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# Beyond 'Cesarean Overuse'

*Hospital-Based Audits of Obstetric Care and  
Maternal Near Miss in Tehran, Iran*

SOHEILA MOHAMMADI



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### **Abstract**

Mohammadi, S. 2016. Beyond 'Cesarean Overuse'. Hospital-Based Audits of Obstetric Care and Maternal Near Miss in Tehran, Iran. *Digital Comprehensive Summaries of Uppsala Dissertations from the Faculty of Medicine* 1280. 95 pp. Uppsala: Acta Universitatis Upsaliensis. ISBN 978-91-554-9757-6.

With one in two women delivering surgically, Iran has one of the highest rates of cesarean section (CS) worldwide. CS overuse in low-risk pregnancies potentially exposes women to Maternal Near-Miss (MNM) morbidity with minimal health benefits. This thesis studied obstetric care quality and MNM at hospitals with high rates of CS in Tehran, Iran.

In Study I, we investigated whether audits of CS indications and feedback influenced CS rates at a general hospital. Subsequent to the audit, a 27% reduction in the risk of primary CS was found.

In Study II, characteristics of MNM were investigated at university hospitals between 2012 and 2014. During a 26-month period, 82 MNM cases were identified using the WHO MNM approach. Severe postpartum hemorrhage (35%), severe preeclampsia (32%), and placenta previa including abnormally invasive placenta (10%) were the main three causes of MNM. Iran has a huge influx of migrants from Afghanistan. Women with antepartum CS and those who lacked health insurance, almost all Afghans, had increased risk of MNM.

In Study III, audits examined whether MNM care quality differed between 54 Iranians and 22 Afghans and whether near-miss events were preventable. A majority of MNM cases (62%) arrived at hospital in a moribund state and obstetric care was more suboptimal for Afghans than Iranians (adjusted odds ratio 5.1, 95% confidence interval 1.2–22.6). Moreover, MNM was commonly (71%) potentially preventable and professionals with suboptimal practice were involved in 85% of preventable cases.

In Study IV, a qualitative interview study was conducted to explore care experiences of Afghan MNM survivors. Discrimination, insufficient medical attention, and ineffective counseling were the main experiences. To a lesser extent, poverty and low education were perceived as contributing factors to delays in accessing care.

This thesis emphasizes the importance of high-quality care for preventing undesirable maternal outcomes. The audit method along with interviews was useful to determine quality and equity gaps in care provision. Policymakers and professionals should consider these gaps when structuring programs to reduce adverse maternal outcomes.

**Keywords:** Caesarean section, maternal near miss, clinical audit, care quality, care experience, Afghan migrants, Iran

*Soheila Mohammadi, Department of Women's and Children's Health, International Maternal and Child Health (IMCH), Akademiska sjukhuset, Uppsala University, SE-75185 Uppsala, Sweden.*

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Whoever saves one life, saves all of humanity.

Quran [5:32]

*To all mothers, whose lives are worth saving!*



# List of Papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.

- I Mohammadi S, Källestål C, Essén B. Clinical audit: a practical strategy for reducing cesarean section rates in a general hospital in Tehran, Iran. *J Reprod Med*. 2012;57(1–2):43–8.
- II Mohammadi S, Essén B, Fallahian M, Taheripanah R, Saleh Gargari S, Källestål C. Maternal near-miss at university hospitals with cesarean overuse: an incident case-control study. *Acta Obstet Gynecol Scand*. 2016;96(7):777–86.
- III Mohammadi S, Saleh S, Fallahian M, Källestål C, Ziaei S, Essén B. Afghan migrants face more suboptimal care than natives: a maternal near-miss audit study at university hospitals in Tehran, Iran. Submitted manuscript in *BMC Pregnancy and Childbirth*. 2015.
- IV Mohammadi S, Carlbom A, Taheripanah R, Essén B. ‘Who cares for Afghanis?’ Care experiences of migrant mothers surviving near-miss morbidity in Iran. Submitted manuscript in *Ethnicity and Health*. 2016.

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# Abbreviations

AIP	Abnormally Invasive Placenta
AOR	Adjusted Odds Ratio
BMI	Body Mass Index
CI	Confidence Interval
CS	Cesarean Section
CTG	Cardiotocography
FFP	Fresh Frozen Plasma
FHR	Fetal Heart Rate
FIGO	International Federation of Gynecology and Obstetrics
H	Hypothesis
ICU	Intensive Care Unit
INR	International Normalization Ratio
IMCH	International Maternal and Child Health
MNM	Maternal Near Miss
MMR	Maternal Mortality Ratio
MOHME	Ministry of Health and Medical Education
NICU	Neonatal Intensive Care Unit
OR	Odds Ratio
PPH	Postpartum Hemorrhage
SBMU	Shahid Beheshti University of Medical Sciences
SES	Socioeconomic status
SSO	Social Security Organization
UNHCR	United Nation High Commissioner for Refugees
WHO	World Health Organization

# Glossary

**Antepartum cesarean section:** cesarean sections performed before the onset of uterine contractions and cervical change.

**Extremely preterm birth:** a baby born alive before 28 weeks of pregnancy is completed.

**Preterm birth:** a baby born alive between 28–37 weeks of pregnancy is completed.

**Gender parity index:** the ratio of girls to boys in primary, secondary, and tertiary education.

**Health inequality:** differences in the health of persons or groups regardless of moral judgment.

**Health inequity or disparity:** health inequality that indicates unfair differences in health, in other words, health differences that are preventable by reasonable means and allowing them to persist is unjust.

**Intrapartum cesarean section:** cesarean sections performed after uterine contractions had started and resulted in cervical effacement.

**Maternal mortality ratio:** number of maternal deaths per 100,000 live births.

**Maternal near miss:** a woman who almost died but survived a severe complication that occurred during pregnancy, childbirth, or within six weeks postnatal.

**Maternal near-miss ratio:** number of maternal near misses per 1,000 live births.

**Migrant:** a person who moves/has moved from his/her habitual place of residence, disregarding the person's legal status, the causes for moving, whether it is chosen or not, and the length of the stay.

**Obstetric hemorrhage:** excessive bleeding because of an abnormality in the process of childbirth.

**Refugee:** a person in an intolerable situation who flees conflict or persecution and crosses national borders to seek safety. It is often dangerous for a refugee to return home and denial of asylum can have deadly consequences for him/her.

**Stillbirth:** a fetus born dead after 24 completed weeks of pregnancy.

# Preface

It was a warm sunny day; I planned to conduct my first interview with a mother in the obstetric ward. That day, I did not perform my role as an obstetrician; neither did I wear my white robe. The first interview turned out to be a bitter, sorrowful, and unforgettable experience. I vividly recall her timid face as she gazed absently out the window. Sitting on the bed in her pink hospital gown her eyes were filled with sadness. Mahgol, a very shy and quiet woman, had three school children at home. Her husband was out trying to find and buy the medication that had been prescribed to her. After having her three childbirths at home, she had been admitted to the hospital nine days ago for her fourth childbirth in hopes of having a safer experience. However, she had developed severe pregnancy-related complications while giving birth and had been transferred from the intensive care unit to the obstetric ward two days ago. Her main request was to be discharged from the hospital quickly. Sadly, her baby and her womb were lost this time!

A mother is the core of a family with the privilege to reproduce. A family is the most fundamental institution in a society. Although healthy people are important to a society's improvement, maternal health is central to sustainable development. Therefore, providing healthcare for mothers should not only be a serious priority for obstetric professionals and health planners, but also a mandatory element in national development agendas. It is essential for societies to protect women's rights to life and health, particularly during the risky periods of reproduction.

Despite advanced developments in science and technology in the 21<sup>st</sup> century, women still face preventable undesirable outcomes during pregnancy and childbirth. On one hand, the availability and ease of access to medical services has resulted in the rising trend of surgical birth, which is a challenging phenomenon in current obstetrics. On the other hand, war, violence, and insecurity have motivated great waves of migration over decades. Migration is another challenging phenomenon in obstetrics because migrants have an increased risk of maternal severe outcomes compared to their hosts.

In Iran, both cesarean overuse and a huge migrant influx from Afghanistan have challenged maternal health efforts. This thesis comprises hospital-based studies conducted in such a context in Tehran. The research journey started years ago. During my career as an obstetrician and gynecologist in a large and well-established public hospital on the outskirts of Tehran, I developed ideas about improving the quality of care services. There, concerted efforts were made into finding scientific solutions to improve services and enhance patient satisfaction. Those efforts resulted in many major and minor improvements, leading me to develop my career to be the first woman, and the youngest ever, director of that hospital. The first study shows the impact of one of those achievements: reducing cesarean deliveries by introducing a clinical audits strategy at that hospital.

The continuation of these efforts to acquire academic knowledge and to develop a better understanding of healthcare problems eventually led me to the Department of Women's and Children's Health, International Maternal and Child Health, at Uppsala University in Sweden. The second to fourth studies are the results of an international collaborative project that was carried out at three university hospitals affiliated with Shahid Beheshti University of Medical Sciences in Tehran. This time, as a researcher, I stepped into the hospitals that were my medical school 20 years ago. My knowledge and experiences of obstetrics and public health, along with the possibility to compare the quantity and quality of maternity care between two countries, provided a unique opportunity to investigate the challenges of promoting high-quality care in this setting.

I hope that this thesis increases the awareness of medical students, care professionals, and maternal health experts and contributes to the improvement of obstetric care quality. My wish is that each and every mother, while pregnant, during childbirth, and afterwards, would receive effective care that not only results in desirable outcomes for her and her baby, but also a memorable experience of humane and respectful services.

Soheila Mohammadi  
September 2016  
Uppsala

# Introduction

Considerable efforts have been made to scale up essential interventions to improve maternal survival by the 2015 deadline for the eight Millennium Development Goals [1,2]. Yet, adverse maternity outcomes are unacceptably high and often preventable [3]. Modern obstetrics, with high coverage of institutional delivery, has been accompanied by a significant rise in cesarean section (CS) births and a shift of undesirable outcomes from community to health facilities [1,4]. The dramatic increase in CS births is an example that suggests ‘too much’ use of obstetric interventions unsupported by evidence, which is potentially harmful [5,6]. Therefore, the inherent assumption for encouraging institutional delivery, that is, ensuring optimal care and desirable outcomes, remains to be accomplished successfully [7,8].

Millions of childbearing women are forcibly displaced in the world, making the provision of optimal and equitable maternal care challenging for hosting countries [9,10]. Migrants have a variety of socioeconomic statuses, cultural values, and risk profiles. Moreover, health systems, maternal health resources, and obstetric care vary from country to country. Therefore, specific research is required to inform practice accurately in each setting [10]. Ending preventable adverse outcomes in the post-2015 era, beyond essential interventions, requires high-quality care provision in a humane environment for all women [2,11]. The focus of this thesis is obstetric care quality in a setting with CS overuse that serves an Afghan minority, in Iran.

## Cesarean Section

CS is basically a life-saving procedure in obstetrics with certain maternal and fetal indications. The optimal rates of CS vary from country to country depending on healthcare resources, access to services, obstetric practice, among other factors [12]. However, two recent reviews of ecological studies show that neither maternal nor perinatal outcomes benefit when population-based CS rates increase above 16% to 19%

[12,13]. In recent decades, the rising CS births rate has been one of the major challenging public health concerns in many countries [13–16].

