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SOCIO-DEMOGRAPHIC FACTORS AND INCIDENCE OF CAESAREAN SECTIONS IN MOZAMBIQUE

Master´s thesis
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ABSTRACT

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The United Nation`s fifth Millennium Goal, reduction of maternal mortality, is significantly lagging behind schedule. Worldwide, approximately 600,000 mothers die each year in complications due to pregnancy and childbirth.

In emergency obstetrics, the caesarean section is a key measure used to reduce a large number of complications due to pregnancy and delivery. The concern has been the availability of surgical care in developing countries. Average caesarean section rates vary between 0.4 %—40 %, unlike WHO`s recommended 5—15 %. There is socio-demographical distribution in caesarean section rates within countries. Also the overuse of caesarean sections can be seen in some areas.

This Master`s thesis studies the distribution of caesarean sections according to socio-demographic factors in Mozambique. The data used was population—based data from years 1994—1997 and 1998—2003 from Demographic Health Survey (DHS). Mother`s age, parity, and educational level, partner´s educational level, wealth index and residential area were examined as socio-demographical factors.

According to this study, the socio-demographic factors are related to the incidence of caesarean sections in Mozambique. The connection was found by carrying out cross tabulations, Pearson`s $\chi 2$- tests and logistic regression analyses. In 1994—1997 age group and parity were associated with incidence of caesarean sections when adjusted with all confounders. The older the mother was, the higher was the risk of a caesarean section. Women having their first child had caesarean section more often than women having at least their second or third child. People living in urban areas more likely receive a caesarean section than those in rural areas. In 1998—2003, in addition to age, parity and area of residence, the study found the wealth index to be the strongly associated socio-demographic factor for caesarean section. Caesarean sections were more common among women who—or whose partners—were highly educated. Socio-demographical factors, especially parity, have stronger association in incidence of caesarean sections in subsequent time period.

Even in Maputo, the capital of Mozambique, where the caesarean section rates were the highest in 1998—2003 (12.9 %), the rate was slightly under the recommended upper limit of WHO. On the basis of this study it is not possible to draw final conclusions on overuse of caesarean sections.

Key words: socio-demographic factors, caesarean section, Demographic Health Survey, Mozambique

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Viides YK:n asettamista Vuosituhattavoitteista, äitikuolleisuuden vähentäminen, on merkittävästi jäljessä asetetusta aikataulusta. Maailmassa kuolee noin 600 000 äitiä vuosittain raskauden ja synnytyksen aiheuttamiin komplikaatioihin.

Keisarileikkauksen avulla pystytään voittamaan suuri osa vastaantulevista komplikaatioista. Huolenaiheena on ollut kirurgisen hoidon saatavuus kehitysmaissa. Keskimääräiset sektioprosentit vaihtelevat maittain 0.4 %—40 % välillä, poiketen WHO:n suosittelemasta 5—15 %:sta. Maiden sisällä sektiomäärät jakautuvat sosiodemografisten tekijöiden suhteen. Tietyillä aluilla esiintyy myös sektion ylikäyttöä.

Tässä tutkimuksessa tarkastellaan keisarileikkausten jakautumista sosiodemografisten tekijöiden mukaan Mosambikissa. Aineistona käytetään Demographic Health Surveyn (DHS) väestöpohjaista aineistoa vuosilta 1994—1997 ja 1998—2003. Sosiodemografisina tekijöinä tutkittiin äidin ikää, pariteettia, koulutusastetta, isän koulutusastetta, vaurausindeksiä ja asuinaluetta.

Tämän tutkimuksen perusteella sosiodemografiset tekijät ovat yhteydessä sektioiden esiintyvyyteen Mosambikissa. Yhteys löydettiin ristiintaulukoinnilla sekä Pearsonin $\chi 2$-testin ja logistisen regressioanalyysin avulla. Vuosina 1994—1997 ikä ja pariteetti olivat yhteydessä keisarileikkausten esiintyvyyteen, kun tulokset vakioitiin sekoittavien tekijöiden suhteen. Mitä vanhempi äiti oli, sitä suurempi oli keisarileikkauksen todennäköisyys. Ensisynnyttäjät saivat keisarileikkauksen todennäköisemmin kuin toista tai kolmatta lastaan synnyttävät ja kaupungeissa asuvat saivat todennäköisemmin keisarileikkauksen kuin maaseudulla asuvat. Vuonna 1998—2003 iän, pariteetin ja asuinalueen lisäksi tilastollisesti merkitsevä yhteys sektion saamiseen oli vaurausindeksillä. Keisarileikkaukset olivat myös yleisempiä naisilla, jotka olivat koulutettuja tai joiden puolisot olivat koulutettuja. Sosiodemografisten tekijöiden, erityisesti pariteetin, vaikutus keisarileikkauksiin on voimakkaampi myöhemmän aikajakson aikana.

Edes Maputossa, Mosambikin pääkaupungissa, jossa sektioprosentti oli korkeimmillaan vuosina 1998—2003 (12.9 %), WHO:n suosittelema yläraja ei ylittynyt. Tämän tutkimuksen perusteella ylikäytön mahdollisuutta ei voida kuitenkaan lopullisesti sulkea pois.

Avainsanat: sosiodemografiset tekijät, keisarileikkaus, Demographic Health Survey, Mosambik

Contents

1 Introduction

The United Nations set a great challenge to the world in the year 2000 – the Millennium Development Goals (MDG). 189 countries together wrote eight objectives that aimed to halve poverty and improve health, education, gender equality and the environment. In short, they adopted a blueprint for a better world – and pledged to spare no effort in fulfilling that vision. One of the key health aims was to improve maternal health and to reduce maternal mortality by a quarter from 1990 to 2015. (UN 2009.) The MDG´s have been commonly accepted as a framework for measuring the progress of these aims.

There are not many years left in the program and the results continue to lag behind the goals. Evidence shows that maternal mortality has declined at a slow rate, from 576 000 deaths in 1990 to 536 000 in 2005. This reduction amounts to an average decrease of less than 1 % annually between those years, well short of the 5.5 % annual decline required to achieve the MDG target. About 99 % of maternal deaths worldwide still occur in developing countries. (UNDP 2010.) Islam and Yoshida (2009) present that the progress has been patchy and uneven. Even if a large number of countries have progressed in improving the health of mothers and their newborns, the countries with the highest burdens of mortality and ill-health have made the least progress. There are huge inequalities between and within each country. People's well-being differs according to their geographical, economical and social groups. Rural populations have fewer opportunities for health care than urban populations, but in urban areas mortality rates can also vary widely by ethnicity and wealth status. (Islam & Yoshida 2009.)

While maternal mortality has many causes and both direct and indirect determinants, it is well known that most deaths could be prevented if adequate emergency obstetric care were to be provided in a timely manner. In emergency obstetrics, the caesarean section is a key measure used to reduce many complications due to pregnancy and delivery (Jamisse et al. 2004). The aim has been to define the most appropriate caesarean section figures for each country. Recommendation of WHO is a range of 5—15 % (WHO 1985; WHO 2009a).

Caesarean section is a lifesaving method that is invaluable. It is believed that every

woman should have the possibility for this procedure when necessary. For a long time, the problem has been poor access to, and the availability of caesarean sections in many developing countries. Caesarean section rates show a wide variation among countries in the world, ranging from 0.4 to 40 percent (Betrán et al. 2007). When the caesarean section rate is under 1 % it is obvious that there are high unmet needs among mothers for life-saving obstetric surgery (Ronsmans, Holtz & Stanton 2006).

As a new phenomenon, overuse of caesarean sections has been in the headlines of scientific publications. Overusing surgical procedures naturally has consequences for both the individual and on the public health in general. Beside variations between countries, huge variations are also found within countries and that suggests improper targeting. Several studies suggest that within countries there are huge disparities among different socio-economical groups. Within these countries the caesarean section rates vary according to wealth quintile and residence. (Ronsmans et al. 2006.) Documented scientific literature outlining technology and medical practices in developing countries is limited. Modern health-care procedures are spreading into poorer countries and it is useful to examine the consequences.

The National Institute for Health and Welfare in Finland has a research project in Mozambique, which is one of the poorest developing countries, located in Sub-Saharan Africa, where half of all maternal deaths take place (UN 2009). The research project is called “Medical technology in maternity services” (METEMA), and this Master`s thesis is a part of the project. The project gets grants from the Academy of Finland (2010: 139191).

Even if there has been some promising progress in achieving many of the MDG´s, major problems in regards to the availability and accessibility of maternal health care still remains. Mozambique has succeeded in reducing maternal mortality rates but is still a long way from achieving the set goals. The interventions that need to be pursued are: providing increased access to emergency obstetrical care, ensuring that all women deliver with the assistance of a skilled birth attendant, responding to the high unmet family planning needs and refocusing on the health needs of adolescents. (WHO 2009b.)

Distribution of caesarean sections according to different socio-demographic groups (such as age, educational level, incomes and area of residence) in the timeline has not been studied in Mozambique. There are no studies concerning the possibility of overusing caesarean sections in certain groups either. In this paper The Demographic and Health Surveys (DHS) were used as a source of data. The DHS provides the most representative and widely available source of data for birth by caesarean in developing countries. The data concerning Mozambique is available from years 1997 (1994—1997) and 2003 (1998—2003). The DHS are highly standardized and based on nationally representative samples of women of reproductive age. The final DHS country reports have shown the differences in caesarean rates by, for example, urban or rural residence, women´s education and region, but these significant differentials are rarely discussed in the published literature.

The purpose of this Master`s thesis is to examine the incidence of caesarean sections in Mozambique between years 1994 and 2003, and to study if there is difference in the incidence of caesarean sections among different socio-demographic groups. The purpose is also to find if the influence of socio-demographic factors is changing between time periods 1994—1997 and 1998—2003. This study is also examining if there appears to be overuse of caesarean sections (over 15 % of deliveries) in some socio-demographic groups in Mozambique.

2 Maternal health globally

2.1. Definitions

United Nations Population Fund (UNFPA 2011) has defined reproductive health as a state of complete physical, mental and social well-being in all matters relating to the reproductive system and to its functions and processes. It implies that people have the capability to reproduce and the freedom to decide if, when and how often to do so. Implicit in this is the right of men and women to be informed and have access to safe, effective, affordable and acceptable methods of family planning of their choice, as well as other methods of their choice for regulation of fertility, which are not against the law, and the right of access to health-care services that will enable women to go safely

through pregnancy and childbirth. Reproductive health care also includes sexual health, the purpose of which is the enhancement of life and personal relations. This definition was drawn in International Conference on Population and Development (ICPD) in Cairo in 1994. (UNFPA 2011.)

This Master`s thesis will use the WHO´s definition of maternal death:

"The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and 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 2010b, 4)

This definition identifies maternal deaths based on their causes as either direct or indirect. Direct obstetric deaths are those resulting from obstetric complications of the pregnant state (pregnancy, delivery and postpartum), from interventions, omissions, incorrect treatment, or from a chain of events resulting from any of the above. Indirect obstetric deaths are results from previous existing disease, or diseases that developed during pregnancy, and which were not due to direct obstetric causes but aggravated by physiological effects of pregnancy. For example, deaths due to aggravation of an existing cardiac or renal disease are indirect obstetric deaths. (WHO 2010b.)

