821[a]	.001	.061

a. Estimation terminated at iteration number 10 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	.000	0	.
2	25.381	2	.000
3	30.745	4	.000
4	34.382	8	.000

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Step 1[a]	x61(1)	-1.526	.073	437.802	1	.000	.217	.189	.251
	Constant	7.756	.066	14010.392	1	.000	2335.639		
Step 2[b]	x61(1)	-2.123	.077	764.747	1	.000	.120	.103	.139
	x71(1)	1.248	.062	398.876	1	.000	3.482	3.080	3.935
	Constant	7.604	.066	13412.121	1	.000	2006.044		
Step 3[c]	x41(1)	.732	.061	142.785	1	.000	2.080	1.845	2.346
	x61(1)	-2.056	.077	712.221	1	.000	.128	.110	.149
	x71(1)	1.339	.063	452.663	1	.000	3.815	3.372	4.315
	Constant	7.202	.071	10181.902	1	.000	1342.366		
Step 4[d]	x22			17.062	4	.002			
	x22(1)	-.260	.080	10.562	1	.001	.771	.659	.902
	x22(2)	-.017	.092	.033	1	.856	.983	.821	1.178
	x22(3)	.014	.104	.018	1	.892	1.014	.827	1.243
	x22(4)	.023	.101	.052	1	.820	1.023	.839	1.248
	x41(1)	.693	.068	105.244	1	.000	1.999	1.751	2.282
	x61(1)	-2.047	.077	704.253	1	.000	.129	.111	.150
	x71(1)	1.349	.063	458.265	1	.000	3.855	3.407	4.362
	Constant	7.272	.084	7410.362	1	.000	1439.924		

a. Variable(s) entered on step 1: x61.

b. Variable(s) entered on step 2: x71.

c. Variable(s) entered on step 3: x41.

d. Variable(s) entered on step 4: x22.

Model if Term Removed

Variable		Model Log Likelihood	Change in -2 Log Likelihood	df	Sig. of the Change
Step 1	x61	-9408.530	563.017	1	.000
Step 2	x61	-9392.318	931.672	1	.000
	x71	-9127.022	401.078	1	.000
Step 3	x41	-8926.482	150.660	1	.000
	x61	-9281.691	861.077	1	.000
	x71	-9077.868	453.431	1	.000
Step 4	x22	-8851.152	16.484	4	.002
	x41	-8897.381	108.941	1	.000
	x61	-9267.717	849.613	1	.000
	x71	-9072.337	458.853	1	.000

Appendix 14 Logistic Regression per component of Maternal Mortality Determinant

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	290	98.6
	Missing Cases	4	1.4
	Total	294	100.0
Unselected Cases		0	.0
Total		294	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
Deceased	0
Survived	1

Categorical Variables Codings

		Frequency	Parameter coding (1)	Parameter coding (2)
Head household employment	unemployed	21	.000	.000
	informal jobs	98	1.000	.000
	formal jobs	171	.000	1.000
Group of asset	0-1	68	.000	.000
	2-3	137	1.000	.000
	>=4	85	.000	1.000
Decision for buying luxury stuffs	involved	229	1.000	
	not involved	61	.000	
Desicion for visiting friends	involved	233	1.000	
	not involved	57	.000	
Head Household education	<= elementary school	160	.000	
	>= junior high school	130	1.000	
Decision for health treatment	involved	219	1.000	
	not involved	71	.000	

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	353.283[a]	.055	.076
2	341.651[a]	.092	.128
3	334.280[a]	.115	.159

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	.000	0	.
2	1.771	2	.412
3	10.890	5	.054

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	95% C.I.for EXP(B) Upper
Step 1[a]	d_health(1)	1.139	.283	16.245	1	.000	3.123	1.795	5.433
	Constant	-.141	.238	.352	1	.553	.868		
Step 2[b]	d_health(1)	1.230	.292	17.677	1	.000	3.420	1.928	6.068
	educ5(1)	.908	.273	11.054	1	.001	2.478	1.451	4.232
	Constant	-.582	.279	4.366	1	.037	.559		
Step 3[c]	d_health(1)	1.302	.297	19.178	1	.000	3.676	2.053	6.583
	educ5(1)	.820	.278	8.685	1	.003	2.270	1.316	3.915
	Activity3			7.134	2	.028			
	Activity3(1)	1.277	.520	6.033	1	.014	3.585	1.294	9.929
	Activity3(2)	1.316	.500	6.940	1	.008	3.730	1.401	9.931
	Constant	-1.793	.540	11.004	1	.001	.167		

a. Variable(s) entered on step 1: d_health.

b. Variable(s) entered on step 2: educ5.

c. Variable(s) entered on step 3: Activity3.