### The increasing trend in CS rates and its consequences

The CS rate worldwide increased from 7% in 1990 to 19% in 2014 with a considerable variation between, and also within, regions and countries [6]. In Africa, the national CS rate of 2% in Burkina Faso compared to the rate of 52% in Egypt indicates inequity in access and usage of maternal health services. Asia, with the largest average annual increase of CS rates in the world, shows a similar pattern of extreme variation in CS rates, even between neighboring countries such as Afghanistan (CS rate: 4%), Iran (CS rate: 48%), and Iraq (CS rate: 22%) (Figure1) [6].

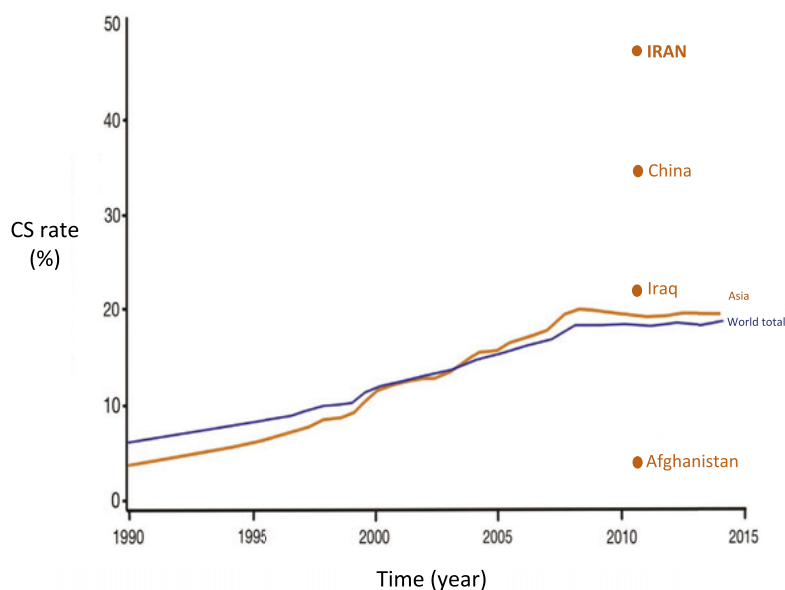


Figure 1. CS trends worldwide and in Asia, 1990–2014, and the variation of CS rates between four Asian countries in 2011 [6].

The most dramatic increase in CS birth is among women with low-risk pregnancy in poor-resource settings [17]. Safety causes concern in both situations, where poor women or those living in rural areas can hardly afford access to CS when it is needed, and when too many CSs are performed for women with high socioeconomic status (SES) at private hospitals [18,19].

The importance of rising CS trends is based on the negative consequences it has on maternal and perinatal outcomes at higher costs [20,21]. For instance, the risk of maternal mortality and maternal near-miss (MNM) morbidity with CS deliveries is higher than with vaginal birth [22–24]. CS is a major risk factor for postpartum endometritis, wound infections, and thromboembolic disorders [25]. Placenta previa and previous CS scars are well-known risk factors for the development of abnormally invasive placenta (AIP) [26]. The incidence of AIP grows considerably in those settings that face an elevation of CS births [27]. The risks of obstetric hysterectomy, intra-abdominal adhesions, surgical injuries, blood transfusions, placenta previa, and AIP, all climb significantly with increasing number of CS [28]. Moreover, neonatal respiratory distress syndrome, asthma, and even serious breathing disorders are common among babies delivered by elective CS [29].

Globally, the cost of unnecessary CS is estimated at about 2.3 billion US dollars, while the cost of the needed CS is approximately 432 million US dollars [21]. In other words, the economic expense of unnecessary CS can cover more than five times the required finance for the unmet needs [30]. Consequently, the burden of non-indicated CS on the health system can set up potent barriers to provide coverage of necessary care for disadvantaged women and can create marked inequity within maternal and perinatal health outcomes [30,31].

## The underlying reasons for increased CS births

The increase in CS births has been a debated concern among maternal health experts, obstetricians, researchers, policy makers, and managers over decades [32,33]. In addition to obstetric indications, a number of non-medical reasons may contribute to the high rates of CS [34]. Understanding these reasons is important for developing successful strategies to address the high rates. Figure 2 schematically shows the underlying reasons classified into women-, obstetrician-, and health system-related categories.

Women's concerns about urinary incontinence, pelvic relaxation, and sexual dissatisfaction, as well as a misunderstanding about the safety of surgical birth, are repeatedly reported in studies [35,36]. CS is more frequently performed in private than in public hospitals and for rich rather than poor women, indicating a relationship between SES and CS [18,19]. Cultural factors such as choosing the birth date based on luck and fate, and scheduling a CS for convenience, are also factors that influence women's choice of surgical birth [37,38]. Moreover,

psychological reasons, such as anxiety due to previous birth experience or sexual abuse, may result in maternal request for CS [39]. A recent systematic review shows that, although maternal request for CS may influence CS rates, only a minority of women worldwide express a preference for surgical birth [40]. CS on demand is a debated issue and some publications suggest it to be ethically acceptable if only adequate guidance and information are provided to women for decision-making [41,42]. However, the International Federation of Gynecology and Obstetrics (FIGO) states that performing CS for non-medical reasons is ethically non-justified due to its potential hazards and overuse of limited resources [43].

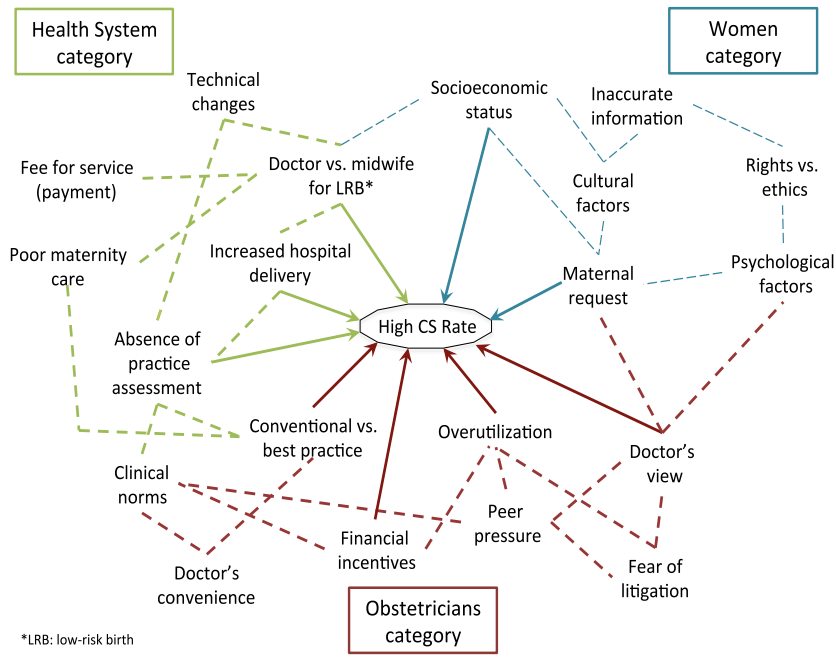


Figure 2. Non-obstetric reasons and high rates of CS.

Obstetricians' fear of malpractice litigation is suggested to contribute to the rising CS rates [44,45]. However, along with the rise of CS rates, the number of malpractice suits have climbed due to poor quality of practice [46]. Scheduled surgical births are more compatible with performing other gynecologic operations and having active office practice, and assist obstetricians to achieve work-life balance conveniently [20]. Moreover, considering CS as a safe medical procedure facilitates performing the



operation with a lower threshold of abnormality in obstetric conditions [47,48]. Obstetricians claim that having more resources in the form of experienced personnel and equipment, as well as effective leadership, are needed to practice on the basis of evidence [49].

Health systems perform a critical role in keeping the national CS rate low. For instance, midwives and general practitioners provide maternity care to low-risk pregnancies in the Netherlands [50]. Mothers may choose to give birth at home or at hospital with the attendance of primary healthcare professionals [50]. Sweden has a well-established midwifery system and midwives are routinely in charge of all normal pregnancies and low-risk births. While the Swedish national CS rate of 16% is among the lowest in the world, the lifetime risk of maternal death in Sweden is 1 in 12,900 women [6,51]. Payment for services is an important factor that affects obstetric practice [52]. Some payment schedules charge a higher price for CS than vaginal birth and may even offer hospitals a better option for profit. In the United States, CS is the most commonly performed operation and the rate of CS varies enormously among hospitals [52]. However, the national CS rate of 33% has been unable to reduce maternal and perinatal deaths and creates more public health challenges [6,20]. Health systems have the greatest power to influence obstetric practice for CS by setting out tighter regulations, changing financial policies, providing reimbursement for vaginal births, and running assessment programs [52].

Evidence-based strategies of reducing CS deliveries have been the focus of intensive research worldwide [14,53]. Concerted efforts, including the active management of labor, training healthcare professionals, encouraging vaginal birth after CS, implementing clinical guidelines, and financial incentives with different results, have been channeled into lowering CS rates [14,53–55]. The WHO Statement on CS rates in 2015 underlined that “Every effort should be made to provide caesarean sections to women in need, rather than striving to achieve a specific rate” [56,57]. In recent years, the CS rate has been increasingly recognized as a quality indicator for obstetric performance [34]. Appropriateness rather than frequency of CS births has thus become a matter of discussions among maternal health experts [34]. To ensure the safest method of delivery for women and their babies, clinical audits are recommended to continuously monitor the quality of obstetric care in a systematic way [50,58].

## Maternal near miss

MNM is defined as a woman with severe life-threatening conditions during pregnancy, childbirth or the postnatal period who nearly died but survived with luck or good care on her side [59,60]. As maternal death becomes a rare event in many countries, MNM audits produces major benefits compared with mortality reviews because it occurs more frequently in absolute numbers, and MNM investigations produce rapid results in situation analyses [61]. Moreover, as mothers with near-miss morbidity survive the serious events, women's voices can be heard directly and the first-hand information obtained will benefit maternal health strategies [62].

Until recently, MNM studies have used a wide variety of criteria for the identification of cases that are mainly grouped into clinical, management, and organ system dysfunction categories. Each category of identification criteria has disadvantages that affect the reported frequencies and rates of MNM, making comparisons of the results over time and across settings problematic [63].

A WHO working group in 2011 published a standard approach to evaluating care quality for MNM. In this approach, a uniform definition and case-identification criteria for MNM were applied [60]. Routine use of this approach has been suggested in all facilities that admit women for childbirth with potential pregnancy-related complications [60]. In this approach, Mantel's theory about the sequence of events that leads to organ dysfunctions is used to set the identification criteria of MNM [59]. Schematically, on the bottom of the pyramid, there is the population of pregnant women who are mostly healthy. A list of complications with sequential overlapping events may change women's status leading from health to organ dysfunctions, organ failures, and death (Figure 3). Maternal health and safety reduces from the bottom to the top of the pyramid where safety is the least prominent and a mother dies [59].