2.2. Rates and causes of maternal mortality

Sciarra (2009) shows that population growth in low-income areas of the world has been rapid, but reproductive health services have not been expanded enough to provide proper maternity care for all. As a consequence, maternal mortality has become a global tragedy. Estimation concerning the rates of maternal deaths varies in different sources. According to Sciarra (2009), every year more than 600 000 women die, of whom 99 % die in low-income countries (Figure 1). Half of deaths occur in Africa. Maternal mortality is highest in Africa, Asia and Latin America. In some Latin American countries, the numbers may be as high as 200 maternal deaths per 100 000 live births, and in some regions in sub-Saharan Africa, maternal mortality may even be 1000 deaths per 100 000 live births. (Sciarra 2009.)

United Nations (2009) remarks that Eastern Asia, Northern Africa and South-Eastern Asia showed successful declines of 30 % or even more between 1990 and 2005. Southern Asia reports a decline of more than 20 % over the same period, but the number of deaths in that region still remains unacceptably high. Very little progress was achieved in sub-Saharan Africa, and women living in those areas face the greatest lifetime risk of dying as a result of pregnancy and childbirth. (UN 2009.) In high-income countries ratios are as low as 10 maternal deaths per 100 000 live births. This means that a mother's risk of dying in childbirth in developing countries can be 1 in 16, while in industrialized countries, it is only 1 in 4000. (Sciarra 2009.)

WHO (2005) notes that where nothing is done to avert maternal death, "natural" mortality is around 1000–1500 per 100 000 births. This estimate is based on historical studies and data from contemporary religious groups who do not intervene in childbirth. If women were still experiencing "natural" maternal mortality rates today – if health services were discontinued, for example – then the maternal death toll would be four times its current size, totaling over two million maternal deaths per year worldwide. (WHO 2005.)

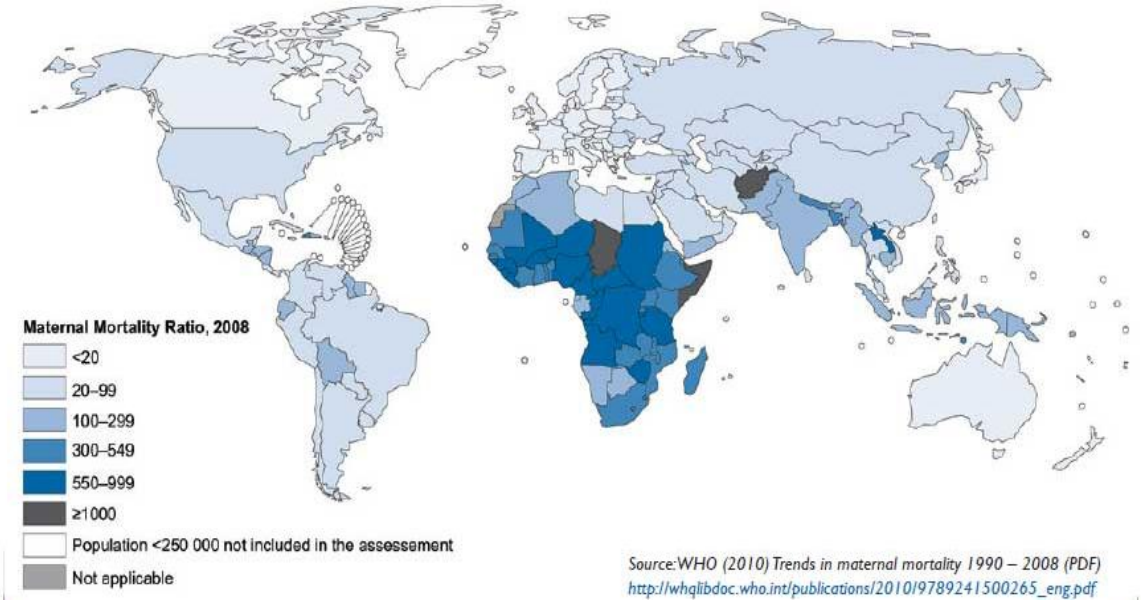

Figure 1. Maternal mortality ratio by country, 2008. (WHO 2010b)

According to the United Nations (2009) measuring maternal mortality is very challenging. Underreporting and misreporting of maternal deaths are common and estimates lie within large uncertainty intervals. Reliability of currently available data sources varies. (UN 2009.)

Sciarra (2009) remarks that complications of pregnancy and abortion are the leading causes of death among young women (15–19 years) worldwide. The tragedy of modern obstetrics is that the majority of maternal deaths are preventable with presently available medical technology. The medical causes of direct obstetric deaths in low-income countries are primarily hemorrhage, toxemia, infection, obstructed labor and deaths from induced abortion. (Sciarra 2009.) Anemia, exacerbated by malaria, HIV and other conditions, all heightens the risk of death from hemorrhage. Hemorrhage alone causes 34 per cent of maternal deaths in sub-Saharan Africa. Yet most of these conditions could be prevented or treated with good quality reproductive health services, antenatal care, skilled health workers assisting at birth, and access to emergency obstetric care. (UN 2009.)

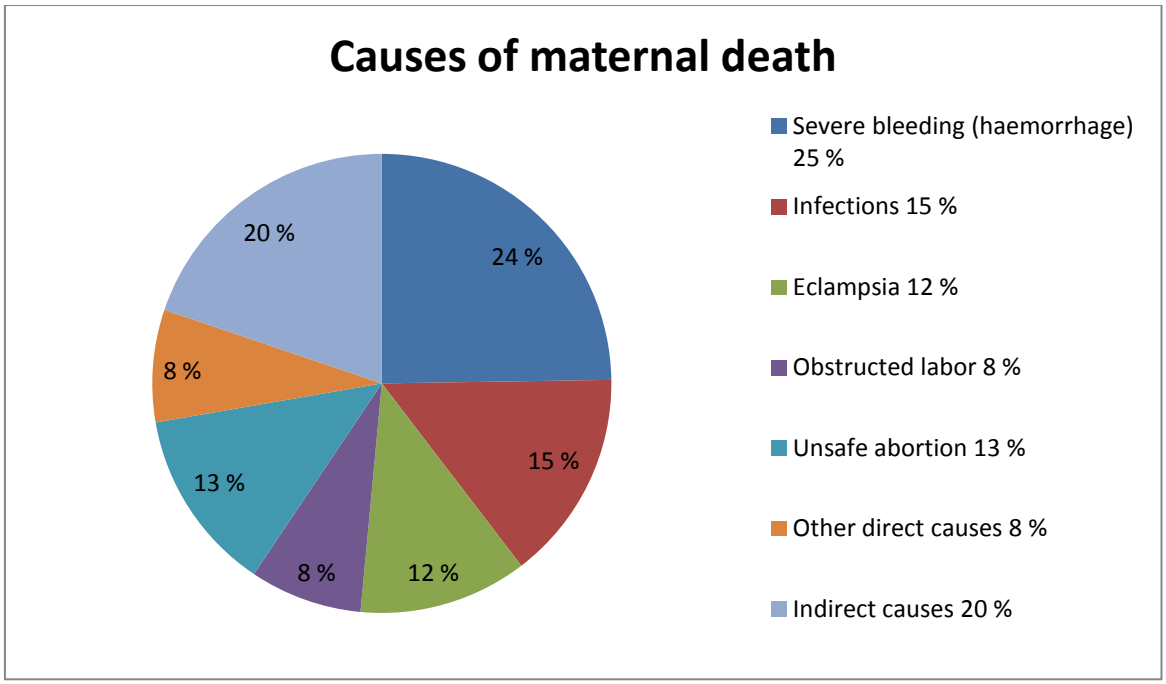

Figure 2. Causes of maternal death, 2005. (WHO 2005)

In addition to maternal mortality, maternal morbidity is a major obstetrical problem. There are at least 15 million women every year who suffer from birth-related injuries,

infections or disabilities. The result of prolonged or obstructed labor is often vesicovaginal fistula, which is a typical problem in many developing countries. Such an injury occurs when a mother has been in labor for many hours or even days. Another consequence is too often a stillbirth. Women suffer from the continual leakage of urine and are often socially isolated. (Sciarra 2009.)

2.3. Socio-demographic issues in maternity health

The weak position of women in the developing world is seen in different contexts. Female genital mutilation, early marriage, sex selection abortion and domestic violence are all problems which women are forced to face (Sciarra 2009). Early marriages contribute to a large number of teenage pregnancies. Young adolescents are more likely to die or experience complications in pregnancy and childbirth than adult women (UN 2009). Lennox (2003) explains that this phenomenon is a result of poor nutrition in the mother´s childhood and birthing at a time when the pelvis is not yet fully developed. Thus, young age and poverty can be considered as risk factors for complicated delivery (Lennox 2003).

In many areas women are forced to live in economically disadvantaged situations. According to United Nations (2009) women comprise over 50 % of the world's population and work more than 66 % of the total work hours, but generate only 15 % of the world's income, and own less than 5 % of the world's property. Only one-third of the world's women enjoy educational benefits (UN 2009). Securing women´s rights to safe motherhood must be understood as a shared interest. The death of a woman does not mean only a tragedy for a family but also for a society through an economic impact. (Milliez 2009.)

One factor maintaining maternal mortality according to Kulmala (2007) is the lack of trained health professionals. In many developing countries there are not enough graduating doctors or midwives to meet the need. In some countries education is not organized at all and when the education takes place abroad, a large proportion of the graduates stay abroad. Often many professionals also leave their home country for better salary and living conditions. (Kulmala 2007.) In addition to this Milliez (2009)

points out that the reduction of maternal mortality also depends on nonmedical policies such as the development of roads and transportation, and the financial support for underprivileged women, particularly in rural communities and remote areas (Milliez 2009).

Within countries there are large differences between rich and poor and between urban residents and rural residents (WHO 2008). Maternal mortality is one of the health indicators that displays the greatest gap between the rich and the poor - both between countries and within them (UN 2009). Also Islam (2007) highlights the prevailing inequality in safety of childbirth. According to him, there are wide variations between regions and countries, but also differences between population groups when they are examined according to economic, social or ethnic factors. Rural populations usually have weaker access to skilled care than urban residents. Within urban settings mortality is higher among urban slum populations. (Islam 2007.)

The role of mothers is certainly big in all societies. Women bear a great responsibility on children`s education process and nutrition (Chavane 2004). The complications that cause the deaths and disabilities of mothers often also damage the infants they are carrying. In cases where the mother dies, the orphans will be at a greater risk of illness and even of death. In developing countries the role of a mother is significant also as an economic source and that is why mortality carries also serious socio-economic consequences. There will be an economic impact brought about by the death of a young individual. Disability due to unsafe delivery, such as obstetric fistula, carries even greater moral and material detrimental consequences for the society at large. Therefore, rights to safe motherhood should be regarded as a profitable investment. (Milliez 2009.)

2.4. The conditions for healthy motherhood

The International Federation of Gynecology and Obstetrics (FIGO), which is the only worldwide organization that groups obstetricians and gynecologists, has named four elements to reduce maternal mortality. They call these premises “Save the Mothers Initiative”.