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	283	96.3
	Missing Cases	11	3.7
	Total	294	100.0
Unselected Cases		0	.0
Total		294	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
Deceased	0
Survived	1

Categorical Variables Codings

		Frequency	Parameter coding (1)	Parameter coding (2)
groups of CEB	1-2	133	.000	.000
	0	53	1.000	.000
	>=3	97	.000	1.000
Having health problem before pregnancy	yes	48	.000	
	No	235	1.000	
Age group of women at delivery	< 20 or >35	73	.000	
	20-25	210	1.000	
Having health problem during delivery	yes	58	.000	
	No	225	1.000	
Having health problem during pregnancy	yes	40	.000	
	no	243	1.000	

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	308.845[a]	.133	.188
2	283.877[a]	.206	.291
3	273.853[b]	.234	.330
4	263.510[b]	.261	.369

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

b. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	.000	0	.
2	6.397	2	.041
3	1.848	3	.605
4	8.221	4	.084

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	95% C.I.for EXP(B) Upper
Step 1[a]	b5r1(1)	2.121	.354	35.931	1	.000	8.340	4.168	16.685
	Constant	-.887	.318	7.807	1	.005	.412		
Step 2[b]	b5r1(1)	1.977	.373	28.067	1	.000	7.220	3.475	15.001
	b5r3(1)	1.673	.339	24.319	1	.000	5.327	2.740	10.357
	Constant	-2.046	.428	22.903	1	.000	.129		
Step 3[c]	b5r1(1)	1.682	.390	18.612	1	.000	5.378	2.504	11.549
	b5r2(1)	1.356	.434	9.754	1	.002	3.880	1.657	9.086
	b5r3(1)	1.466	.352	17.392	1	.000	4.332	2.175	8.628
	Constant	-2.798	.524	28.546	1	.000	.061		
Step 4[d]	GRP_CEB8			10.235	2	.006			
	GRP_CEB8(1)	-1.298	.406	10.235	1	.001	.273	.123	.605
	GRP_CEB8(2)	-.469	.356	1.735	1	.188	.626	.312	1.257
	b5r1(1)	1.800	.406	19.660	1	.000	6.050	2.730	13.408
	b5r2(1)	1.353	.442	9.372	1	.002	3.868	1.627	9.198
	b5r3(1)	1.482	.361	16.844	1	.000	4.401	2.169	8.931
	Constant	-2.459	.550	20.001	1	.000	.086		

a. Variable(s) entered on step 1: b5r1.

b. Variable(s) entered on step 2: b5r3.

c. Variable(s) entered on step 3: b5r2.

d. Variable(s) entered on step 4: GRP_CEB8.

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	254	86.4
	Missing Cases	40	13.6
	Total	294	100.0
Unselected Cases		0	.0
Total		294	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
Deceased	0
Survived	1

Categorical Variables Codings

		Frequency	Parameter coding (1)	Parameter coding (2)
Quality and quantity of food intake (before vs during pregnancy)	better during pregnancy	61	1.000	.000
	similar	166	.000	1.000
	worse during pregnancy	27	.000	.000
Group of frequency check up 3rd trimester	<= 1	20	.000	.000
	2	62	1.000	.000
	>= 3	172	.000	1.000
Antenatal care	at least 4 times	213	1.000	
	others	41	.000	
Consumed food supplement during pregnancy	Yes	238	1.000	
	No	16	.000	

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	303.741[a]	.043	.061
2	295.375[a]	.074	.104

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	.000	1	1.000
2	.249	4	.993

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	95% C.I.for EXP(B) Upper
Step 1[a]	b5r5			9.398	2	.009			
	b5r5(1)	1.061	.545	3.789	1	.052	2.889	.993	8.407
	b5r5(2)	-.150	.439	.117	1	.732	.861	.364	2.034
	Constant	.693	.408	2.883	1	.090	2.000		
Step 2[b]	b5r5			8.964	2	.011			
	b5r5(1)	.949	.560	2.866	1	.090	2.582	.861	7.743
	b5r5(2)	-.253	.459	.305	1	.581	.776	.316	1.908
	rd_check			8.299	2	.016			
	rd_check(1)	.749	.541	1.916	1	.166	2.115	.732	6.108
	rd_check(2)	1.298	.500	6.744	1	.009	3.662	1.375	9.756
	Constant	-.251	.570	.194	1	.660	.778		

a. Variable(s) entered on step 1: b5r5.

b. Variable(s) entered on step 2: rd_check.

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	263	89.5
	Missing Cases	31	10.5
	Total	294	100.0
Unselected Cases		0	.0
Total		294	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
Deceased	0
Survived	1

Categorical Variables Codings

		Frequency	Parameter coding (1)
Having discussion about delivery assistants	yes	179	1.000
	no	84	.000
Having discussion about finance of birth	yes	203	1.000
	no	60	.000
Accompanied by husband for medical check	yes	192	1.000
	no	71	.000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	307.493[a]	.046	.065

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	b6r110a(1)	1.078	.306	12.420	1	.000	2.940	1.614	5.356
	Constant	.067	.258	.067	1	.796	1.069		

a. Variable(s) entered on step 1: b6r110a.