Considering this continuum, near-miss mothers experience different levels of severity but what all of them have in common is that they represent and survive organ dysfunctions that happen or are aggravated by pregnancy-related complications [64]. Delays that women face indirectly contribute to the development of MNM and deaths. These delays are known as the 'three delays' and encompass 1) delay in seeking medical attention for an obstetric complication for reasons of cost, lack of knowledge, lack of perception of illness severity, and gender inequality; 2) delay in accessing and reaching an appropriate health facility for reasons of distance, road infrastructure, and transportation; 3) delay in receiving appropriate obstetric care when a facility is reached

for reasons of shortages in care professionals, medical supplies, and poor care quality [65].

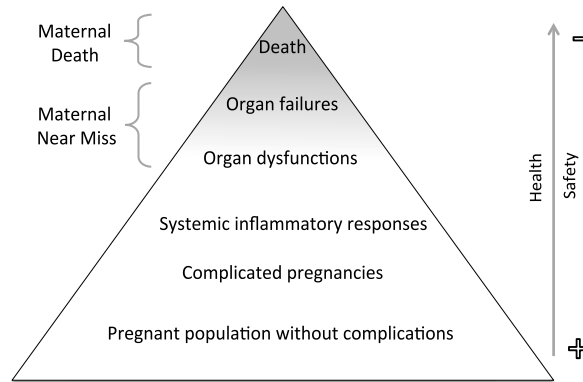


Figure 3. Event sequences from health to death in the pregnant population [59].

MNM studies suggest that mothers who are already in a critical condition upon arrival at hospitals have more frequently faced barriers to seeking and accessing care in so-called pre-hospital delays, while near-miss events that develop during hospitalization are more likely related to suboptimal care at health centers [62,66].

There are different degrees of near-miss consequences for a mother and her family. The mother who survives can experience minor short-term morbidity to long-term severe disability with financial and social consequences [67]. Non-somatic consequences are sometimes hidden behind the somatic sequelae of MNM [68]. Near-miss morbidity not only threatens mothers' lives but it can also destroy families and marital relations [67,69]. On the one hand, surviving mothers deal with the physical stress and strains of severe morbidities and the loss of the baby; on the other hand, they feel deep shame in being unable to complete their reproduction task [70]. Infertility and perinatal mortality, as consequences of MNM, may add to the self-blame and, together with social stigma, can become a reason for men to seek divorce [67]. The financial burdens of severe morbidity, with long-term hospital care and recovery time, can also indirectly affect the quality of life for the whole family. These consequences are a particularly significant burden for socioeconomically disadvantaged women. High-quality care provision with early recognition and appropriate management of pregnancy-induced complications can avert adverse maternal outcomes.

# Quality in healthcare

The critical role of high-quality healthcare in achieving desirable outcomes is well documented [71,72]. The challenge is that quality in healthcare is a multidimensional concept (Table1) and having both a good understanding of these dimensions and a methodical way to evaluate them are critical for achieving desirable outcomes [1,73].

The industrial approach to quality assurance was introduced into healthcare in the late 20th century, yet there is no universally accepted definition for quality of care [73]. According to the WHO, quality of care is “the extent to which healthcare services provided to individuals and patient populations improve desired outcomes. In order to achieve this, healthcare must be safe, effective, timely, efficient, equitable, and people-centered” [1,74].

According to the cumulative efforts of Sheila Leatherman and her colleagues and Lord Darzi in the UK, quality in healthcare means clinical effectiveness, safety, and patients’ good experiences [75]. Clinical indicators, such as survival and complication rates, measure care effectiveness, while prevention of avoidable harms, such as excessive drug errors and healthcare-associated infections, ensure patient safety. Lastly, the quality of caring, respect, and dignity with which patients are treated results in good experiences and satisfaction for patients [75].

Table 1. Dimensions of healthcare quality [76,77]

Dimension	Description
Effectiveness	• Evidence-based, resulting in desired outcomes for those in need.
Efficiency	• Maximum benefit within available resources while avoiding waste.
Accessibility	• Geographically: road infrastructure, distance, and transports. • Financially: affordability and willingness to pay for the costs. • Organizationally: human resources, clinic hours, waiting time. • Linguistically: care professionals’ ability to communicate clearly. • Physically: ‘user-friendly’ layout of care facilities.
Acceptability	• Respecting patients’ values and cultural preferences.
Timeliness	• Reducing delays in the provision and the receipt of care.
Equity	• Fair provision to those in need regardless of personal backgrounds.
Safety	• Preventing avoidable risks and harm to patients.

## Quality in maternal care

Hulton and her co-workers incorporated the reproductive rights of women in quality definition and defined care quality in the context of maternal health as follows: “Quality of care is the degree to which maternal health services for individuals and populations increase the likelihood of timely and appropriate treatment for the purpose of achieving desired outcomes that are both consistent with current professional knowledge and uphold basic reproductive rights” [78,79]. In recent years, a body of efforts has concentrated on women’s perceptions of the received care during pregnancy and childbirth to better understand quality in maternal care [70,80]. Women’s experiences provide information on different aspects of quality that have considerable impact on their care-seeking behavior, care utilization, and the reduction in maternal adverse outcomes [80]. Literature shows that women experience a wide typology of mistreatment while pregnant and during childbirth in the world [81]. Women’s basic human rights are commonly denied within families, by care professionals, and by health systems [81]. For instance, ignoring women’s autonomy, suboptimal care, discrimination, and a lack of health insurance indicate barriers to optimal care provision that result from the violation of these rights [82,83]. These kinds of barriers can contribute to inequity in maternal outcomes that would be preventable by reasonable means [84].

The provision of women-centered optimal care is associated with timely recognition and effective management of pregnancy-related complications and leads to fewer emergencies. Such care promotes optimal uptake of limited resources and technologies, and eliminates inefficiencies. Provision of this care ultimately improves health outcomes and patient satisfaction [7,78]. Lastly, high-quality care minimizes the additional health risks related to suboptimal practice.

A number of models have emerged in healthcare for assessing and improving care quality. The three well-known models that are most commonly used are systems, perspectives, and characteristics models. Donabedian described the systems model and the structure-process-outcome paradigm for the assessment of healthcare quality in 1980s [85]. In this model, structure involves components of resources and management systems, process implies that what is actually done to and for the patient, while outcome questions the effect of care for the patient in terms of mortality, morbidity, and patient satisfaction. Care quality is interpreted differently in the perspectives model, depending on whose perspective is considered: patients’, care professionals’, or healthcare managers’. Healthcare services that meet the patients’ perspectives are

more likely to provide adherence to treatment. Care professionals perceive technical competence as care quality, whereas health managers are responsible for the resources, finance, logistics, and supervision of healthcare and perceive care quality based on their visions [86]. Finally, care quality in the characteristics model comprises different dimensions [76,77]. These dimensions of healthcare quality (Table1) have increasingly been accepted and used in recent years [73].

The new WHO framework for quality in maternal and neonatal care, published in 2016, is comprehensive and includes the definition of the quality dimensions within a systematic model (Figure 4) [74]. Health system developers, healthcare professionals and care users, all have roles and responsibilities for promoting high-quality care [87].

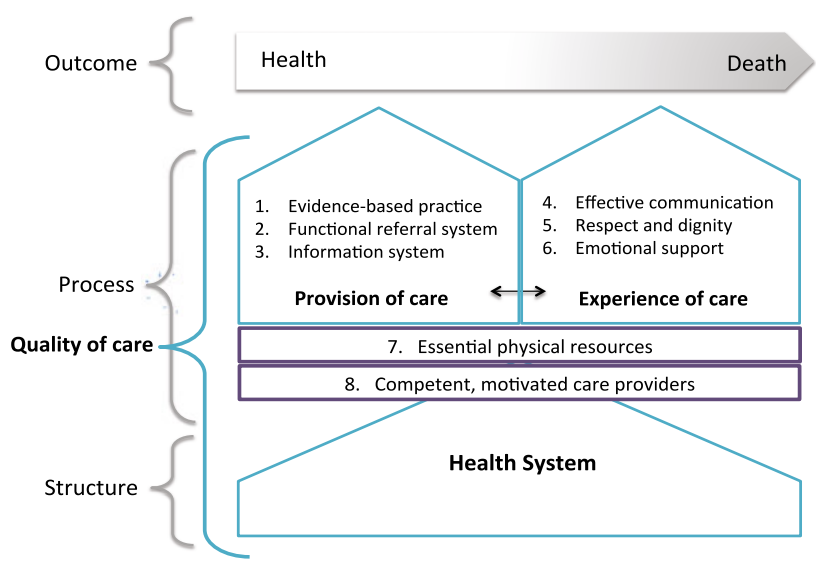


Figure 4. The WHO framework for quality in maternal care [74].

## Clinical audit in obstetrics

A clinical audit is basically a systematic and critical review of care quality to optimize performance and provide best possible services for patients [88]. Such an audit scrutinizes not only the accuracy of recognition and medical management of clinical disorders, but also the timeliness of interventions, the appropriateness of referrals, the attitudes of care providers, and the information provided to patients [58]. Audits

provide evidence of deficiencies in terms of knowledge, skills, medical supplies, and other resources. Audit topics are clinical areas with important problems or with less optimal quality and are chosen by professional auditors [88]. There are three common types of clinical audit: critical incident or adverse event audit, case notes review, and criterion-based audit [89].

Maternal mortality audit is the best known and the longest running example of critical incident audit in obstetrics and has been used in many countries at national or regional level. MNM is another critical incident that has been increasingly audited in low- to high-income countries to complement mortality reviews [90].

The WHO MNM approach utilizes the audits method to evaluate and improve the quality of obstetric care [60]. In the first step, evaluators systematically and critically review the appropriateness of current care and scrutinize care processes provided in MNM cases [58]. In the second step, the situation is analyzed to identify why the complications and the near-miss events happen and how they can be averted. Identified obstacles will afterward be addressed by designing tailored and multifaceted interventions [60,61]. Finally, the situation will be reassessed and the interventions readjusted according to the new analysis. Careful implementation and incorporation of the audit steps into routine practice over time can contribute to quality care improvements (Figure 5).

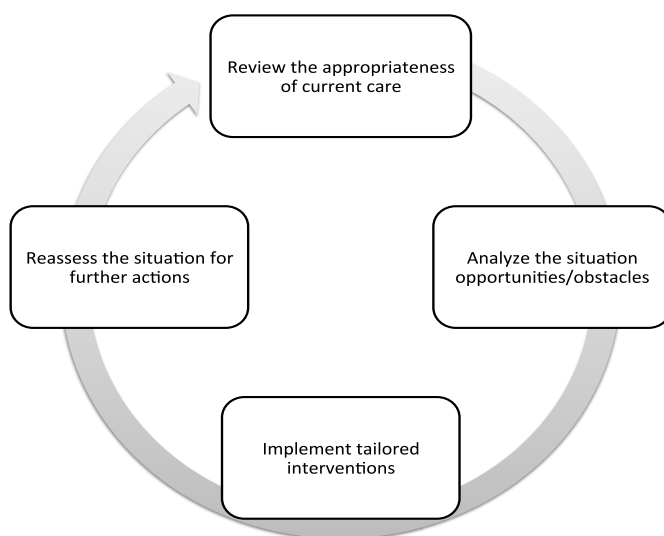


Figure 5. The near-miss audit cycle for improving care quality [60,88].