1. Skilled help in attendance at all births
    - During childbirth, every woman should be assisted by a health professional, who can take care of a normal delivery and detect and manage complications such as hemorrhage, shock and infection. Skilled attendants should also be able to refer women to an appropriate health facility for higher lever medical care when needed and they should have access to a functioning emergency and transport system.
2. Basic emergency obstetric care (BEmOC) in peripheral units
    - BEmOC includes the availability for injectable antibiotics, oxytoxics, anticonvulsants, provision for the manual removal of placenta or retained products and assisted vaginal delivery
3. Comprehensive emergency obstetric care (CEmOC) in referral hospitals
    - CEmOC should include also caesarean section and blood transfusion in addition to BEmOC functions
4. Rapid transport of women in need of special care (Benagiano, Fathalla, Lalonde & Thomas 2002.)

Ensuring that all women deliver with the assistance of a skilled birth attendant, responding to the high unmet family planning needs, and refocusing on the health needs of adolescents are interventions that need to be vigorously pursued (WHO 2009b). One remarkable way of reducing maternal mortality is by improving the availability, accessibility, quality and use of services for the treatment of complications that arise during pregnancy and childbirth. These services are collectively known as Emergency Obstetric Care (EmOC). (WHO 2009a.)

UN (2009) estimates that every region of the developing countries has made some progress in improving the four elements introduced above. The proportion of births attended by skilled health workers has increased from 53 per cent in 1990 to 61 per cent in 2007. Still in sub-Saharan Africa and in Southern Asia more than half of all births take place without the assistance of trained personnel. Caesarean section can be used as a proxy indicator for access to emergency obstetric care. In Sub-Saharan Africa, still only 3 per cent of all deliveries are caesarean sections. (UN 2009.)

3 Caesarean sections, from underuse to overuse

3.1. Caesarean section as a life-saving procedure

The caesarean section is a surgical intervention for preventing or treating life-threatening maternal or perinatal complications (Belizan & Althabe 2006). Caesarean section in Western health care is a safe and common way to reduce most of the difficulties arising from childbirth. When developed nations critically assess the ever-increasing rates of surgical births, women in many parts of the world do not have the possibility for a comparable operation. The caesarean section seems to be inextricably linked to the prosperity at both the national and individual level. Very low rates of caesarean section can be used as an indicator when assessing mothers' access to care. (Wylie & Mizra 2008.)

According to Villar et al. (2006) rates of caesarean delivery have risen from about 5 % in developed countries in the early 1970s to more than 50 % in some regions of the world in the late 1990s. They list some factors, which have contributed to this rise: improved surgical and anesthetic techniques, reduced risk of post-operative complications, demographic and nutritional factors, providers' and patients' perception of the safety of the procedure, changes in health systems, and patient demand. "Caesarean delivery is thought to protect against urinary incontinence, prolapse, and sexual dissatisfaction, increasing its appeal. Finally, the rise in numbers of women opting for a caesarean might also be affected by obstetricians' defense of women's rights to choose the method of their delivery", Villar refers. (Villar 2006.)

Several researchers have attempted to define the most appropriate caesarean section figures using different conceptual approaches and methodology (Atlhabe et al. 2006; Betrán 2007). WHO has recommended a range of 5—15 %. The proposed upper limit is not a target to be achieved but rather a threshold not to be exceeded. This recommendation was based on the cesarean section rates of countries with the lowest maternal and neonatal mortality rates in the world at that moment. Since those were developed countries, WHO increased the recommended cesarean section rate to 15

percent, taking into consideration, that developing countries had a larger proportion of population at risk that could benefit from cesarean section. (WHO 2009a.)

Caesarean section rates of countries or towns do not tell the whole story of the quality of services. It is important to study if the women receiving a caesarean section are those who are in most urgent need of that service or just those women using the service. WHO (2009a) has listed good indicators for estimating the quality of Emergency Obstetric Care (EmOC). It is important to consider if there are enough facilities providing EmOC and if they are well distributed. Also the women using those services need to be assessed. It is also important to evaluate if there are enough women using the facilities, are the right women (i.e. women with obstetric complications) using the facilities, and if the quality of the services is adequate. (WHO 2009a.)

Caesarean section is a recommended treatment when mother is having pre-eclampsia/eclampsia or prolonged/obstructed labor as a complication during her delivery. Pre-eclampsia/eclampsia is the reason for 8 % of maternal deaths and prolonged/obstructed labor causes 12 % of maternal deaths. This means that caesarean section is a key measure in saving 20 % of mothers, who die in due to pregnancy or delivery. (WHO 2005.)

3.2. Socio-economic trends and differences in caesarean section rates in developing countries

3.2.1 Differences between countries

As it is seen in Table 1, caesarean section rates show a wide variation among countries in the world, ranging from 0.4 to 40 percent (Betrán et al. 2007). As a contrast for alarmingly low caesarean section rates in developing countries, there are more advanced regions, where the rates have increased notably over the past decade. An increasing trend has been observed in the past 30 years. In Latin America and the Caribbean, where the average caesarean section rate is very high (29.2 %), in some subgroups extremely high caesarean rates are also documented. For example, the caesarean section rate among the richest 10 % of Brazilian women in 1996 was 77 %. That confirms that

caesareans have now become a norm for some women. (Ronsmans 2006.) The lowest caesarean section rate is in Africa (3.5 %). According to Betrán et al. (2007) an uneven distribution of caesarean sections is seen in national rates ranging from 0.4 % in Chad, 0.6 % in Madagascar, Niger and Ethiopia to 36.7 % in Mexico and 39.1 % in Brazil. Betrán and the colleagues also note that in more developed regions (including Europe, Northern America, Japan, Australia and New Zealand) the rates range between 6.2 % and 36 % with an average of 21.1 %. (Betrán et al. 2007.)

Table 1. Caesarean section rates by region and sub region and coverage of the estimates (figures in brackets represent coverage excluding data from China) (Betrán et al. 2007)

Region/subregion *	Births by caesarean section %	Range, minimum to maximum %	Coverage of estimates ** %
Africa	3.5	0.4—15.4	83
Eastern Africa	2.3	0.6—7.4	93
Middle Africa	1.8	0.4—6.0	26
Northern Africa	7.6	3.5—11.4	84
Southern Africa	14.5	6.9—15.4	93
Western Africa	1.9	0.6—6.0	95
Asia	15.9	1.0—40.5	89 (65) ***
Eastern Asia	40.5	27.4—40.5	90 (0.3) ***
South-central Asia	5.8	1.0—10.8	93
South-eastern Asia	6.8	1.0—17.4	83
Western Asia	11.7	1.5—23.3	75
Europe	19.0	6.2—36.0	99
Eastern Europe	15.2	6.2—24.7	100
Northern Europe	20.1	14.9—23.3	100
Southern Europe	24.0	8.0—36.0	97
Western Europe	20.2	13.5—24.3	100
Latin America and the Caribbean	29.2	1.7—39.1	92
Caribbean	18.1	1.7—31.3	78
Central America	31.0	7.9—39.1	98
South America	29.3	12.9—36.7	90
Northern America	24.3	22.5—24.4	100
Oceania	14.9	4.7—21.9	92
Australia /New Zealand	21.6	20.4—21.9	100
Melanesia	4.9	4.7—7.1	87
Micronesia	na	na	0
Polynesia	na	na	0
World total	**15.0**	**0.4—40.5**	**89 (74)**
More developed regions	21.1	6.2—36.0	90
Less developed countries	14.3	0.4—40.5	89 (72)
Least developed countries	2.0	04.—6.0	74

* Countries categorized according to the UN classification. Countries with a population of less than 140 000 in 2000 are not included.

** Refers to the proportion of livebirths for which nationally representative data were available.

*** Figures in brackets represent coverage excluding data from China.

na, data not available. (Betran 2007.)

According to Villar et al (2006) in 2004 to 2005, the median rate of caesarean sections in Latin America was 33 %, with the highest rates of caesarean section noted in private hospitals (51 %). In an evaluation of caesarean section rates in Latin America, 12 of the 19 countries examined had national rates above the 15 %, which is WHO`s recommendation (Wylie & Mizra 2008). Also, Flamm (2000) notes that the rate of

caesarean sections occurred at private hospitals, and exceeded 40 % in three countries in Latin America (Argentina, Brazil and Paraguay) and actually exceeded 50 % in three other countries (Chile, Columbia and Mexico). According to Flamm North American and European caesarean section rates have already been well documented for many decades. Historically, there has been little documentation on caesarean rates in Central and South America. Reports of extremely high caesarean section rates in South America have caused interest and one to wonder what is going on south of the United States border. (Flamm 2000.)

Some studies provide evidence that doctors contribute to high caesarean section rates in some areas. Hopkins (2000) shows that doctors clearly have more decision-making power in the hospital birthing situation, and their medical expertise and authority is often marshaled to convince a woman to "choose" a cesarean. Also Kilsztajn et al. (2006) have studied the maternal mortality and caesarean sections in Sao Paulo, Brazil. The writers state that the caesarean section rate in the private sector in Sao Paulo State in 2003 (80.4%) is very close to the lowest limit of vaginal deliveries recommended by the World Health Organization (85%). (Kilsztajn 2006.) There are some areas also in Asia with high caesarean section rates, like China (25.9 %) and South Korea (37 %) (Stanton 2006).

3.2.2. Differences within countries

Beside variations between countries, there are some convincing researches concerning unequal distribution of caesarean sections within countries. This suggests improper targeting (Ronsmans 2006).

Table 2 presents caesarean rates for all births demonstrating the situation in developing countries among people in different wealth quintiles. The figures are based on Demographic and Health Surveys (DHS). Caesarean section rates were extremely low among the poorest people. Less than 1 % of the poorest 20 % of the population had delivered by caesarean in 20 countries. In Chad, Ethiopia, and Pakistan none of the poorest had delivered by caesarean. (Ronsmans 2006.)

Table 2. Caesarean sections by wealth quintiles as percent of deliveries. (Ronsmans 2006)

Country	Number of deliveries	CS % Poorest quintile	CS % Middle quintile	CS % Richest quintile	CS % All women
Africa					
Burkina Faso (2003)	6077	0.20	0.20	2.16	0.66
Ghana (2003)	2245	1.53	2.41	13.35	4.18
Nigeria	3531	0.57	0.66	4.79	1.51
Mozambique (2003)	6041	0.36	0.65	8.80	2.10
Uganda (2000)	4276	2.36	2.40	2.38	2.63
Malawi (2000)	7410	1.75	2.37	4.36	2.61
Kenya (2003)	3563	1.17	2.67	11.60	4.19
South Africa (1998)	3036	9.66	13.81	32.82	15.03
Asia					
Bangladesh (2004)	4059	0.15	1.98	18.04	4.37
Indonesia (2002)	9749	1.08	1.71	13.70	4.49
India (1998)	32721	1.97	4.68	20.25	6.83
Nepal (2001)	4023	0.27	0.27	4.09	0.97
Philippines (2003)	4198	1.95	6.70	20.85	7.57
Vietnam (2002)	1306	3.69	7.57	26.06	9.71
Latin America and the Caribbean					
Colombia (2000)	2520	10.87	28.68	39.26	25.95
Haiti (2000)	3998	0.22	0.52	5.64	1.64
Peru (2000)	7098	1.42	14.84	34.54	12.28
Bolivia (2003)	5914	2.71	14.61	45.25	15.07
Brazil (1996)	2986	16.43	42.43	67.59	36.35

Table 3 shows caesarean section rates for births in urban areas and in rural areas among women in the wealthier and poorer halves of the population. In general there are higher caesarean section rates among urban women than rural rich women. Only the Central African Republic, the Philippines, the Dominican Republic, and Brazil have higher rates among rich rural women than urban women. (Ronsmans 2006.)