Model if Term Removed

Variable		Model Log Likelihood	Change in -2 Log Likelihood	df	Sig. of the Change
Step 1	b6r110a	-159.887	12.282	1	.000

Appendix 15 Logistic Regression of Maternal Mortality Determinant

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	232	78.9
	Missing Cases	62	21.1
	Total	294	100.0
Unselected Cases		0	.0
Total		294	100.0

a. If weight is in effect, see classification table for the total number of cases.

Dependent Variable Encoding

Original Value	Internal Value
Deceased	0
Survived	1

Categorical Variables Codings

		Frequency	Parameter coding (1)	Parameter coding (2)
Group of frequency check up 3rd trimester	<= 1	13	.000	.000
	2	56	1.000	.000
	>= 3	163	.000	1.000
groups of CEB	1-2	112	.000	.000
	0	43	1.000	.000
	>=3	77	.000	1.000
Quality and quantity of food intake (before vs during pregnancy)	better during pregnancy	59	1.000	.000
	similar	149	.000	1.000
	worse during pregnancy	24	.000	.000
Head household employment	unemployed	19	.000	.000
	informal jobs	78	1.000	.000
	formal jobs	135	.000	1.000
Head Household education	<= elementary school	131	.000	
	>= junior high school	101	1.000	
Having health problem before pregnancy	yes	39	.000	
	No	193	1.000	
Having health problem during pregnancy	yes	29	.000	
	no	203	1.000	
Having health problem during delivery	yes	50	.000	
	No	182	1.000	
Having discussion about finance of birth	yes	178	.000	
	no	54	1.000	
Decision for health treatment	involved	185	1.000	
	not involved	47	.000	

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	239.614[a]	.128	.185
2	221.580[a]	.193	.280
3	206.609[b]	.243	.353
4	194.613[b]	.282	.408
5	182.294[b]	.319	.462

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

b. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	.000	0	.
2	2.897	2	.235
3	5.149	3	.161
4	3.854	5	.571
5	13.390	8	.099

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	95% C.I.for EXP(B) Upper
Step 1[a]	b5r3(1)	1.913	.347	30.405	1	.000	6.773	3.431	13.368
	Constant	-.405	.289	1.973	1	.160	.667		
Step 2[b]	b5r1(1)	1.709	.406	17.691	1	.000	5.521	2.490	12.239
	b5r3(1)	1.675	.368	20.718	1	.000	5.341	2.596	10.988
	Constant	-1.590	.436	13.284	1	.000	.204		
Step 3[c]	b5r1(1)	1.837	.438	17.590	1	.000	6.275	2.660	14.802
	b5r3(1)	1.861	.399	21.705	1	.000	6.427	2.938	14.059
	educ5(1)	1.412	.391	13.070	1	.000	4.106	1.909	8.830
	Constant	-2.360	.529	19.896	1	.000	.094		
Step 4[d]	b5r1(1)	1.767	.454	15.124	1	.000	5.855	2.403	14.268
	b5r3(1)	1.895	.415	20.861	1	.000	6.651	2.950	14.996
	educ5(1)	1.525	.407	14.016	1	.000	4.593	2.068	10.203
	d_health(1)	1.444	.419	11.881	1	.001	4.238	1.864	9.632
	Constant	-3.471	.665	27.271	1	.000	.031		
Step 5[e]	GRP_CEB8			12.209	2	.002			
	GRP_CEB8(1)	-1.608	.485	10.982	1	.001	.200	.077	.518
	GRP_CEB8(2)	-.118	.438	.073	1	.787	.888	.377	2.094
	b5r1(1)	2.023	.479	17.856	1	.000	7.562	2.959	19.326
	b5r3(1)	1.905	.430	19.596	1	.000	6.719	2.891	15.618
	educ5(1)	1.554	.418	13.807	1	.000	4.731	2.084	10.738
	d_health(1)	1.588	.432	13.501	1	.000	4.893	2.098	11.413
	Constant	-3.397	.718	22.396	1	.000	.033		

a. Variable(s) entered on step 1: b5r3.

b. Variable(s) entered on step 2: b5r1.

c. Variable(s) entered on step 3: educ5.

d. Variable(s) entered on step 4: d_health.

e. Variable(s) entered on step 5: GRP_CEB8.

Appendix 16 Discussion Topics and Documentation of Focus Group Discussion (FGD)

FGD for medical personnel and TBA in each district

1. Identification of Patients condition at first time
    a) What is the main reason for patients to seek care?
    b) How is their condition at first time under your treatment?
    c) What do you think whether they come to you at the right time or too late?
    d) In case it is too late, have you ever identified the causes of lateness?
    e) Can you manage the bad impact of the lateness?
    f) Does the lateness increase the fatality rate?