In addition to mortality and morbidity, audits of care processes are frequently used in obstetrics. As CS numbers have been increasing globally, audit of CS has become a prominent example of process audit in obstetric care. Among the strategies applied for reducing the rates of CS, audit and feedback is shown to be practical and effective [14,91]. A Cochrane systematic review of audit studies found no randomized trials that indicate the effectiveness of clinical audit in reducing maternal mortality and morbidity [92]. However, the results illustrate the effectiveness of clinical audits in improving professional practice and the quality of care [93,94].

## The Islamic Republic of Iran

Iran, with more than 2,500 years of civilization and plentiful natural resources, was a constitutional monarchy until the Islamic Revolution of 1979. This middle-income country, with an estimated 79 million people now has the second largest population of the Middle East [95]. After the revolution and due to the suspension of the family planning program, a dramatic change in fertility and population has occurred, which has resulted in 31 million babies being born between 1978 and 1991 [96]. The family planning program was revived in 1989 and the fertility rate declined significantly afterward. A considerable rise in the rate of urbanization of the population has occurred and a majority of the population now lives in urban areas. Iran has a diverse population that consists of a number of ethnic groups (Persian, Azari, Kurd, Lur, etc.), of which Persians are the largest one (51%) [97]. Over three decades, Iran has been the hosting country for a huge number of refugees, mostly from Afghanistan [96]. According to the UN High Commissioner for Refugees (UNHCR), in 2016, an estimated one million registered and 1.5–2 million undocumented Afghans live in Iran [98].

The majority of Iranians are Muslims (Shia 89%, Sunni 8%), while Zoroastrian, Jewish, and Christian make up the other religious minorities in the population. Persian or Farsi is the official language, but a number of other languages, such as Azari, Kurdish, and Luri, are also spoken in the country.

Education has improved for both males and females at all levels [96]. The youth literacy rate for females is 98% (2008–2012) [99]. The gender parity index for education has increased and the latest consensus indicates that females account for the majority of undergraduate university entrants [96]. As women have achieved remarkable advances



in education, they have succeeded in obtaining better employment, economic independence, delayed marriage, and in having smaller families [96]. The UNHCR supports the provision of education for refugees in Iran and the Supreme Leader ordered that all children must attend school regardless of their residency permission status [98].

## Healthcare in Iran

Health outcomes have greatly improved and exceeded the regional averages due to the effective delivery of primary healthcare [96]. The Ministry of Health and Medical Education (MOHME) is responsible for providing healthcare as well as for training health professionals through medical universities in 30 provinces. In 2002, MOHME developed a national strategic plan for medical ethics and enacted the patients' bill of rights to enhance care quality and patient satisfaction (Table 2) [100]. However, some examples of ignoring these rights have been seen in real healthcare practice [101].

Table 2. The patients' bill of rights, Iran, 2002 [100]

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Each patient has the right to:	
1	Timely appropriate care with dignity and respect regardless of religion, culture, and racial background.
2	Know the professional status and full identity of all staff providing care.
3	Get information about their medical condition, diagnosis, and treatment as long as it does not delay the treatment and put the patient's life in danger.
4	Be completely informed about all alternatives of treatments and the related risks and benefits and to participate in making the final decision.
5	Give consent freely to finish treatment or to choose another medical center without any external pressure based on the principles of law and for legal reasons.
6	Privacy and confidentiality of personal and medical information unless it is requested by the authorities.
7	Be asked for permission for people who are not involved in the patient's treatment to attend his/her bedside.
8	Have access to care professionals during treatment, transmission, and after discharge.
9	Be informed about all on-going educational/research activities in the hospital that affect the patient's health and treatment. The patient has the right to agree or refuse to be involved in such activities.
10	Be completely informed about professionals' qualifications, cost of services, and insurance coverage before being transferred to a new medical centre.

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Both public and private sectors provide primary, secondary, and tertiary care services. While MOHME is the main care provider through a large number of public clinics and hospitals, it also has the responsibility to monitor and evaluate the provided care [96]. Yet, health statistics are not adequate enough to produce reliable epidemiological reports and to assist with care assessments.

Iran has faced years of war, international isolation, sanctions, and shares long borders with neighbors in conflict in recent decades [96]. Article 29 of the Constitution of the Islamic Republic of Iran emphasizes the right for every Iranian to enjoy the highest attainable level of health. However, health resources have been inadequate to provide care services to all citizens and out-of-pocket payments are high (up to 55%) [96,102]. The organization of health finance is quite complicated and health expenditure is covered through a number of public (more than four large and several smaller) and private schemes. Emergency care services should be provided without prior payment. Health insurance covers 25% and 10% of the fee for outpatient and inpatient care services, respectively [96]. Before 2015, the costs of hospital care in the public sector were covered by at least one of these insurance schemes for more than 90% of nationals, while uninsured individuals had to pay for these services [98,102]. Moreover, financial constraints imposed in the country prevented registered migrants from obtaining insurance coverage [98,103]. Some healthcare tasks, such as buying and substituting the prescribed medications, organizing some advanced medical supplies and blood examinations, were facilitated by the patients' relatives. However, the recent reform in healthcare aims at providing universal health insurance and covers the costs of the needed care for all citizens and registered migrants at public centers with the Salamat Insurance Scheme [98]. Public hospitals are under the obligation to provide and organize all the required services for patients.

## Reproductive and maternal health

Reproductive health services including antenatal consultations, postnatal visits, and family planning services, are integrated within primary healthcare and are equally free for Iranian and migrant women. Life expectancy for women at birth is 78 years and the total fertility rate is 1.9 births per woman [99]. Antenatal care coverage (at least four visits) and the institutional birth rate stand at 94% and 95%, respectively [99]. The National Maternal Mortality Surveillance System has been implemented

since 2001. All maternal deaths are reported to the regional university committees for detailed review [104]. National guidelines for obstetric practice have been adopted since 2006 to ensure high-quality care and to respect the human rights of women and their families at hospitals [105]. In addition to scaling up healthcare services, the aforementioned tailored actions contribute to improving maternal health. In 2015, Iran achieved a 75% reduction in maternal death and the maternal mortality ratio (MMR) stands at 25/100,000 live births [51]. The lifetime risk of maternal death is 1 in 2,000 women. However, the availability and easy access to healthcare services has directly challenged the health system with the overuse of medical procedures that has resulted in, among many other effects, high rates of surgical birth [106,107]. This causes maternal health concerns when one out of two women deliver surgically without the support of reliable statistics in relation to pregnancy outcomes at hospitals [106].

The underlying reasons for this dramatic rise in CS deliveries are very complex [108]. Women are affected by sociocultural acceptance and perceived norms in Iran [109]. Having little information about the consequences of CS, many women consider surgical delivery as a high-class mode of childbirth. Educated women give birth by CS more than those with low education [110]. Moreover, men perceive CS as a scientific and modern procedure, a perception that is promoted by clinicians and midwives [109,111]. It is believed in Iranian society that the more you pay the better care you get; therefore, men readily pay for CS while they are unaware of its potential complications [109]. Another publication shows that fear of childbirth and changes in the vagina as well as low confidence in midwives are contributing factors in maternal requests for CS [112].

Although women's background factors, such as older age and comorbidity, are suggested as important contributors, health system policies and the SES of women as well as legal issues have indirectly affected obstetric practice [111,113]. For instance, the number of employed obstetricians per birth at hospitals exceeds the number of midwives [108]. Moreover, maternity care has primarily become the obstetricians' responsibility, even in low-risk pregnancies [108]. Fees for services is the common method of payment and obstetricians contend that the paid fee for vaginal birth is not worth the long and stressful process [111]. Additionally, obstetricians claim that they perform CS to protect themselves against litigation [111]. However, a recent publication shows that less than 50% of CS surgeries are performed appropriately at hospitals in Tehran [114,115]. A review study in 2014 suggests doctors'

advice on CS delivery is one of the main reasons for the increasing trend of CS births in Iran [110]. Consequently, with a CS rate of 74%, the capital city, Tehran, has one of the highest rates of CS in the world [106].

Tehran accommodates over 13 million inhabitants [116]. Almost 25% of the care services for the whole country are provided in this metropolis through the huge number of public, private, and university healthcare suppliers. There are approximately 140 hospitals that provide secondary and tertiary care in Tehran, of which 42 sites are affiliated with five large medical universities and 10 are affiliated with the Social Security Organization (SSO) [116]. The SSO is a non-governmental public organization and the core for comprehensive social assurance and welfare [117]. The SSO is a social insurer that provides different insurance benefits and medical care services for formal sector employees, self-employed laborers, and their families [97,117]. Those hospitals and medical centers that are affiliated with SSO provide care services free of charge to the beneficiaries.

## Migrants in Iran

Afghans are the second largest group of refugees worldwide [118]. Iran is a hosting country for refugees from Iraq and Afghanistan. A refugee is defined as a person in an intolerable situation who flees conflict or persecution and crosses national borders to seek safety [119]. Refugees are often unable or unwilling to return home. The number of registered Iraqi refugees (28,000) compared to Afghans (950,000) is negligible in Iran [98]. Moreover, many Afghans live in Iran as labor migrants and move between Iran and Afghanistan without difficulty [120]. Therefore, in this thesis, the overarching term ‘migrant’ relates to Afghan-born people who have recently arrived or have lived for a long time in Iran. The great wave of migration from Afghanistan has been motivated by domestic upheaval, decades-long war and conflicts arising from the Soviet occupation to the Taliban attacks, poverty, widespread violence, insecurity, and unemployment [120,121].

In Afghanistan, the population consists of Pashtuns, Tajiks, Hazaras, and other ethnic minorities. Ninety-nine percent of Afghans are Muslims (Sunni 84%, Shia 15%). Pashtuns, the dominant group, comprise more than half of the population. They speak Pashto, which is one of the two official languages. Tajiks and Hazaras, who are mostly Shiites, speak Dari, which is the second official language and a variant of Persian, similar to Farsi. The Hazaras consider themselves as outsiders in their own country [122]. Hazaras men were killed and their women and

children sold as slaves following the Pashtun king's order in the central Afghanistan as late as the 19th century. Historically, they have faced long-term persecution from the Sunni population [122]. Hazaras were granted equal rights in the 2004 Afghanistan Constitution. However, many of them still experience discrimination.

Similarities between the languages and the Shia Islamic government have particularly influenced many Hazaras Shia Muslims to move to Iran, while Pashtuns have mostly fled to Pakistan due to ethnic, religious, and linguistic similarities [121].

The patriarchal society, low literacy level (31% among adults), cultural traditions, and religious extremism have been associated with violation of women's rights in Afghanistan [123]. Women are mostly hidden at home and isolated from the outside society and their status is one of the lowest worldwide [123]. Females' life expectancy at birth and total fertility rate are 62 years and 4.9, respectively [124]. More than half of girls are married before the age of 16 and a majority of women face forced marriage. Women are accustomed to giving birth at home. The lifetime risk of maternal death in Afghanistan is 1 in 52 women. Skilled health workers only attend 36% of childbirths, and the MMR of 396/100,000 live births is among one of the highest in the world [51,124]. Yet, low capability has challenged the government to scale up effective healthcare services in the country.