Table 3. The caesarean section rates by wealth quintile among urban and rural births. (Ronsmans 2006)

Country	CS % Urban	CS % Rural richer	CS % Rural poorer
Africa			
Burkina Faso (2003)	2.5	0.5	0.3
Ghana (2003)	9.0	2.5	1.3
Nigeria	3.0	2.0	0.7
Mozambique (2003)	5.8	1.1	0.3
Uganda (2000)	8.1	2.3	1.7
Malawi (2000)	4.4	2.5	2.2
Kenya (2003)	9.5	4.0	2.3
South Africa (1998)	19.9	14.8	9.2
Asia			
Bangladesh (2004)	13.5	4.4	0.4
Indonesia (2002)	7.1	5.8	0.8
India (1998)	14.5	8.4	2.2
Nepal (2001)	5.1	1.2	0.2
Philippines (2003)	10.2	11.4	2.4
Vietnam (2002)	23.4	10.6	4.4
Latin America and the Caribbean			
Colombia (2000)	30.8	23.3	14.7
Haiti (2000)	3.3	3.3	0.4
Peru (2000)	19.9	10.0	1.9
Bolivia (2003)	21.8	20.4	4.5
Brazil (1996)	41.2	52.4	16.8

Rates vary within each country according to certain factors. There are some common factors in all countries (area of residence, wealth index, level of education) but within some countries there are also some specific factors that have an influence on rates. Collin, Anwar and Ronsmans (2007) have studied inequalities in maternity care in Bangladesh and compared women with different socio-demographic profiles. They draw attention to the fact that among the richest urban women with secondary or higher education 35 % of live births were delivered by caesarean section. Among the poorest rural women without formal education the rate was only 0.1 %. Collin et al. (2007) also reported major demographic and socio-economic changes between 1991 and 2004 in the population.

Klemetti et al. (2010) describe the trends and determinants of caesarean section rates among primiparous women in rural China by using representative national surveys from 1991—2002. They outline that the rise of rates was seen in all groups of women, but with varying speed. The trend was strongest among women, who had the highest

income and health insurance and who gave birth at the highest level hospital and who lived in Eastern China. (Klemetti et al. 2010.)

Also Betràn et al. (2009) have studied mothers in eight countries in Latin America, because of high caesarean section rates. They identified women with single cephalic pregnancy at term without a previous caesarean section as the largest contributor to the overall caesarean section rate. They represented only 11.4 % of the obstetric population, yet made up 26.7 % of all the caesarean sections. He created this classification in order to help health care providers to plan practical and effective actions to reduce these rates. (Betràn 2009.)

Belizan, Althabe, Barros and Alexander (1999) found in their study a clear positive association between socioeconomic indicators and the proportion of caesarean sections. Strong associations were found between the proportion of caesarean sections and the gross national product per capita, the number of doctors per 10 000 population, the proportion of urban population, and the proportion of institutional deliveries. The proportion of caesarean sections in private hospitals was higher than that in public or social security hospitals in all countries the information was available. Although higher caesarean section rates are positively related to higher income and social class, women with low income have the greatest obstetric risk. Women assisted in public hospitals are more likely to be single, less educated, adolescent, and to have a poor medical history compared with women attending private hospitals. No medical justification exists for the finding that women with low obstetric risk, and presumably least likely to benefit from a caesarean section, had higher caesarean section rates. (Belizan et al. 1999.)

Even if caesarean section rates have increased worldwide, maternal mortality ratios in most developing countries still ranged from approximately 100 deaths to 2,000 deaths during the 1990s, showing little evidence of decline. This contrast suggests that the additional women delivered by cesarean section in developing countries are not necessarily those in the greatest need. (Stanton & Holtz 2006.)

3.3. Negative consequences of overusing caesarean sections

There are many different reasons for the overuse of caesarean sections. Hopkins (2000) studied women in Brazil, and by analyzing conversations between doctors and women during labor and delivery, and through the women´s narratives of their delivery experienced — she argues that doctors are very active participants in the ongoing construction of the culture of caesarean sections in Brazil (Hopkins 2000).

Kilsztajn (2006) refers in his article to Castro (1999), who states that in Latin America obstetricians created high demand for caesarean sections by offering them to higher socio-economic groups as a distinctive way of giving birth; people from other social groups imitate this trend assuming that if the more privileged prefer it, it must be better. (Castro 1999 in Kilsztajn 2006.)

Even if a caesarean section is often necessary to save the life of mother or infant, (and when done in modern facilities is safe), evidence of negative consequences of caesarean section is increasing. Several recent studies demonstrate varying adverse immediate or long-term consequences. Benefits and harms need to be estimated when different alternatives to deliver are compared.

Villar & co`s (2006) findings indicate that increased rates of caesarean delivery are associated with increased use of antibiotics postpartum, greater severe maternal morbidity and mortality, as well as higher fetal and neonatal morbidity. Despite the clear inverse relation between very high maternal mortality and low rates of caesarean section, this procedure (like any major surgery) carries a risk for surgical or anesthetic accident, postoperative infection, and even death of the patient. (Villar et al 2006.) A uterine scar increases the risk for uterine rupture in future pregnancies (WHO 2009a). Betràn and the colleagues (2007) have come to the same conclusion - when caesarean section rate is over 15 %, maternal mortality increases and the same happens to neonatal mortality. It has been shown that when rates rise substantially above 15 %, risks to reproductive health outcomes may begin to outweigh benefits. (Betrán et al. 2007.) WHO (2009a) highlights that where conditions in a facility are particularly precarious, the case fatality rate among women who undergo caesarean sections can be unacceptably high. Association between caesarean history and subsequent stillbirth is

not found except for some reason among black mothers, a group with the highest caesarean delivery rate in the target country (Missouri) (Salihu et al. 2006).

In a large study, in Finland, the effects of type of delivery on problems in subsequent birth were investigated. The results of the study were in line with the previous literature on the reduced number of subsequent births and increased frequency of placental problems after cesarean delivery. Also the increased risk of various abnormal positions of the fetus at birth was found. Increased risk of preterm birth, low birth weight, perinatal mortality rate and ante partum stillbirths was supported in some of their analyses. In addition, the higher rates of infants with asphyxia were found. (Hemminki et al. 2004.)

Unnecessary surgery will not only cause harm for individual mothers but has also extended impact on the economy of the country. On a larger scale the use of caesarean section needs to be seen from an economical perspective. Klemetti et al. (2010) draw attention to an economic perspective especially in areas with poor resources. The proper use of caesarean section should be a focus of international and national activities for safe motherhood and the improvement of health care systems (Klemetti et al. 2010). According to Prata, Sreenivas, Greig, Walsh & Potts (2010) the most cost-effective intervention to reduce maternal mortality is not caesarean section but family planning and safe abortion, antenatal care including misoprostol distribution for postpartum hemorrhage prevention at home deliveries, followed by sepsis treatment and facility-based postpartum hemorrhage management. (Prata et al. 2010.) Thus, it is important to find a proper way to use the surgical procedure for saving mothers lives.

Already in 1999 Belizàn et al. wrote about high caesarean section rates in Latin America. Caesarean section has become culturally accepted as a normal way of giving birth. Belizan with the colleagues call for multiprofessional co-operation to reduce the use of caesarean sections. To be effective, actions to reduce caesarean section would need to involve public health authorities, medical associations, medical schools, doctors, midwives, nurses, the media, and the general population. Scientifically tested medical approaches to decrease caesarean section rates at the hospital level are also much needed. (Belizan et al. 1999)

4 Maternal Health in Mozambique

4.1. Basic information of Mozambique

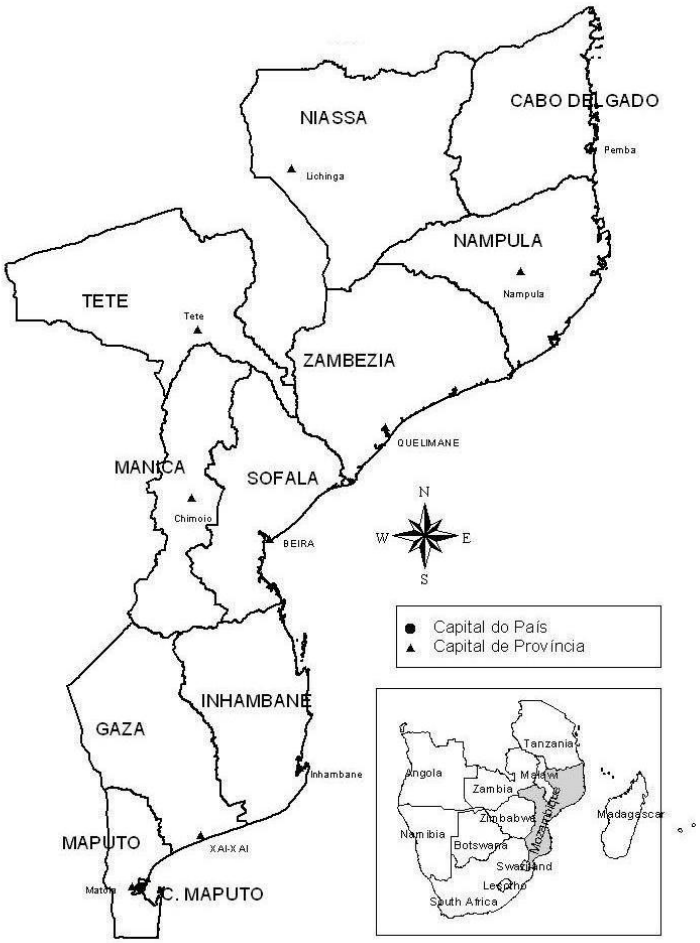

Figure 3. The map of Mozambique (Moçambique Inquérito Demográfico 2003, 2005)

Mozambique is located in Sub-Saharan Africa. It shares a border with Tanzania in North, with Malawi, Zambia, Zimbabwe and Swaziland to the West and South Africa to the South. There were 23.4 million people in Mozambique in 2010. In the same year, life expectancy at birth was 49 years (World Bank 2011). Mozambique is a developing country with GDP 530 US$ (2009) (Global Finance 2009). The Human Development Index, which is a comparative measure of life expectancy, literacy, education, and standards of living for countries worldwide, is 0.322 in Mozambique. All figures under 0.400 are categorized as "very low". Between 1985 and 2011, Mozambique's Human Development Index value has increased from 0.192 to 0.322 (UNDP 2012).

Mozambique is still one of the poorest countries in the world, but during the last decades, it has enjoyed a remarkable recovery. It has achieved an average annual rate of economic growth of 8 percent between 1996 and 2008 and also taken many steps forward when measuring with different health indicators. During the same period more than three million people have been lifted out of poverty. According to the WHO country profile 38 % of people were living in urban areas in year 2009, when the global average was 50 %. (WHO 2011.)

4.2. Health of Mozambican people

Mozambique has a typical epidemiological profile of developing countries. A weakly developed health care system is burdened by complex problems. Mozambicans need to fight against malnutrition and prevailing infectious diseases, like malaria, tuberculosis and HIV/AIDS. According to the 2009 National Survey on Prevalence, Behavioral Risks and Information about HIV and AIDS in Mozambique (INSIDA), 11.5% of Mozambicans aged 15—49 are HIV-positive (Mozambique National…2009). Although the prevalence is not as high as that of some neighboring countries, it`s impact exacerbates the intertwined problems of scarce human resources and a weak health care system (Santos et al. 2006).