2. Identification of reaching the patient or Covering of area to perform their duty
    a) In case you should go to reach the patient, how long do you need to travel in average? How many km must be passed to reach the patients in average?
    b) Can you describe the coverage areas of your duty?
    c) Does it influence your performance to provide services? Why?
    d) In general, Do your patients come from close areas to your residence or far away?
    e) Are the public transportations accessible for the community?
    f) Do you have an experience to provide treatment in a difficult situation? Please describe it?

3. Identification of possible problem to provide maternal care
    - Common problem during pregnancy and delivery
        a) What is the common health problem that patients have and need your treatments?
        b) Can you handle all of the health problems? If not what kind of health problem that you cannot manage?
        c) Can you list the reasons why you cannot manage particular problem?
    - Referral system
        a) In case you cannot handle the problem, what is your next step?
        b) Will you refer the patient to the other health personnel? Why?
        c) For how long do you decide to deliver the patients to the other medical personnel?
        d) What are your considerations during referral process?
    - Drug and equipment adequacy
        a) What is the main drug or equipment needed to perform health treatment?
        b) Do you have an experience that the drug supply or equipment is inadequate?

c) How do you do to overcome that problem?

- Some consideration to provide treatment for patients

a) Do you think that ability to pay the treatment is important?
b) What is your response when you should give treatment during difficult condition (late at night, heavy rain, long way to travel and so on)?
c) Do you have some priority to treat the patients?
d) Do you run a private service and also health service in public facility?

4. The content of maternal health care

Can you mention the treatment that you provide for maternal health care during these periods?

a) Antenatal care
b) Delivery care
c) Post-delivery care

FGD with medical personnel in Haurgeulis Indramayu.

FGD with TBA in Cikarang Timur Bekasi.

FGD for married women from rural and urban areas in each district

1. Identification of health seeking behaviour
   - Consideration to seek care
   a) How is your feeling when you pregnant or giving birth? Do you think that you will expose to some complications?
   b) Are there any signs during pregnancy and delivery which you consider as normal symptoms?
   c) Based on your experiences what is your consideration to use health facility?
   d) Why do you go to health facility?
   - Constrain to seek care
   a) Do you ever have a situation in which you want to find help but you cannot do that? If yes what is the problems?
   - Preference of health treatment
      a) Who is your first priority to get a health care?
      b) What are the reasons?
   - Opinion about modern health care
      a) What is your opinion about modern health care compared to traditional care?
      b) Which one that you this is the best? Why
   - Knowledge about complications
      a) Did you ever think that pregnancy or delivery may be dangerous for your health? What kind of signs that show it will be dangerous for you?
2. Identification of problem to reach health facility and obtain adequate care
   - Distance and cost to health facility
      a) Who is the health care provider for you? It is easy to reach their help? If not why?
   - Opinion about quality of maternal care
      a) Can you rate your satisfaction of health care treatment? What is the reason form your answer?

b) What is your opinion to improve the services?

- Long queue or waiting time
  a) When you arrive at health facility are there many paperwork to do before your obtain care?
  b) Do you have an experience to be referred to the other health personnel? Can you describe your experience to me?

3. The content of maternal health care

   Can you mention the treatment that you obtain for maternal health care during these periods?

   - Antenatal care
   - Delivery care
   - Post-delivery care

FGD with women in rural areas of Sukra Indramayu

FGD with women in urban areas of Sindang Indramayu

Appendix 17 Conference Proceedings

1. Maternal health Inequality in West Java Province, Indonesia. Annual HRD Conference of Science and Engineering Faculty, Flinders University, November 2014.

2. Contextual and Compositional Effect of Maternal Health Inequality: An Evidence form Two Districts in Indonesia. Australian Population Association 17th Biennial conference, 3–5 December 2014, Hobart Australia.

3. The Level and Determinant of Maternal Mortality Inequalities in West Java Province: A Micro Level Analysis based on Population Census 2010. Australian Population Association 17th Biennial conference, 3–5 December 2014, Hobart Australia.

4. The Role of Culture to Determine Maternal Health: The Process of Candidacy in Bekasi and Indramayu. The 3rd Asian Population Association Conference to be held on 27-30 July 2015, Kuala Lumpur, Malaysia.

5. The Underlying factors of maternal Mortality: A comparison between Deceased and Surviving Women. The 3rd Asian Population Association Conference to be held on 27-30 July 2015, Kuala Lumpur, Malaysia.

6. Maternal health Inequality in West Java Province, Indonesia. Annual HRD Conference of Science and Engineering Faculty, Flinders University, 30th September – 1st October 2015.