# Rationale of the study

Despite maternal health improvements in Iran, the drastic rise in CS rates is hardly justified by evidence. The change in obstetric practice to a reduction of vaginal birth may affect the frequency and causes of near-miss morbidity, and thereby challenge maternal health. Moreover, migrants’ maternal healthcare in one of the top hosting countries for refugees worldwide needs to be investigated. Reducing preventable MNM in Iran requires the acquisition of reliable evidence. Figure 6 presents the research questions for this thesis.

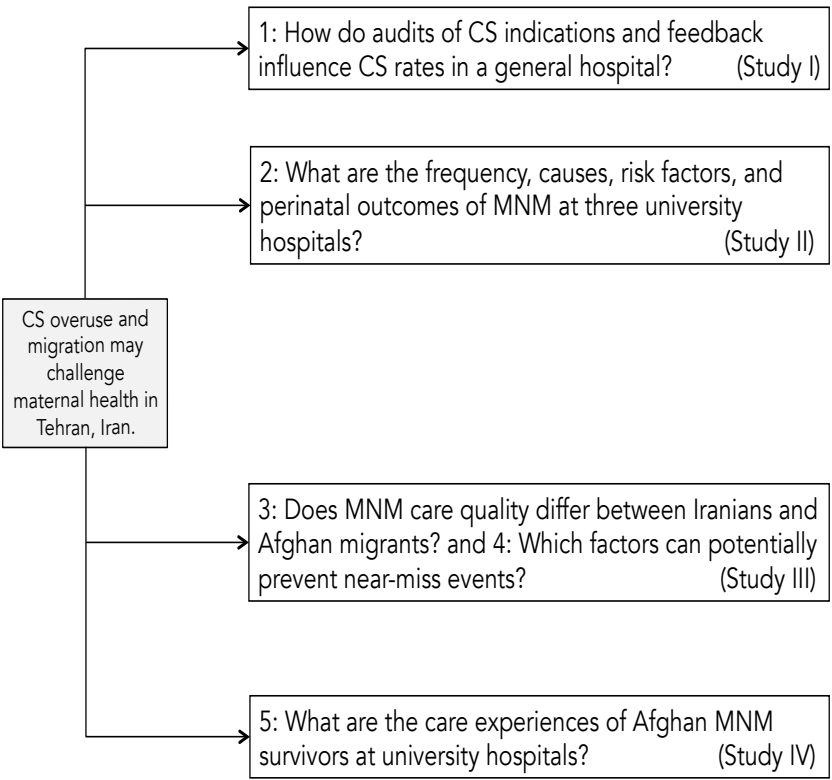


Figure 6. Research questions of the four hospital-based studies of this thesis.

## Aims and objectives

The aim was to provide research evidence in relation to obstetric practice by using a clinical audit strategy and the WHO MNM approach in settings with CS overuse and an influx of Afghan migrants in Tehran, Iran. The specific objectives were:

1. To investigate whether clinical audits of CS indications and feedback influenced CS rates in a general hospital (Study I);
2. To determine the frequency, causes, risk factors, and perinatal outcomes of MNM at three university hospitals (Study II);
3. To evaluate whether MNM care quality differs between Iranians and Afghans and identify potential preventable attributes to near-miss events (Study III);
4. To explore care experiences of Afghan MNM survivors to increase insight into migrants' healthcare (Study IV).

# Methods

This thesis is based on both quantitative and qualitative methodologies. The studies were conducted in various public hospitals in Tehran. Table 3 shows a summary of the study designs, data collection methods, the study populations, and methods of analyses.

Table 3. Overview of the material and methods used in the thesis

Study	Design	Data collection	Population	Analysis
I	Retrospective before-after	Hospital statistics database	3,494 deliveries	Chi-square test
II	Prospective case-control	Incident MNM cases, a control sample, hospital records	82 MNM cases 1,024 controls	Descriptive statistics, Chi-square and multivariable logistic regression
III	Audit	Case note reviews, patients and professionals interview	54 Iranian and 22 Afghan MNM cases	"
IV	Qualitative	Semi-structured interviews	15 Afghan MNMs and their husbands	Thematic analysis

## Study setting

The first study (Study I) was performed at a public general hospital, which manages about 2,500 deliveries annually and is affiliated with the SSO. The obstetric ward was staffed with 16 midwives and 10 specialists. At least one specialist in obstetrics and gynecology was required to be on duty in the hospital at all times, 24 hours a day. The hospital had intensive care units for both adults (ICU) and neonates (NICU) and two anesthesiologists were on duty 24 hours a day. Since



2002, the maternity unit has been equipped with a cardiotocograph (CTG) and a mixture of oxygen and nitrous oxide gases to alleviate labor pains and promote vaginal birth. The on-call specialist at the hospital was responsible for all deliveries, including normal low-risk pregnancies.

The other studies (Studies II–IV) were carried out at one secondary and two tertiary university hospitals affiliated with Shahid Beheshti University of Medical Sciences (SBMU) in Tehran. SBMU is one of the medical universities that provide training as well as health services to the general population, including Afghan migrants, through outpatient clinics and 17 public and university hospitals. In the hospitals included in the studies, consultants, residents, midwives, and nurses provide 24-hour medical staffing using national and local guidelines for emergency obstetric care. Consultants and residents are responsible for all deliveries, regardless of risk, and the rates of CS are around 60%. The annual deliveries at the secondary hospital are about 4,500 and the obstetric department is well staffed with nine consultants, 39 residents, and 30 midwives. This site, which is located in a low-income zone, refers critically ill women to the tertiary hospitals. The two tertiary hospitals have annual deliveries of over 600 and 1,000, respectively. The first tertiary hospital is located in a high-income zone and has specialized expertise for, among others, hematologic and psychiatric diseases. Seven consultants, 16 residents, and six midwives provide obstetric services at this hospital. The third teaching site, in a middle-income zone, admits referrals with neurosurgical complications and cardiac diseases and has five consultants, 13 residents, and 10 midwives. All the hospitals have on-duty anesthesiologists, blood banks, a clinical laboratory, ICU and NICU, and the labor wards are equipped with CTG.

## 1. How do audits of CS indications and feedback influence CS rates in a general hospital? (Study I)

### Audit procedure

Clinical audit and feedback were introduced to a local committee for safe motherhood at the hospital affiliated with the SSO between May and December 2005. Individual case note reviews was the chosen method for evaluating the quality of obstetric care for women who delivered by CS for the first time. Two board-certified obstetricians, including the Head of Obstetric and Gynecological services, a senior midwife, and a general practitioner representing the hospital director, were evaluators. In

monthly meetings, one-fourth of all primary CS patient records were randomly sampled and evaluated using predefined criteria.

Clinical judgments were established for three common indicators of primary CS: 1) for dystocia, the criterion was no labor progress after two hours of appropriate uterine contractions, qualified as three well-forced uterine contractions in a 10-minute period in the active labor; 2) for fetal distress to trigger CS, CTG trace had to verify fetal distress; and 3) for breech presentation, ultrasonography had to show this presentation after 37 weeks of gestation to serve as a justification for CS. Moreover, as the SSO policy was paying the cost of needed care, clinicians had to defend their practice if they performed medically unnecessary CS.

The indications of CS operations were questionable in one-third of all cases audited. However, the auditors did reach a consensus to provide written feedback to the concerned obstetricians in approximately half of them. The written feedback politely and scientifically pointed out the identified obstetric areas for improvement.

Additionally, financial incentives were offered to those obstetricians whose performance matched the audit criteria and achieved the lowest CS rates. These specialists were even honored publicly for their practice.

## Study design and population

A retrospective before-after study was conducted. The frequency of CS and the related indications were measured for women who gave birth during a seven-month period in 2004 (before introduction of clinical audit) and compared with the same measurements for women who gave birth during the same chronological period in 2005 (during the institution of the clinical audit and feedback).

To minimize selection bias, all CS deliveries and vaginal births in the comparable time period were included. Study data were collected from the Tehran Health Directorate database center, which was connected to the hospital statistics database. To lower information bias, 15% of the collected data were validated against the original sources via delivery room registers and hospital archives registers. We obtained data on CS statistics from three further general hospitals that have obstetric services and are affiliated with SSO in Tehran for comparison.

## Analysis

OpenEpi software (Open Source Epidemiologic Statistics for Public Health, <http://www.openepi.com>), Version 2.3, provided the statistical

measures by using 2 x 2 tables. Chi-square tests compared CS rates before and after the audit intervention. The results were reported by risk ratios and differences with a 0.05 probability were considered statistically significant.

## 2. What are the frequency, causes, risk factors, and perinatal outcomes of MNM at university hospitals? (Study II)

### Study design and population

An incident case-control study was conducted at three university hospitals affiliated with SBMU between March 2012 and May 2014. Based on the WHO MNM approach, MNM was defined as a pregnant woman who developed life-threatening conditions (near-miss events) from early pregnancy to six weeks postnatal [60]. The provision of blood products and specialized expertise were limited in the secondary hospital, making life-threatening conditions possible at a lower threshold. Therefore, the WHO near-miss criteria were modified in the case of two indicators to suit the limitations of institutional resources and were used to identify cases (Appendix1: near-miss inclusion criteria) [60]. These two criteria were the transfusion of  $\geq 4$  units of blood and an acute reduction in thrombocytes to  $\leq 75,000$  platelets/ml. A rapid decrease of  $\geq 4$  g/dl in hemoglobin concentration was also accepted as a near-miss criterion. A MNM case was a mother with one or more severe complications who further developed at least one near-miss event.

One consultant and one resident in obstetrics and gynecology were members of our research group in each hospital. In January 2012, several preparatory meetings were conducted with research members and the WHO MNM approach was discussed. They were provided with verbal and written instructions for completing the research forms. The residents identified MNM cases during daily morning reports, under the supervision of the consultants. To minimize the possibility of information bias, the first author periodically validated the data against the original records in the hospital archives. Delivery room registers provided birth statistics (source population) including CS and vaginal birth as well as stillbirths for the study period.

A systematic random sample of 1,024 women delivering during the study period at the obstetric wards was selected to represent the source population hereafter called controls. Data in relation to pertinent

maternal and medical background factors and perinatal outcomes were extracted from the patients' records in the hospital archives.

Maternal factors were characterized by age (<20, 20–34, ≥35 years), gestational age (extremely preterm <28, preterm 28–37, term 37–42, postterm >42 weeks), parity (0, 1–2, ≥3 para), body mass index (BMI) (underweight: ≤18.5; normal weight: 18.5–24.9; overweight and obese ≥25), nationality (Iranian and Afghan based on country of birth), level of education (illiteracy, primary and secondary school, university), family income (low if it barely covered household expenses, medium if it paid the household bills, and high if it was more than the household expenditures, as reported by mothers), addiction (use of any addictive drug), and insurance status. The first day of the last menstruation period and ultrasound examinations, or just the latter when menstruation dates were not recalled, were used to estimate gestational age. Almost all migrants and a number of Iranian nationals had no health insurance; therefore, an independent variable was created and called 'insurance-nationality' to categorize nationality with different insurance statuses: insured Iranian, uninsured Iranian, insured Afghan, and uninsured Afghan.