Natural disasters such as droughts and floods make the Mozambican population vulnerable to additional diseases of epidemiological nature like cholera, dysentery and other diarrheal diseases. Children also suffer from low birth weight, avitaminosis and food insecurity. Four out of ten children (44 %) under 5 years old are shorter in relation to the height that they are deemed to have at their age or suffer from chronic underfeeding, and 4 % suffer from acute malnutrition (low weight to the height). In addition many kind of infections cause health problems for children. (Mozambique National…2009.)

Mozambique made substantial progress in achieving some milestones towards the Millennium Development Goals (MDG). For instance, net primary school enrollment reached 95 percent in 2010. (World Bank 2011.) Although promising progress towards

the achievement of the health-related MDG targets has been made, health outcomes are still unsatisfactory (WHO 2009b). As it is seen in Table 4 the development according to many indicators, especially concerning the health of children, is progressing slow, but to the right direction. Maternal mortality ratio is still getting even worse and will most likely not achieve the target in 2015.

Table 4. The Millennium Development Goal´s progress in Mozambique.

MDG Indicator	**1990**	**1995**	**2000**	**2005**	**2008**	**2015**
Children 1-year-old immunized against measles	59 % *	61 %	71 %	77 %	_	95 %
Infant mortality rate / 1000 live births	158 *	147	124	100	_	67
Under-five mortality rate /1000 live births	235 *	219	178	145	_	108
Contraceptive prevalence rate		5.1 %	17%	11.8 %	_	34 %
Births attended by skilled health personnel		44.2 %	47.7 %	48 %	55 %	66 %
Maternal mortality ratio / 100 000 live births	1500 *	1000	408	520 **	_	250

*Other sources, MoH data

**According to the Maternal Death UN Report 2005, the estimate for Mozambique is 520. Range 360—680 maternal deaths/100 000 live births (WHO 2009b)

Chavane (2004) describes the structure of Mozambican National Health Service. There is a pyramidal structure with four levels of care. The health posts and health centers are the base of the pyramid while the central hospitals in the three main cities are the upper referral level. Between central hospitals and health centers there are provincial hospitals in each province capital and rural Hospitals, which serve a set of 3 to 5 districts. The Administrative structure of the National Health Services in Mozambique is organized on three levels: The National Level, the Province Level and District Level. For a long time the state was the only provider of health care. The private sector started to provide care in the early 90s. There are some private clinics in the main cities of the country. (Chavane 2004.)

4.3. Mozambican mothers

Fertility still remains high in Mozambique. The total fertility rate decreased from 6.2 births per woman in 1990 to 5.5 in 2003. This means a very slow progress. The rate is very high among women in the lower three wealth quintiles. Disparities are evident in the rates between women in rural areas (6.1) and urban areas (4.4). The women with no education have a rate as high as 6.3 compared to women with secondary or higher education with a rate of 2.9. (Worldbank 2008.)

Estimates on maternal mortality in Mozambique vary according to the source and definition of maternal death. All studies agree on the fact that Mozambique has succeeded to significantly reduce maternal mortality rates. In 1990 there were 1000 maternal deaths per 100 000 live births and in 2008 the ratio was 550 maternal deaths per 100 000 live births. (World Bank 2008.) The rate is 408 /100 000 according to DHS (Inquérito Demográfico e de Saúde 2003, 2005). Both figures still tell the same story of weak maternal care of Mozambican mothers. Although a lot of work has been done and the situation is slowly getting better, there is still a long way to the MDG target of 250 maternal deaths per 100 000 live births. Not to mention that Mozambican mothers live in a remarkably unequal situation compared to western mothers with a maternal death ratio which is under 10 deaths per 100 000 live births.

According to the Demographic and Health Survey 2003 (DHS) 84.2 % of pregnant women had at least one antenatal visit, but slightly more than half (53.1 %) had four antenatal visits or more, with significant differences between urban (71 %) and rural (45 %) areas. (Moçambique Inquérito Demográfico…2005.) In addition to the number of antenatal visits, having a skilled attendant during delivery is a good indicator when quality of maternity care is measured. In Mozambique 34.1 % of women who delivered in rural areas had a skilled attendant comparing to women on urban area where 80.7 % had a skilled attendant helping them. The woman`s education also has a remarkable affect on the presence of a skilled attendant during delivery. Only 31 % of uneducated mothers had a skilled attendant compared to 81 % of mothers with an education. In urban areas 17 % of women delivered at home, but in rural area 64 % of deliveries occurred at home. (Moçambique Inquérito Demográfico…2005.)

In a prospective study Menendéz et al. **(**2008) studied the causes of maternal death in a tertiary-level referral hospital in Maputo, using complete autopsies with a histological examination. According to their findings, obstetric complications accounted for 40.5 % of maternal deaths. Hemorrhage was the most frequent single cause (16. 3 %). Also puerperal septicemia (6.6 %) and eclampsia (5.4 %) were typical causes of maternal death. Infectious diseases accounted for at least half of all maternal deaths, even though effective treatment was available for the four leading causes: HIV/AIDS, pyogenic bronchopneumonia, severe malaria and pyogenic meningitis. Thus, Menendéz suggests that a substantial reduction in maternal mortality in sub-Saharan Africa would be achieved by increasing the uptake of HIV testing during pregnancy, antiretroviral treatment of HIV-positive pregnant women and preventive measures in the general population. (Menendéz et al. 2008.) Efforts to improve malaria control in pregnancy may also have an impact on maternal mortality in sub-Saharan Africa (Romagosa et al. 2007).

In 2000, a needs assessment evaluation was conducted in Zambézia, a Province of Mozambique. The results showed that there were 1.2 basic emergency care service and 0.57 complete emergency obstetric care services for each 500,000 inhabitants when the minimum recommended by WHO is four basic and one complete emergency obstetric care service for that amount of inhabitants. (Chavane 2004; UNICEF, WHO, UNFPA 1997.) Chavane comments that 15 % of pregnancies end with complications and then they will need an obstetric intervention. The Zambézia study reveals that 93.3 % of the needs for obstetric interventions were unmet in all provinces. (Chavane 2004.)

Even if there has been promising progress towards the achievement of the health-related MDG targets in Mozambique, the health outcomes are still unsatisfactory. Mozambique needs more investment in its health system structures and functions. Primary health care needs strong support to ensure sustainability and success of disease-specific programs. Expansion of the health facility network and education of the workforce is needed to improve coverage and access to services. (WHO 2009b.)

Maternal health care system requires a lot of effort. There is enormous amount of work to do in many fields of maternity care. Increasing access to emergency obstetrical care, ensuring that all women deliver with the assistance of a skilled birth attendant,

responding to the high unmet family planning needs and refocusing on the health needs of adolescents are all interventions that need to be vigorously pursued. Newborn and postnatal care also needs attention. Health-promotion campaigns and community involvement need to be developed as well. This all is based on good nutrition and safe water which should be available for everyone along with sanitation, gender equality, literacy and human rights.

4.4. Caesarean sections in Mozambique

There are already some statistics available concerning caesarean sections in Mozambique based on DHS. The Final Reports of the surveys were conducted by Instituto Nacional de Estatìstica and the Ministry of Health. In the DHS, the respondents who had children in the last five years before the survey were asked about the type of birth of each child (whether it was vaginal or caesarean). (Mozambique Demographic 1998; Moçambique Inquérito 2005.)

According to the Final Reports the rate of caesarean sections has decreased between Survey 1997 and Survey 2003 from 2.7 % to 1.9 %. There seems to be significant differences between rural (from 1.4 % to 0.5 %) and urban (from 7.3 % to 5.3 %) area. Urban areas have higher rates, but all of these rates are notably under the recommendations of WHO (5—15 %). The only area where the rate of caesarean sections seems to be increasing is Maputo City (from 6.0 % to 9.8 %). Even that rate is beneath the recommendations. Thus, the existing statistics show that the relative underuse of caesarean sections prevails in all over the country. (Mozambique Demographic 1998; Moçambique Inquérito 2005.)

There is also one interesting point related to the parity of women. Caesarean section rate has increased from Survey 1997 to Survey 2003 among women having their first, second or third baby, but decreased among women having at least their fourth baby. (Mozambique Demographic 1998; Moçambique Inquérito 2005)

According to Pettersson et al. (2006) there were 17,000 deliveries at Maputo Central Hospital in 1997. Approximately 3,000 (17 %) of them were caesarean sections. The

proportions of low- and high-risk deliveries are not known, but the findings from an observational study indicated that more than 40 % of women admitted to Maputo Central Hospital presented one or more of the defined maternal risk variables in relation to neonatal outcome. (Pettersson et al. 2006.)

5 Aims of the study

The purpose of this Master`s thesis is to examine the incidence and distribution of caesarean sections in Mozambique according to different socio-demographic factors between 1994 and 2003. The chosen socio-demographic factors are age, parity, education, partner´s education, wealth index (year 2003), and living area (urban / rural). This study attempts to answer the question whether there is corresponding uptake of caesarean section by women across all strata of Mozambican society or whether the accessibility and availability of caesarean sections is unequal.

The study questions are:

1. What is the total incidence of caesarean sections in Mozambique between years 1994—1997 and 1998—2003?
2. Is there difference in incidence of caesarean sections among different socio-demographical groups in Mozambique? Is the influence of socio-demographic factors changing between time periods 1994—1997 and 1998—2003?
3. Does there appear to be overuse of caesarean sections (over 15 % of deliveries) in some socio-demographic groups?

6 Materials and methods

6.1. Demographic and Health Surveys

The data used in this study were from the Demographic and Health Surveys (DHS), which represent the largest worldwide effort to obtain demographic and health data from nationally representative household surveys in developing countries (Measure

DHS). As the DHS use standardized questionnaires and methods of training, data collection and data processing, they are often considered the "best available gold standard" for many types of health indicator in developing countries (Betrán 2007).

The DHS program has collected, analyzed, and disseminated accurate and representative data on population in more than 260 surveys in over 90 countries. DHS is established (1984) and primarily funded by the United States Agency for International Development (USAID). Several non-USAID supported countries have participated with funding from other donors such as UNICF, UNFPA or the World Bank. (Measure DHS.)

The basic approach of the DHS program is to collect data that are comparable across countries. Standard model questionnaires have been developed. A country is asked to adopt the model questionnaire in its entirety, but they can add questions of particular interest. DHS surveys are designed to collect data on marriage, fertility, family planning, reproductive health, child health and HIV/AIDS. Due to the subject matter of the survey, women of reproductive age (15—49) are the focus of the survey. DHS surveys utilize a minimum of two questionnaires: a Household Questionnaire and a Women´s Questionnaire. The main purpose of the Household Questionnaire is to provide the mechanism for identifying women eligible for individual interview and children under five who are to be weighed, measured, and tested for anemia. Women´s Questionnaire covers questions about background, reproductive history, knowledge and use of contraceptive methods, antenatal care, delivery care and postnatal care, breastfeeding and infant feeding practices, immunization, child health, and nutrition, marriage and recent sexual activity, fertility preferences, knowledge about HIV/AIDS and other sexually transmitted diseases and husband´s background and respondent´s work. (Measure DHS.)