Antenatal care coverage (≥4 visits), admission status (primary or referral), previous CS, comorbidity, mode of delivery (antepartum CS, intrapartum CS, vaginal birth), severe anemia (hemoglobin <10 g/dl), time of near-miss event (upon or after arrival), night-shift delivery (2 o'clock pm till 8 o'clock am), and twin pregnancy were studied as medical factors. Diabetes; chronic hypertension; cardiac, pulmonary, renal, hepatic, and hematologic diseases; severe anemia, previous pelvic operations; and uterine scar were considered as comorbidities. Data relating to BMI, family income, education, and neonatal deaths for cases were documented during hospitalization, but no such data were found for controls.

## Analysis

A sample size calculator for descriptive studies by OpenEpi software, Version 3.03, was used to estimate the required sample size for controls at each hospital. The number of deliveries was used as population size, a CS rate of 60% was adopted as anticipated frequency, and a confidence limit of 5% and a design effect of 1.0 were set, which resulted in a total sample of 1,024 controls. The standardized mortality/morbidity module by the aforementioned software calculated the MNM ratios using all live births at the hospitals included in the study. Background factors of MNM

cases and controls were compared using the chi-square test in Statistical Package for Social Sciences (SPSS), Version 21. The results were presented as crude odds ratio (OR) with 95% confidence intervals (CI) and differences with a 0.05 probability were considered statistically significant. Multivariable logistic regression models were built to identify independent risk factors for MNM. Background factors such as age, parity, CS, and comorbidity that are well-known risk factors for MNM through previous publications and had association with MNM in the aforementioned chi-square analyses were entered as independent variables in these models [125]. Model 1 presented adjusted odds ratios (AOR) for maternal and medical factors. In Model 2, 'health insurance' was added to other variables in the first model. In Model 3, the effect of 'insurance-nationality' was assessed with a view to understand nationality as a risk factor, while the created variable was substituted for the 'health insurance' and 'nationality' in the second model. Background factors were controlled for collinearity.

### 3. Does MNM care quality differ between Iranians and Afghan migrants? And 4. Which factors can potentially prevent near-miss events? (Study III)

#### Study design and population

This audit study was conducted as the second phase of the MNM research undertaken at university hospitals between March 2012 and May 2014. The study population was 76 MNM cases of the total 82 women with near-miss morbidity who were identified in the previous case-control study. Six cases with severe comorbidities were excluded from this audit (Figure 7).

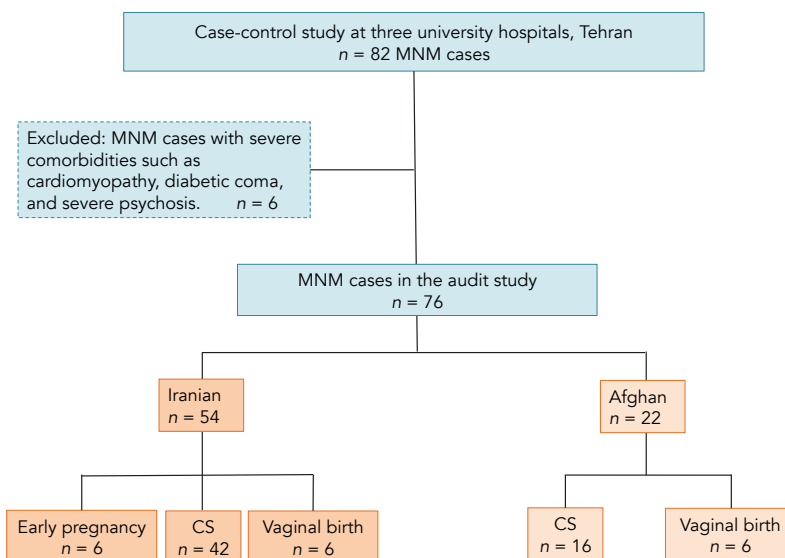


Figure 7. Flow diagram showing MNM population for audit (Study III).

## Audit procedure

Patients' records, including admission, progress, operation, and nurses' notes as well as sheet of orders, laboratory and pathology reports, and summary notes were primarily assessed in the hospital archives. Data were extracted from the original records and the research form containing background data, past and present obstetric history, and the clinical process leading to near-miss events were completed. Copies of important documents, such as CTG trace, laboratory tests, or pathology results were made in advance and attached to the research form to make audit sessions more productive. Furthermore, in cases with insufficient documentation, the relevant care professionals were interviewed to obtain more information. Interviewing a number of near-miss cases added further input to the clinical audit.

A conceptual model including eight care items was created to use as the audit framework for the evaluation of pre-hospital and hospital care. Antenatal care consultations and referral system functions represented pre-hospital care. To evaluate the use of evidence in obstetric practice at hospital, care quality was reviewed based on a systematic routine approach from initial assessment to documentation of patient history and care processes (Figure 8) [59]. Three auditors, two board-certified and

one Maternal-Fetal Medicine specialist, comprised the audit team. The first author presented the history of each patient anonymously (in terms of identity, SES, nationality, and the hospital) and evaluators discussed the quality of care using the audit framework. For every case, each item was assessed separately and the final decision relating to care inadequacy was made by consensus.

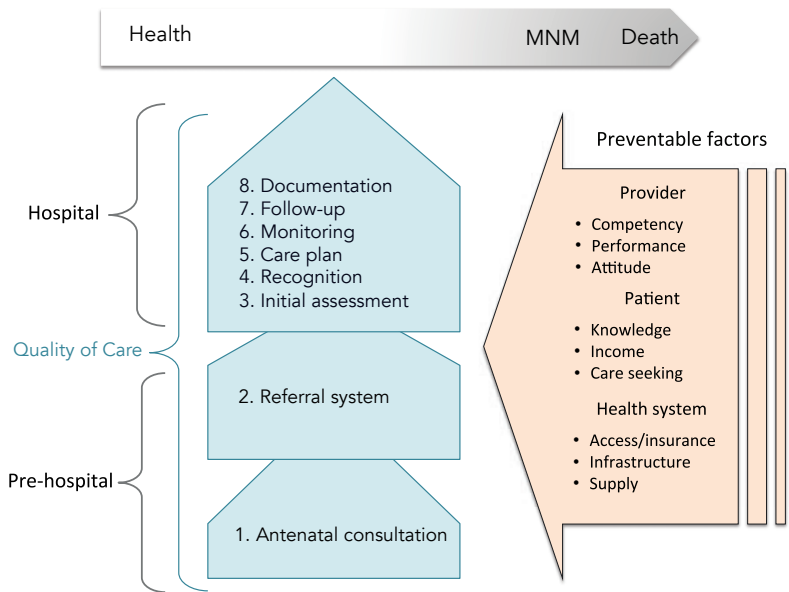


Figure 8. The audit framework includes eight care items (pre-hospital and hospital) for assessing obstetric care quality and preventability of MNM [3,59].

To evaluate obstetric care quality for MNMs with severe postpartum hemorrhage (PPH) and severe preeclampsia, the auditors created criteria on the basis of scientific evidence and formatted these to the six-item protocol of hospital care (Appendices 2 and 3). The audit panel used these predefined criteria for all related cases.

Pre-hospital care was labeled suboptimal if either antenatal consultation or referral function ( $\geq 50\%$  of care items) was inadequate. Hospital care was considered suboptimal if three or more items ( $\geq 50\%$  of care items) were inadequate. Auditors discussed further whether high-quality care could potentially have prevented or minimized the severity of the near-miss events. In such cases, the potential factors were categorized at provider, patient, and health system levels [3,126].

## Analysis

Background factors between Iranians and Afghans (including SES, severe obstetric complications, and near-miss events) were compared using chi-square test in SPSS, Version 21, and differences were considered significant with a 0.05 probability. Multivariable logistic regression models were built to identify independent predictors of suboptimal care provision. Those background factors that differed significantly between Iranians and Afghans, found in the aforementioned chi-square analyses, were entered as independent variables in the models. Model 1 shows the association between maternal SES and suboptimal care by crude ORs. In Model 2, education, income, and nationality were assessed as independent variables and AORs presented the predictors of suboptimal care. In Model 3, 'insurance-nationality' was added to other variables in Model 2 with a view to understand whether Afghan nationality was associated with suboptimal care when adjusted for education, income, and health insurance. The independent variables were controlled for collinearity. Potentially preventable attributes for near-miss events were compared and presented as percentage for both Iranians and Afghans.

## 5. What are the care experiences of Afghan MNM survivors at university hospitals? (Study IV)

### Study design and population

A qualitative study was designed as the third phase of the MNM research at university hospitals in Tehran. Semi-structured interviews were conducted with a heterogeneous sample of Afghan MNMs and their husbands (15 interviewees), who were chosen purposely. The first author recruited the women (11 Afghan MNMs) when they were either recovering from critical morbidity but were still at hospital or when they returned to the study sites for interviews within six months after recovery. Four women were interviewed together with their husbands. As it was impractical to perform in-person interviews with three of the women, telephone interviews were conducted. The interviews always started with describing the study objectives and asking for consent. Afterward, the open-ended questions were asked. The questions were about maternal experiences of antenatal visits, the information they received during consultations, what they recalled from antenatal care, the way they decided where to give birth, how they reached hospitals,



affordability of maternity services, perceived quality of obstetric care, and postnatal maternal care experiences. Information obtained from one participant was presented to a subsequent one to comment on in order to increase the validity of the interview data. Interviews lasted about 30 to 80 minutes each, were held in Farsi, recorded, and transcribed. The interviews were continued until no new information was retrieved and the data reached the theoretical saturation.

## Analysis

The analysis began after the first few interviews while considering the aim of the study and by performing multiple readings of the transcripts. The readings assisted me to become acquainted with the data. Thematic analysis, which provides the opportunity to critically reflect on the interview data, was used [127]. A data-driven approach with an explicit level of analysis was mostly applied, while the research questions and the 'three delays model' served to inform a framework [65,127]. The 'three delays model' is based on three phases: Phase 1: delays in making decision and seeking care; Phase 2: delays in accessing to care services; and Phase 3: delays in receiving appropriate care. After readings, the transcripts were coded manually and in later phases of analysis, the codes were mapped to generate patterns and themes.

## Ethics approvals

The hospital director and the Tehran Health Directorate of SSO approved Study I. The Ethics Committee of SBMU approved the MNM study protocols on 7 January 2012 (Panel number: 129) for the case-control and audit studies (Studies II and III) and on 11 March 2013 (Panel number: 149) for the qualitative study (Study IV). Written and oral consent from participants for in-person interviews and telephone interviews, respectively, were obtained. Moreover, interviewees were informed about their rights to withdraw from the sessions at any time or to choose not to answer the questions if they did not want to.

# Results

This thesis was conducted based on two hypotheses in a setting with CS overuse and a huge influx of Afghan migrants. The results generated a further hypothesis, which was tested in the third study. Our findings were further pursued in a qualitative interview study that generated further hypotheses for future studies (Figure 9).