The samples are generally representative on the national level, at the residence level (urban-rural) and at the regional level (departments, states). The sample is usually based on a stratified two-stage cluster design. (Measure DHS.)

DHS 1997

Fieldwork for the survey was carried out between March and July 1997. The survey gathered information on 9,282 households, which included a total of 40,433 persons. Data were gathered from 8,779 women of reproductive ages (15—49 years) and 2,335 men age 15 to 64 years. The information gathered includes fertility and reproductive behavior, maternal and child health, infant and child mortality, contraceptive knowledge and use, and knowledge and attitudes regarding HIV/AIDS. (Mozambique Demographic… 1997.) Women who had delivered in the three years preceding the survey were included in births recode. There were 4,667 deliveries in the database.

DHS 2003

The data was collected in 2003. The survey gathered information on 12,315 households, which included 12,418 women of reproductive age (15—49 years) and 2,900 men aged 15 to 59 years. Women who had delivered in the five years preceding the survey were included in births recode, which was used in this study. The number of deliveries in the database was 11,875. (Moçambique Inquérito… 2005.)

6.2. The variables and the method of analysis

In this study we will use databases from DHS concerning Mozambique in the years 1994—1997 and 1998—2003. The data set was already in PASW- format and data was analyzed using PASW Statistics 18 –program. In all analysis the limit of statistical significance was 5 %. The data was weighted according to instructions of DHS.

The surveys report whether the deliveries were by caesarean section. In 1997 all women delivered during three years preceding the survey were included. In 2003 all women delivered during five years preceding the survey were included. The other variables used in the analysis are mother's age at delivery (in five year age groups), parity (1, 2, 3, 4, 5, 6+), mother's and father`s highest level of education (none, primary, secondary, higher), area of residence (rural, urban), region (all provinces in Mozambique), wealth index (five groups) and antenatal visits (from 1 to 20). The age groups were categorized again, so that all mothers over 35 years are in the same group. “Parity” was re-categorized again. New groups were 1, 2—3, 4—5 and 6+. The groups “secondary

education" and "higher education" were combined because of small number of people in those categories. "Antenatal visits" was also categorized again so that new groups were: no visits, 1—4 visits, 5—10 visits and 11—20 visits.

Analysis was started by exploring the target group, delivered women, in two year groups according to different socio-demographic factors. Both two databases (1994—1997 and 1998—2003) were used. "Wealth index" was not available in DHS 1997. The first step was frequency distribution analysis to become familiar with the data.

In the second phase the connection of incidence of caesarean sections and socio-demographic factors were examined with the help of cross tabulations and the statistical significance (p-value) of the differences were evaluated with Pearson´s $\chi 2$-test (chi-square-test). To get population based information the weighting factor was used according to DHS guidelines (Rustein & Rojas 2006).

After getting this basic information of the data sets, logistic regression analyses were conducted to estimate the strength of influence of different socio-economic characteristics to caesarean sections. At first crude odd´s ratios (OR) and 95 % confidence levels (CI) were counted. Secondly, the analyses were adjusted for several potential confounding variables (age group, parity, area of residence, mother`s educational level, partner`s educational level). Crude and adjusted OR`s (CI 95 %) were counted separately for caesarean section and wealth index in 2003. Weighting was not used in this phase.

Also the caesarean section rates were counted for opposite ends of the socio-demographic spectrum to see in more detail how the caesarean sections are distributed among women in Mozambique.

In the next phase the interaction between the time period (1994—1997 or 1998—2003) and the socio-demographic variables (age group, parity, area of residence, education and partner`s education) with caesarean section was studied with binary logistic regression. In this phase the data was not weighted. The associations between socio-demographic factors and time period and incidence of caesarean sections were studied multivariately; all variables in Table 6 were included and all variables were adjusted

with others one by one. Statistical significance was defined as p-value <0.05 in all analyses.

Both databases include mothers who have delivered two or even three times during the time period. All the results are crude figures so that one unit in this study is delivery, not a mother. Logistic regressions were re-counted with SAS –program so that one mother was included only once and the results remained substantially the same.

7 Results

7.1 Description of the target population

There is not much change in parity between 1994—1997 and 1998—2003. Nearly half of the mothers were delivering at least their fourth child in both time periods (Table 4). Deliveries were increasingly located in urban areas: 20.5 % in 1994—1997, 28.8 % in 1998—2003. The rise in education level among delivering mothers was negligible. The percentage of women with no education increased from 41.2 % to 46.3 %, while the percentage of women with primary education is decreased from 55.7 % to 49.9 %. At the same time, women with secondary or higher education is slightly increasing (from 3.1 % to 3.8 %). Also education level among partners of delivering mothers is rising. Percentage of partners without education is slightly decreasing (from 27.4 % to 25.3 %) and so is the percentage of partners with primary education (from 64.0 % to 63.2 %). The percentage of partners with secondary or higher education (from 8.6 % to 11.6 %) is increasing. About half of pregnant women (49.9 %) had 1—4 antenatal visits in 1998—2003, in 1994—1997 the percentage was only (34.7 %). The recommendation of WHO is at least four visits for every mother. The percentage of women who didn´t have any antenatal visits significantly decreased (from 24.0 % to 14.9 %). Delivering mothers are concentrating in rural areas (from 20.5 % to 28.8 %).

Table 4. Description of the target population. Women delivered Mozambique in 1994—1997 and 1998—2003, n (%). (DHS 1997; DHS 2003)

Socio-demographic variables	Delivered women in 1994—1997.	Delivered women in 1994—1997 (weighted).	Delivered women in 1998—2003.	Delivered women in 1998—2003 (weighted).
n	1994: 1,233 1995: 1,276 1996: 1,566 1997: 592 n : 4,667	1994: 1,264 1995: 1,333 1996: 1,558 1997: 653 n: 4,809	1998: 1,729 1999: 1,977 2000: 2,215 2001: 1,926 2002: 2,120 2003: 1,907 n: 11,875	1998: 1,782 1999: 2,041 2000: 2,308 2001: 1,978 2002: 2,169 2003: 1,953 n: 12,230
Age groups, n (%)				
15—19	567 (12.1)	588 (12.2)	1,017 (8.6)	1,041 (8.5)
20—24	1,341 (28.7)	1,357 (28.2)	3,183 (26.8)	3,207 (26.2)
25—29	1,140 (24.4)	1,222 (25.4)	3,058 (25.8)	3,172 (25.9)
30—34	749 (16.0)	758 (15.8)	2,110 (17.8)	2,300 (18.8)
35+	870 (18.6)	883 (18.4)	2,506 (21.1)	2,510 (20.5)
Total	4,667 (100)	4,809 (100)	11,874 (100)	12,230 (100)
Parity, n (%)				
1	911 (19.5)	853 (17.7)	1,562 (13.2)	1,512 (12.4)
2—3	1,723 (36.9)	1,772 (36.8)	4,291 (36.1)	4,321 (35.3)
4—5	1,032 (22.1)	1,172 (24.4)	3,052 (25.7)	3,302 (27.0)
6+	1,001 (21.4)	1,013 (21.1)	2,969 (25.0)	3,096 (25.3)
Total	4,667 (100)	4,809 (100)	11,874 (100)	12,230 (100)
Area of residence, n (%)				
Urban	1,143 (24.5)	987 (20.5)	4,181 (35.2)	3,526 (28.8)
Rural	3,524 (75.5)	3,822 (79.5)	7,693 (64.8)	8,704 (71.2)
Total	4,667 (100)	4,809 (100)	11,874 (100)	12,230 (100)
Province, n (%)				
Niassa	421 (9.0)	248 (5.2)	968 (8.2)	613 (5.0)
Cabo Delgado	302 (6.5)	270 (5.6)	951 (8.0)	1,137 (9.3)
Nampula	517 (11.1)	808 (16.8)	1,364 (11.5)	2,620 (21.4)
Zambézia	376 (8.1)	791 (16.4)	1,091 (9.2)	1,857 (15.2)
Tete	309 (6.6)	216 (4.5)	1,327 (11.2)	1,269 (10.4)
Manica	560 (12.0)	331 (6.9)	1,186 (10.0)	931 (7.6)
Sofala	589 (12.6)	726 (15.1)	1,311 (11.0)	911 (7.4)
Inhambane	381 (8.2)	406 (8.4)	968 (8.2)	940 (7.7)

Gaza	477 (10.2)	512 (10.7)	1,099 (9.3)	601 (4.9)
Maputo	330 (7.1)	276 (5.7)	814 (6.9)	755 (6.2)
Maputo City	405 (8.7)	225 (4.7)	795 (6.7)	597 (4.9)
Total	4,667 (100)	4,809 (100)	11,874 (100)	12,230 (100)
Educational level, n (%)				
No education	1,799 (38.5)	1,982 (41.2)	4,923 (41.5)	5,665 (46.3)
Primary	2,694 (57.7)	2,677 (55.7)	6,368 (53.6)	6,098 (49.9)
Secondary or higher education	174 (3.8)	149 (3.1)	583 (4.9)	467 (3.8)
Total	4,667 (100)	4,809 (100)	11,874 (100)	12,230 (100)
Partner´s educational level, n (%)				
No education	929 (25.0)	1,063 (27.4)	2,391 (22.0)	2,852 (25.3)
Primary	2,363 (63.6)	2,482 (64.0)	6,985 (64.3)	7,125 (63.2)
Secondary or higher education	422 (11.4)	335 (8.6)	1,479 (13.6)	1,305 (11.6)
Total	3,714 (100)	3,880 (100)	10,855 (100)	11,282(100)
Antenatal consultation, n (%)				
No visits	763 (20.3)	1,155 (24.0)	872 (12.6)	1,055 (14.9)
1—4 visits	1,755 (46.6)	1,667 (34.7)	3,406 (49.4)	3,535 (49.9)
5—10 visits	1,234 (32.8)	1,015 (21.1)	2,602 (37.7)	2.479 (35.0)
11—20visits	15 (0.3)	11 (0.2)	21 (0.3)	14 (0.2)
Total	3,767 (80.7)	3,847 (80.0)	6,901 (58.1)	7,083 (57.9)

7.2 The women with caesarean section in Mozambique

In Figure 4 it is seen that total caesarean section rates are very low between 1994 and 2003. It is not possible to see any increase in caesarean section rates.

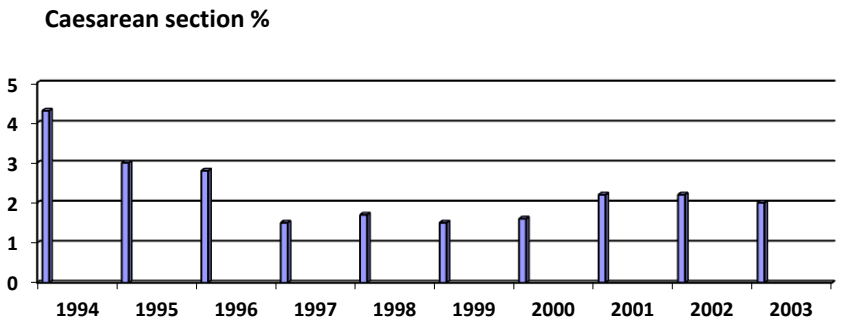

Figure 4. Total caesarean section rates from 1994 to 2003.

Statistically, no significant differences between age groups in caesarean section rates in either time period (1994—1997 and 1998—2003) were found (Table 5). Likewise, during the first period (1994—1997), a statistically significant difference between parity groups in caesarean section rates was not found. Instead, in time period of 1998—2003, those who were delivering for first time had caesarean section more often (4.5 %) compared to those who had their 2nd or 3rd baby (2.2 %), 4—5th baby (0.9 %) or at least their 6th baby (1.0 %).

In both time periods the area of residence was a significant factor in the women`s possibility to have caesarean section ($p<0.001$). As well, it was also statistically significant in which province the delivering woman lives – during both time periods ($p<0.001$). The highest caesarean section rates were found in Maputo Province (8.9 % and 6.3 %). In all other provinces the rates were 3.2 % or less during both time periods. In Maputo City the rates were 5.9 % (1994—1997) and 9.7 % (1998—2003).

Both mother`s and partner`s education was statistically significant in both time periods ($p<0.001$). There were more women with caesarean section among women with secondary or higher education (3.7 % and 11.3 %) compared to women with no education (1.4 % and 0.9 %). The results were parallel among partners. If a mother`s partner had secondary or higher education she was more likely to have caesarean section (7.4 % and 5.8 %) in both time periods than mothers with partners that were un-educated (1.8 % and 0.6 %).

The poor-rich gap in caesarean sections in time period 1998—2003 was staggering. There were statistically significant differences between the identified wealth groups in time period of 1998—2003. 8.1 % of mothers had caesarean section among the richest group. All the other groups had a rate 2.3 % or under that, which is very low.

The number of antenatal visits during pregnancy was also associated with having a caesarean section. If a women didn`t have any antenatal visits, there was only 0.4 % (1994—1997) and 0 % (1998—2003) probability of her having caesarean section for that mother. Among mothers with five or more antenatal visits the rates are 4.4 % (1994—1997) and 4.1 % (1998—2003).

Table 5. Unweighted and weighted rates of women with caesarean section in 1994—1997 and 1998—2003 according to socio-demographic variables.*

Socio-demographic variables	**Caesarean sections rate % 1994—1997**	**Caesarean sections rate % 1994—1997 (weighted)**	**Caesarean sections rate % 1998—2003**	**Caesarean sections rate % 1998—2003 (weighted)**
All delivered women, n	n=4,667	n=4,159	n=11,875	n=10,614
Women with caesarean section, year: n	1994: 29 (4.3)	1994: 21 (3.2)	1998: 3 (1.7)	1998: 1 (0.6)
	1995: 37 (3.0)	1995: 35 (2.7)	1999: 30 (1.5)	1999: 28 (1.4)
	1996: 44 (2.8)	1996: 50 (3.2)	2000: 36 (1.6)	2000: 36 (1.6)
	1997: 9 (1.5)	1997: 6 (0.9)	2001: 43 (2.2)	2001:46 (2.3)
	total: 119 (2.9)	total: 112 (2.7)	2002: 47(2.2)	2002: 61 (2.8)
			2003: 38 (2.0)	2003: 31 (1.6)
			total: 197 (1.9)	total: 203 (1.9)
Age groups, n (%)	p=0.268	p=0.223	p=0.098	p=0.311
15—19	11 (2.0)	11 (2.0)	29 (2.9)	26 (2.5)
20—24	41 (3.5)	30 (2.6)	49 (1.7)	52 (1.8)
25—29	26 (2.7)	31 (2.9)	41 (1.6)	43 (1.6)
30—34	24 (3.7)	24 (3.6)	36 (2.0)	38 (1.9)
35+	17 (2.4)	15 (2.1)	42 (2.1)	44 (2.2)
Total	119 (2.9)	112 (2.7)	197 (1.9)	203 (1.9)
Parity , n (%)	p=0,485	p=0.224	p<0.001	p<0.001
1	32 (3.7)	23 (2.8)	58 (3.8)	66 (4.5)
2—3	40 (2.7)	32 (2.1)	87 (2.3)	86 (2.2)
4—5	24 (2.7)	35 (3.5)	24 (0.9)	25 (0.9)
6+	23 (2.8)	22 (2.6)	28 (1.1)	25 (1.0)
Total	119 (2.9)	112 (2.7)	197 (1.9)	202 (1.9)
Area of residence, n (%)	p<0.001	p<0.001	p<0.001	p<0.001
Rural	43 (1.4)	46 (1.4)	43 (0.6)	39 (0.5)
Urban	76 (7.4)	66 (7.4)	154 (4.2)	165 (5.4)
Total	119 (2.9)	112 (2.7)	197 (1.9)	204 (1.9)
Province, n (%)	p<0.001	p<0.001	p<0.001	p<0.001
Niassa	10 (2.6)	7 (3.1)	12 (1.4)	4 (0.8)
Cabo Delgado	2 (0.8)	2 (0.9)	5 (0.6)	7 (0.7)
Nampula	8 (1.9)	14 (2.1)	14 (1.2)	51 (2.3)
Zambézia	5 (1.7)	20 (3.2)	6 (0.6)	9 (0.6)

Tete	2 (0.7)	2 (1.0)	7 (0.6)	5 (0.5)
Manica	12 (2.4)	9 (3.0)	8 (0.8)	6 (0.7)
Sofala	12 (2.4)	7 (1.1)	12 (1.1)	10 (1.3)
Inhambane	12 (2.4)	7 (1.9)	11 (1.3)	9 (1.1)
Gaza	13 (3.1)	10 (2.1)	19 (1.9)	10 (1.9)
Maputo	22 (7.6)	22 (8.9)	38 (5.3)	42 (6.3)
Maputo City	25 (6.8)	12 (5.9)	65 (9.5)	50 (9.7)
Total	119 (2.9)	112 (2.7)	197 (1.9)	203 (1.9)
Highest educational level, n (%)	p<0.001	p<0.001	p<0.001	p<0.001
No education	25 (1.6)	24 (1.4)	32 (0.7)	44 (0.9)
Primary	85 (3.6)	83 (3.5)	122 (2.2)	115 (2.2)
Secondary or higher education	9 (6.0)	5 (3.7)	43 (8.5)	45 (11.3)
Total	119 (2.9)	112 (2.7)	197 (1.9)	204 (1.9)
Partner´s educational level, n (%)	p<0.001	p<0.001	p<0.001	p<0.001
No education	13 (1.7)	15 (1.8)	9 (0.4)	14 (0.6)
Primary	52 (2.5)	53 (2.4)	86 (1.4)	93 (1.5)
Secondary or higher education	26 (7.0)	23 (7.4)	71 (5.5)	67 (5.8)
Total	91 (2.8)	91 (2.7)	166 (1.8)	174 (1.8)
Antenatal care, n (%)	p<0.001	p<0.001	p<0.001	p<0.001
No visits	4 (0.5)	4 (0.4)	1 (0.1)	0 (0.0)
1—4 visits	50 (2.9)	52 (3.1)	63 (1.8)	67 (1.9)
5+ visits	52 (4.3)	44(4.4)	94 (3.6)	l02 (4.1)
Total	106 (2.9)	100 (2.6)	158 (2.3)	169 (2.4)
Wealth index, n (%)	NA*	NA*	p<0.001	p<0.001
Poorest			6 (0.3)	8 (0.3)
Poorer			6 (0.3)	5 (0.2)
Middle			15 (0.7)	13 (0.6)
Richer			45 (2.2)	41 (2.3)
Richest			125 (6.5)	136 (8.1)
Total			197 (1.9)	203 (1.9)

*Pearson`s $\chi 2$-test was used for subgroup comparisons within 1994-1997 and 1998-2003 data.

Table 6 shows the odds ratios (OR) and 95 % CIs for caesarean section by socio-demographic factors in 1994—1997 and 1998—2003. In 1994—1997 age group seems to be associated with incidence of caesarean sections when adjusted with all confounders. The older a mother was the greater was the likelihood of caesarean section: ORs 3.55, 3.55, 5.36 and 4.30. Primaparas had caesarean section clearly more often than those who were delivering their second or third baby, OR 0.45 (0.23—0.88). The area of residence (rural/urban) seems to have a statistically significant influence on the caesarean section rate when adjusted with other variables OR 5.75 (3.53—9.37). The educational level of mother has statistically significant influence on the caesarean section rate (ORs 1.00, 2.27 and 3.86) but the influence of educational level vanishes when figures are adjusted with area and other confounders. The same happens to partner`s educational level.

In 1998—2003, age group is associated with incidence of caesarean sections when adjusted with all confounders. The same phenomenon as in time period 1994—1997 appears. The older the mother, the greater the chance for a caesarean section. The parity of mother was also meaningful, too. Women delivering their second or third child had an OR of 0.57 (0.36—0.89) and women delivering their fourth or fifth baby had an OR of 0.15 (0.08—0.29) and those women who were delivering at least their sixth baby had an OR of 0.13 (0.07—0.27) for caesarean section as compared to women delivering their first child. Hence, the more previous deliveries the mother had, the less likely she was to have a caesarean section. The area of residence strongly influenced the rate of caesarean section, OR 4.17 (2.76—6.30). Mothers with secondary of higher education had an OR 2.12 (1.15—3.91) for having caesarean section as compared to women with no education. Partner`s educational level was also associated with caesarean section, OR 2.08 (1.01—4.27) for primary education and, OR 3.23 (1.47—7.09) for secondary of higher education. All these results were adjusted for the selected confounders.

Table 6. ORs and adjusted ORs (95 % CIs) for having caesarean section, by socio-demographic factors among Mozambican women in 1994—1997 and 1998--2003.

Sociodemographic variables	1994—1997 OR (95 % CI) n=4,667	1994—1997 Multivariate analysis* OR (95 % CI)	1998—2003 OR (95 % CI) n=11,875	1998—2003 Multivariate analysis* OR (95 % CI)
Age groups				
15—20	1.00	1.00	1.00	1.00
20—24	1.72 (0.88-3.38)	3.55 (1.28-9.83)	0.58 (0.37-0.93)	1.03 (0.56-1.90)
25—29	1.31 (0.64-2.67)	3.55 (1.14-11.03)	0.53 (0.33-0.86)	1.56 (0.80-3.02)
30—34	1.85 (0.90-3.80)	5.36 (1.60-18.14)	0.68 (0.42-1.12)	3.68 (1.81-7.49)
35+	1.16 (0.54-2.49)	4.30 (1.15-15.94)	0.71 (0.44-1.14)	5.88 (2.72-12.70)
Parity				
1	1.00	1.00	1.00	1.00
2—3	0.72 (0.45-1.15)	0.45 (0.23-0.88)	0.59 (0.42-0.82)	0.57 (0.36-0.89)
4—5	0.72 (0.42-1.22)	0.47 (0.20-1.11)	0.24 (0.15-0.38)	0.15 (0.08-0.29)
6+	0.74 (0.43-1.27)	0.50 (0.19-1.32)	0.29 (0.18-0.45)	0.13 (0.07-0.27)
Area of residence				
Rural	1.00	1.00	1.00	1.00
Urban	5.60 (3.83-8.20)	5.75 (3.53-9.37)	6.83 (4.86-9.61)	4.17 (2.76-6.30)
Educational level				
No education	1.00	1.00	1.00	1.00
Primary	2.27 (1.45-3.56)	1.51 (0.83-2.72)	2.98 (2.02-4.41)	1.31 (0.83-2.06)
Secondary or higher education	3.86 (1.77-8.42)	1.17 (0.43-3.17)	12.33 (7.72-19.67)	2.12 (1.15-3.91)
Partner´s educational level				
No education	1.00	1.00	1.00	1.00
Primary	1.51 (0.82-2.79)	0.88 (0.46-1.70)	3.31 (1.66-6.59)	2.08 (1.01-4.27)
Secondary or higher education	4.37 (2.22-8.60)	1.34 (0.60-2.98)	13.25 (6.60-26.61)	3.23 (1.47-7.09)

*Multivariate logistic regression model, adjusted for age groups, parity, area of residence, educational level and partner`s educational level

Table 7 describes the ORs for caesarean sections at each level of wealth index in 1998—2003. As compared to the poorest quintile of women, the "richer" women had an OR of 4.80 (1.88—12.20) and the "richest" women an OR of 11.48 (4.36—30.20) for

caesarean sections when adjusted with all mentioned confounders.