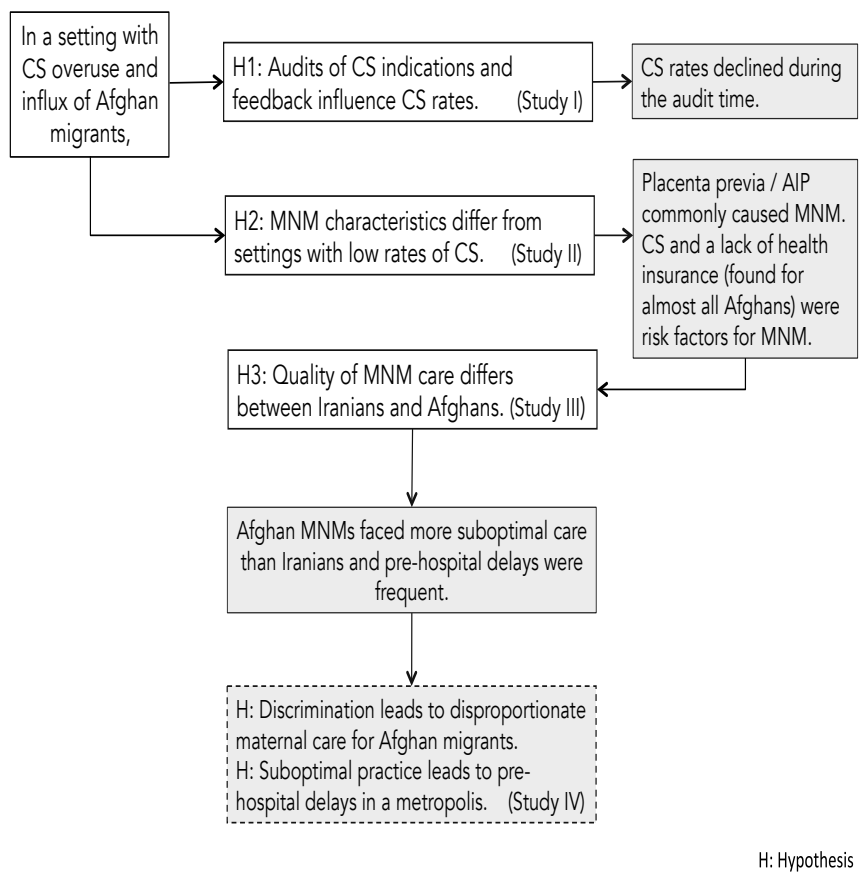


Figure 9. The pathway of hypotheses and results generated through this thesis.

## Clinical audits and CS rates

The frequency of both overall and primary CS dropped significantly while the clinical audit was undertaken in 2005. The overall rate decreased from 40% to 33%, and the primary rate from 29% to 21%. A reduction in the primary CS rate was found every month during the seven-month audit intervention (Figure 10). According to collected data, the study site was the only general hospital in Tehran affiliated with SSO that showed a decline in CS rates in 2005. The frequency of CS due to dystocia, fetal distress, planned primary CS, and CS with 'other' indications decreased significantly after the institution of the audit process. However, there was an insignificant rise in the CS rate due to breech presentation during the study period.

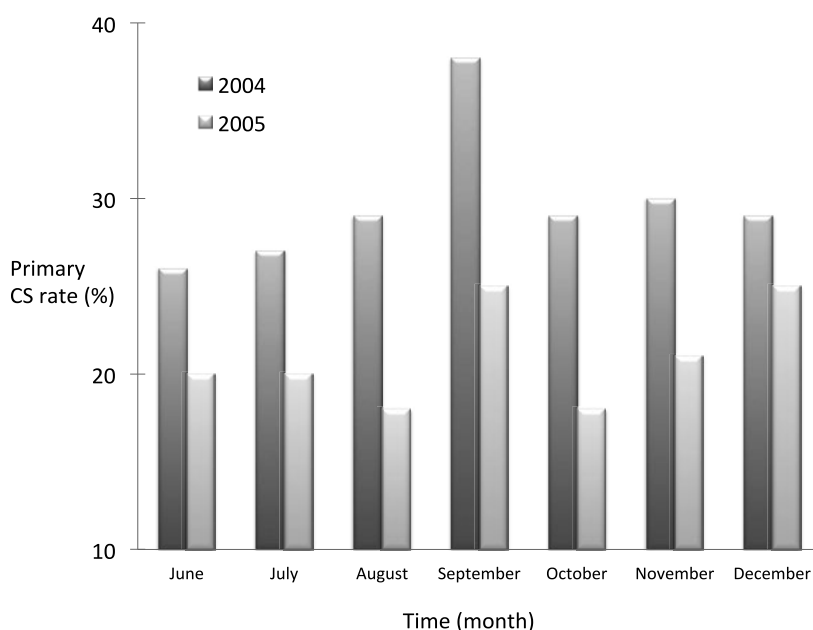


Figure 10. Comparison of monthly CS rates, before and after audits and feedback intervention in the study site.

The risk of primary CS for mothers at the study site during the audit intervention in 2005 was 27% less than this risk for mothers during the same period in 2004. Annual CS rates in the hospital surveyed between 2004 and 2007 increased from 39.5% to 46.5%, although a decline was found in 2005 following the audit process. The CS rate in September 2005 was considerably lower than in 2004, although CS rates in September were higher than other months in both years.

# MNM characteristics

## Frequency and causes

During the 26-month study period, there were 13,169 deliveries at the three hospitals. Of these, 8,513 (64.6%) delivered by CS. A total of 82 mothers fulfilled the near-miss eligibility criteria, and 12 died. Seven women developed near-miss events in early pregnancy and 75 mothers gave birth, 81% (61/75) by CS and 19% (14/75) by vaginal birth, including four home births (Figure 11). One-third (33%, 27/82) of all women with near-miss morbidity were referrals, 44% (12/27) of which were from the secondary hospital. The MNM ratio was 6.3 per 1,000 live births including referral cases.

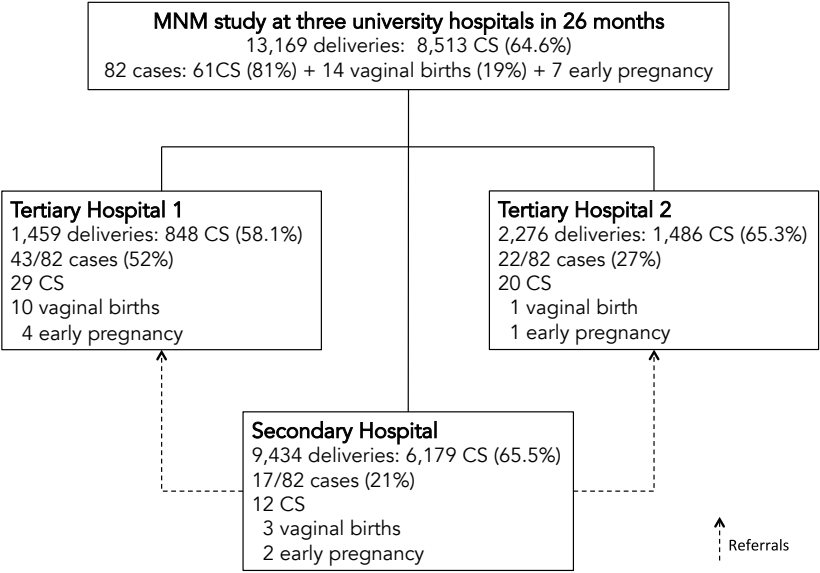


Figure 11. Flow diagram of MNM cases at the hospitals studied.

The majority of cases (62%, 51/82) arrived at hospital in moribund condition or developed a near-miss event within six hours of admission. Near-miss events mainly resulted from severe PPH (35%, 29/82), severe preeclampsia/eclampsia (32%, 26/82), and placenta previa/AIP (10%, 8/82) (Figure 12).

Coagulation-hematological (93%, 76/82), cardiovascular (22%, 18/82), and respiratory dysfunctions (21%, 17/82), and obstetric

hysterectomy (17%, 14/82) were the most frequent near-miss events. AIP was the main indication for obstetric hysterectomy. Several MNM cases had more than one severe complication (21%, 18/82) and 40% (33/82) developed three or more near-miss events.

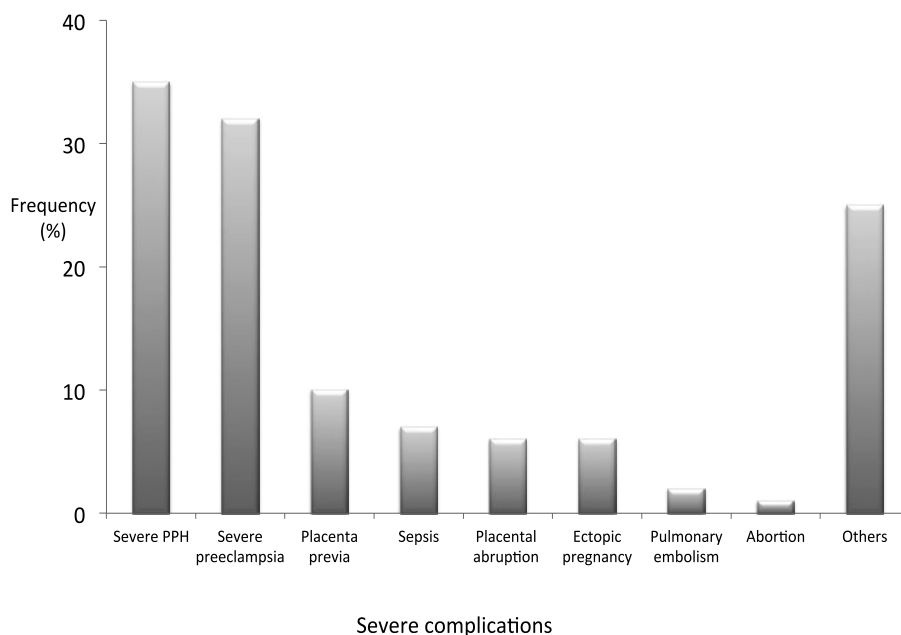


Figure 12. Frequency of severe complications in 82 MNM cases.

## Risk factors

Our analysis shows increased risks of MNM in women aged  $\geq 35$  (OR 2.6, 95% CI 1.5–4.5), in multiparous women (parity  $\geq 3$ ) (OR 3.0, 95% CI 1.6–6.0), and in Afghan women (OR 2.1, 95% CI 1.2–3.5). More than half of the MNM cases (55%, 45/82) involved women who were illiterate or had primary school education; 60% had low family income; and 40% were overweight or obese. However, no such data were available for comparison in the control group.

Comorbidity, severe anemia, and antepartum CS were associated with MNM. Conversely, those who attended antenatal care (OR 0.4, 95% CI 0.2–0.8), who gave birth vaginally (OR 0.4, 95% CI 0.2–0.7), and those who had health insurance (OR 0.4, 95% CI 0.2–0.6) had less risk for MNM. Ninety percent of Iranians (754/834) were insured, whereas only three percent of Afghans (4/132) had insurance coverage.

The most common indication for CS among controls was repeat CS, while MNM cases had 70% less probability of CS with this indication. Instead, severe preeclampsia was the leading cause of CS in MNM cases. As shown in Table 4, the odds of CS due to severe preeclampsia, placenta previa/AIP, and placental abruption were considerably greater in MNM cases than in controls.