Table 7. ORs and adjusted ORs (95 % CIs) for having CS, by wealth index among Mozambican women in 1998--2003.

	1998—2003 OR (95 % CI)	**1998—2003 Multivariate analysis* OR (95 % CI)**
Wealth index		
Poorest	1.00	1.00
Poorer	1.28 (0.41-3.96)	1.23 (0.40-3.83)
Middle	2.80 (1.08-7.23)	2.03 (0.75-5.46)
Richer	8.63 (3.67-20.27)	4.80 (1.88-12.20)
Richest	27.24 (11.98-61.93)	11.48 (4.36-30.20)

*Logistic regression model, adjusted by age group, parity, mother`s and partner`s education and area of residence

To evaluate, if the influence of socio-demographic factors changing between two time periods, an interaction term between time and each socio-demographic factor separately was entered into the model together with all other independent variables. There was only a little interaction between the time period (1994—1997 or 1998—2003) and the socio-demographic variables with caesarean sections.

There is, however, a statistically significant difference in incidence of caesarean sections between those two time periods OR 0.47 (0.36—0.62)—during the first time period the probability of caesarean section was higher than during the second time period. The only socio-demographic factor which had statistically significant interaction with the time period was parity (p=0.031) in these analyses. This result is parallel with Table 3, where the association with parity and caesarean sections was stronger in 1998—2003 than in 1994—1997.

7.3 Women in the opposite ends of socio-demographic spectrum

In Table 8 caesarean section rates are shown in two time periods (1994—1997 and 1998—2003) in the opposite ends of socio-demographic spectrum. Caesarean section rates were highest in women who lived in urban area and had a good education (7.4 % and 12.6 %). Both these rates are under WHO`s recommendation for upper limit rate of

15 %. Surprisingly, in period of 1994—1997 it appears as if there was slightly better possibility for caesarean section in an urban area if a mother was not educated compared to educated women (8.8 % and 7.4 %). In the period of 1998—2003 there was a greater difference in having caesarean section in urban area in different educational levels (4.3 % vs. 12.6 %). Rural women with no education were disadvantaged in both periods in caesarean sections (0.7 % and 0.3 %). If a woman lives in a rural area, she was a less liely candidate for caesarean section even if educated (0 % and 2.0 %).

According to these results there is no appearance of overuse of caesarean sections in any socio-demographic groups. The highest caesarean section rate in this study was among urban women with secondary or higher education (12.6 %) that
is still under the upper limit recommended by WHO (15 %).

Table 8. Caesarean section rates for the opposite ends of the socio-demographic spectrum during the time periods 1994--1997 and 1998—2003. Weighted.

	Caesarean sections 1994—1997 (weighted) *	**Caesarean sections 1998—2003 (weighted) ***
Urban women with secondary or higher education, n (%)	5/68 (7.4)	44/348 (12.6)
Urban women with no education, n (%)	13/148 (8.8)	30/701 (4.3)
Rural women with secondary or higher education, n(%)	0/57 (0.0)	1/51 (2.0)
Rural women with no education, n(%)	11/1,517 (0.7)	14/4,203 (0.3)

*Including women with no education and women with secondary or higher education but excluding women with primary education

8 Discussion

8.1. Summary of the results

The purpose of this Master`s thesis was to examine the incidence of caesarean sections among different socio-demographic groups in Mozambique between years 1994—2003. The possible unequal distribution among socio-demographic groups and possible change in influence of socio-demographic factors between time periods 1994—1997 and 1998—2003 was included in this study, as was possible overuse of caesarean sections.

Some socio-demographical differences in caesarean section rates in Mozambique were found. In 1994—1997, the age group of mother was associated with incidence of caesarean sections when adjusted with all confounders: the older the mother was, the higher was the risk. However, women birthing their first child were more likely to have a caesarean section than women having at least their second or third child. This association was found when adjusted with all confounders. The explanation for this might be that there are a lot of older women who are delivering their first baby and have a caesarean section. This phenomenon could be possible in urban areas among educated women. Urbanites seem to be in a better position to get a caesarean section than people in rural areas in 1994—1997. In 1998—2003, in addition to age group and the area of residence, parity was found as a statistically significant factor in the incidence of caesarean sections. The wealth index was strongly associated socio-demographic factor with caesarean sections in time period of 1998—2003. Caesarean sections were also more common among women who had secondary or higher education or whose partners had at least primary education.

Because all studied socio-demographic factors seem to have an influence on caesarean sections, it is still difficult to determine which one had the strongest influence on caesarean section rates. It is possible that all these factors - higher education, urban living area and high wealth index - are describing the same groups of people. Generally speaking, it could be said that people who live in the capital are more likely to be educated, wealthier, and have fewer children than people in rural areas.

In urban area, among women with secondary or higher education the caesarean section rate was 12.6 % in 1998—2003. In Maputo, the capital of Mozambique, where the caesarean section rates are highest, the rate was 9.7 % between 1998 and 2003. Both rates were under the recommended upper limit of WHO (15 %). This fact suggests that there is no overuse of caesarean sections among any socio-demographic groups in Mozambique. Even if the total rate is not very high, some subgroups may still have caesarean sections without medical indication. If the issue could be studied more deeply, it would be interesting to see if there is overuse among rich women living in Maputo City and if the poor women living in Maputo are able to get caesarean section when needed. On the basis of this information it is not possible to draw final conclusions, because clinical data was not available.

This study indicates that there is socio-demographic variation in caesarean section rates in Mozambique, even though the average rates are low. This means that the actual situation in the country may be even worse than could be expected on the basis of rates. It is possible that some of these surgical procedures are made without medical indication. Yet on the other hand, there are a large number of women who don´t have access to surgery when they are in urgent need of it. Eventually they might die from the complications of childbirth without getting treatment. It seems that caesarean sections are increasingly prevalent in Maputo City. This phenomenon reflects the limited resources in the country - the development takes place only in the capital, partly at the expense of rural areas.

There is statistically significant difference in incidence of caesarean sections between two indentified time periods OR 0.47 (0.36—0.62). Still, only the parity had a statistically significant interaction with the time period in the analyses (p=0.031). Multipara women were already suffering from scarce resources in the time period 1994—1997 -and in the subsequent time period the situation grew even worse.

8.2. Comparisons to previous studies

Ronsman (2006) has studied 49 developing countries about distribution of caesarean sections. Concerning the situation in Mozambique in 2003 he also used DHS, studied

wealth index and area of residence as variables. He found that caesarean rates were extremely low among the very poor: they were below 1 % for the poorest 20 % of the population in 20 countries and below 1 % for 80 % of the population in six countries. Only in five countries did the very poor have caesarean rates exceeding 5 %. In Mozambique the caesarean section rate among urban women was 5.8 %, while among rural rich the rate was 1.1 % and rural poorer 0.3 %. (Ronsman 2006). The parallel results were found in this study. Other studies on the distribution of caesarean sections in Mozambique were not found, and due to this, the results of this study include new and significant information concerning maternal health of Mozambique.

As a comparison, inequalities in maternity care have been studied also in Bangladesh by Collin, Anwar and Ronsmans (2007). They found that among the richest urban women with secondary of higher education, 35 % of live births were delivered by caesarean section. Among the poorest rural women without formal education the rate was only 0.1 %. (Collin et al. 2007.) In this study, in Mozambique, comparable rates were 9.2 % and 0.4 % in 1998—2003.

According to Jamisse (2004, 204) caesarean section is a key measure to reduce complications due to pregnancy and delivery. The results of this study show that there is still a long way to the recommended lower limit of WHO (5 %). When the caesarean section rates are as low as in Mozambique, and the situation is not really getting better, the possibility to achieve the Millennium Goal Five - to reduce maternal mortality by a quarter from 1990 to 2015 - does not really exist. (UN 2009, 3.) In many areas and especially among poor people the rates were largely under 1 % in the results of this study.

8.3. The limitations and strength of the study

There are some limitations in this study. The information of wealth index was not available in data 1994—1997, which is a pity, because in time period 1998—2003 it had the most strongly associated influence on caesarean section rates. In 2011, a new DHS survey was conducted in Mozambique, but it is not expected to be available until the end of 2012. It would have been interesting to include that information in this study.

The recall periods were different in these two databases; four years for the first database and six years for subsequent database. All years were included, because of the gained power by aggregating all available data.

There were some challenges when the data was analyzed. The material had to be cleaned first, because it included women from a large time period. Another problem was the fact that there were some women who had delivered more than once during the chosen time period and the database included information of all those births. After re-counting figures with SAS-program and finding that the results remained substantially the same, it was decided to keep the crude results, so that all deliveries are included in data. After that we had to concentrate on weighting the sample according to the instructions of DHS.

The strengths of this study are large sample size, the representativeness and nationwide nature of data. The data presents a unique opportunity to assess the factors relating to reproductive health. Because of the data collecting technique and weighting, the sample is representative at the national level, at the residence level and at the regional level. The fact that makes information of caesarean sections quite easy to collect by survey is that mothers do remember if they have gone through that procedure. It is more reliable to remember that comparing to other variables like the number of antenatal care visits. There are different factors that have an influence on the reliability of the data of socio-demographical factors and some of them are hard to assess, for example the reliability of the numeral information interviewed people know or want to give. The used variables are categorized and unambiguous, which makes analyzing more reliable. The alternatives in each question were also made very easy to choose to avoid mistakes.

The results of this study may be generalized to other developing countries, which are in the same phase of development. There are not many countries studied as deeply as Mozambique in this study. The results of this study could be useful when planning development projects on health care sector.

9 Conclusions

This study brought out unequal socio-demographical distribution in caesarean section rates in Mozambique. Age, parity, area of residence were associated with caesarean section rate during 1994—1997. During subsequent time period, 1998—2003, also wealth index and both mother`s and partner`s education was associated with caesarean section rate. The association with parity and caesarean section rate strengthened. General information on the average caesarean section rates of the country is not telling the whole story. When some sub groups within the country are able to have caesarean section when needed, the others are suffering from a real scarcity of services. Multipara women are increasingly suffering from scarce of resources.

More studies are needed on this topic. It would be useful to study additional clinical data from individual hospitals to see what kind of indications there are for caesarean section and to examine if all women having undergone this operation had a medical diagnosis. Also, it would be interesting to examine the trend of caesarean section rates during a longer timeline to see if the resources are locating increasingly in the capital at the expense of rural area. This fact would be important to regard in policy decisions considering educating and committing new doctors.

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