Table 4. Frequency of the CS indications in MNM cases and controls at the three hospitals studied

Indication	MNM cases <i>n</i> = 61 (%)	Controls <i>n</i> = 629 (%)	OR (95% CI)
Repeat CS	8 (13)	219 (35)	<b>0.3 (0.1–0.6)</b>
Fetal distress	13 (21)	145 (23)	–
Dystocia	4 (7)	81 (13)	–
Breech	–	40 (6)	–
Placenta previa/AIP	4 (7)	4 (1)	<b>11.0 (2.7–45.1)</b>
Placental abruption	4 (7)	12 (2)	<b>3.6 (1.1–11.6)</b>
Twin pregnancy	3 (5)	31 (5)	–
Severe preeclampsia	21 (34)	33 (5)	<b>9.5 (5.0–17.9)</b>
Others	4 (7)	64 (10)	–

The AORs in Model 1 indicated that MNM was associated with Afghan nationality (AOR 3.2, 95% CI 1.8–6.0), comorbidity (AOR 2.2, 95% CI 1.3–3.7), antepartum CS (AOR 6.4, 95% CI 3.2–12.9), and antenatal care attendance (AOR 0.4, 95% CI 0.1–0.9). Taking health insurance into account in Model 2, the aforementioned association with Afghan nationality and antenatal care disappeared, while a protective association with health insurance (AOR 0.3, 95% CI 0.1–0.6) was found. Lastly, Model 3 showed that, compared with insured Iranians, the risk of MNM was higher among uninsured Iranians (AOR 3.4, 95% CI 1.7–7.1) and uninsured Afghans (AOR 4.7, 95% CI 2.4–9.2).

## Perinatal outcomes

The risk of adverse perinatal outcomes including stillbirth (OR 12.0, 95% CI 5.0–31.5), extremely preterm (OR 11.2, 95% CI 4.6–27.5), preterm birth (OR 3.0, 95% CI 1.8–5.0), and admission to NICU (OR 3.3, 95% CI 2.5–6.7), were significantly higher among MNM cases than the controls.

## MNM care quality for Iranians and Afghans

Overall, obstetric care quality for 76 MNM cases were reviewed, of which 54 were Iranians and 22 were Afghans (Figure 7). Among Iranians, six women developed near-miss events in early pregnancy while Afghans experienced the critical conditions either in late pregnancy or postpartum. Comparing maternal and medical variables, severe complications, and near-miss events between Iranian and Afghan MNM cases, only socioeconomic factors and the percentage of reoperation were found to differ.

Inadequate care items (Figure 8) were identified in 85% (65/76) of MNM cases. Inadequacy of care items was not different between Iranians and Afghans at pre-hospital level (Table 5). However, the inadequacies were disproportionately higher for Afghan MNMs at hospital. Delays in recognition of severe conditions and inappropriate care plans were the most common items found.

Table 5. Inadequate care items for 76 MNM cases

Inadequate care item	Iranian <i>n</i> (%)	Afghan <i>n</i> (%)	Total <i>n</i> (%)	OR (95% CI)
<i>Pre-hospital</i>	24 (22)	14 (32)	38 (25)	1.6 (0.7–3.6)
Antenatal care	17 (31)	10 (45)	27 (35)	1.8 (0.7–5.0)
Referral system	7 (13)	4 (18)	11 (14)	1.5 (0.4–5.7)
<i>Hospital</i>	115 (35)	79 (60)	194 (42)	<b>2.7 (1.8–4.1)</b>
Initial assessment	23 (43)	14 (64)	37 (49)	2.4 (0.8–6.6)
Recognition	21 (39)	17 (77)	38 (50)	<b>5.3 (1.7–16.6)</b>
Care plan	37 (68)	18 (82)	55 (72)	2.1 (0.6–7.0)
Monitoring	4 (7)	6 (27)	10 (13)	<b>4.7 (1.2–18.7)</b>
Follow up	8 (15)	9 (41)	16 (21)	<b>4.0 (1.3–12.4)</b>
Documentation	22 (41)	15 (68)	37 (49)	<b>3.6 (1.1–8.9)</b>
Total	139 (32)	93 (53)	232 (38)	<b>2.4 (1.7–3.5)</b>

Although a majority of women (62%, 47/76) arrived at hospital in a moribund condition, the delay in access to hospital care was not different (*p*-value 0.20) between Iranians and Afghans.

Overall, suboptimal obstetric care was found in 75% (57/76) of the audited cases. Provision of care was suboptimal for 70% (38/54) of Iranians and 86% (19/22) of Afghans. While obstetric care quality at pre-hospital level was similar for both groups, it was more suboptimal for Afghans than Iranians at hospital (OR 4.5, 95% CI 1.3–15.0). As shown in Table 6, suboptimal care was more likely for those mothers who were

illiterate or had primary education, for those with low family income, for Afghans, and uninsured Afghans. Adjusting for maternal education and family income, suboptimal care remained associated with Afghan nationality. As Model 3 shows, the odds of suboptimal care for Afghan MNMs was higher than Iranians, even after controlling for the potential effect of socioeconomic variables.

Table 6. Odds of suboptimal care for MNMs related to socioeconomic factors

<b>Socioeconomic factors</b>	<b>Model 1 Crude OR (95% CI)</b>	<b>Model 2<sup>a</sup> AOR (95% CI)</b>	<b>Model 3<sup>b</sup> AOR (95% CI)</b>
Education			
Illiteracy and primary	<b>2.9 (1.1–7.6)</b>	2.0 (0.5–7.8)	1.6 (0.4–6.2)
Secondary and higher	1.00	1.00	1.00
Income			
Low	<b>3.4 (1.3–9.0)</b>	1.1 (0.2–4.9)	1.4 (0.3–5.7)
Medium and high	1.00	1.00	1.00
Nationality			–
Afghan	<b>6.3 (1.7–23.9)</b>	<b>4.4 (1.1–18.2)</b>	
Iranian	1.00		
Health insurance	<b>0.2 (0.1–0.6)</b>	–	
Insurance-nationality		–	
Uninsured Afghan	<b>7.3 (1.9–28.3)</b>		<b>5.1 (1.2–22.6)</b>
Uninsured Iranian	2.0 (0.5–7.9)		1.7 (0.4–7.1)
Insured Iranian	1.00		1.00

<sup>a</sup> AOR for education, income, and nationality.

<sup>b</sup> AOR for socioeconomic factors while ‘insurance-nationality’ substitutes for ‘insurance’ and ‘nationality’ variables.

## Near-miss survivors’ input

Information disclosed by MNM survivors was employed to some extent in the audits of obstetric care. This information was very helpful for understanding potential underlying factors that cause delays in achieving high-quality care. Some of the care experiences of Iranian MNM survivors are presented in the following sections.

A woman with thrombotic thrombocytopenic purpura who attended a private specialist consultation during her pregnancy developed severe



thrombocytopenia and hemorrhage with her childbirth. She explained her ignorance about seeking the recommended tertiary hospital late in the third trimester, as follows:

“I didn’t really know why she (doctor) referred me to that hospital far away. Even in my first pregnancy when the baby died in my belly and doctor performed cesarean, I remember she just said: ‘you should thank God that I could save your womb’. If I knew that the illness could 1% recur, I would never be negligent.”

A mother who also attended an antenatal private specialist consultation and developed severe preeclampsia late in her pregnancy reported her experience as follows:

“I visited my doctor every month. Her office was crowded and I had to sit and wait for the visit for several hours despite making the appointment in advance. She took in her room two women at a time. It was inconvenient for me. Therefore, the last month, I decided to go there with intervals instead of weekly visits. I did not know that blood pressure could rise in pregnancy, but it did.”

Another woman with severe preeclampsia said:

“I had stomach pain and went to my obstetrician’s clinic, but she did not recognize the problem. She said it was a common stomachache and prescribed syrup. I went to a local clinic at night but they said something similar again and gave me an injection. I went to the hospital a couple of days later because the pain got worse. Then they recognized the illness. The ultrasound examination even showed that my baby had not grown up adequately. My doctor should have realized this and informed me. Doctors think they know the best and don’t listen to patients; they don’t care.”

A woman affected by infertility was pregnant after in vitro fertilization and developed an undiagnosed heterotopic pregnancy with massive intra-abdominal bleeding. She was interviewed after recovering from laparotomy and intensive care.

“I had back and belly pain and asked for help several times. I even stayed at hospital one night but had been discharged. They (doctors) couldn’t recognize the problem. I suffered a lot seeking care without getting adequate help. Now I wonder where to go for childbirth to get right care.”

Women's experiences of different social and cultural challenges were found within their narratives. For instance, a mother felt guilty herself for the burden of her illness and the care costs.

“My husband compared me with other women. He said: ‘I paid so much, while other women become pregnant and just give birth in a birth center.’ He is from a village and can’t believe that pregnant women get disease. He had to pay for the visits and for the expensive prescriptions every month. He said nothing but I could realize that he was annoyed with the costs. To me it means that I have to ignore my illness and hide it even from my husband. It would be different if he would be an engineer, or if I myself would work and make money.”

She added that in her neighborhood, a young bride with insulin-treated diabetes died due to illness stigma because she did not want to take her injections in front of her parents-in-law.

Some women cited that their morbidities resulted from delays in the course of receiving care. For example, a young mother who experienced prolonged labor after early rupture of the membrane developed severe PPH and sepsis. She had a traumatic experience and cried during the interview while remembering that night in the labor ward:

“When the water ran at home my husband took me to the hospital. I had very strong pain for a long time before they took me to the delivery chair. It was terrible. I pushed for a long time there. I thought I was dying. I begged them to help me. I told them that I couldn’t push any more but nobody listened to me. Finally they took me to the operating room but it was too late. My baby could hardly breathe; we both were almost dying, and developed infection. I just wanted to know why they didn’t listen to me, why they let this happen.”

Several mothers and their husbands cited the burden of having to perform healthcare-related tasks that their family faced during the women's hospitalization. Women's husbands or relatives had to buy the medicines that had been prescribed to substitute them, take the blood samples to the laboratories outside the hospitals for advanced examinations, and borrow a plasma exchange apparatus from the central blood bank for those women with hematologic disease. One woman said that she wanted to stop the treatment and leave the hospital due to these overloads on her family.

## Preventability of near-miss events

The majority of MNM cases (71%, 54/76) had at least one near-miss event that could have been prevented or become less severe by providing high-quality care. Preventability of near-miss events did not differ between Iranians and Afghans (67%, 36/54 versus 81%, 18/22; *p*-value 0.20).

The secondary hospital that serves women with less complicated pregnancies had the highest rate of CS among the hospitals included in the study (Figure 11). Auditors found that 23% (4/17) of MNM cases at the secondary hospital were mothers with normal pregnancy who delivered by CS with questionable indications. After surgery three of them developed life-threatening intra-abdominal hemorrhage that required re-operation and the fourth developed lung emboli. Moreover, six mothers with normal pregnancy were admitted for childbirth at the tertiary hospitals (9%; 4/43, in hospital 1 and 9%; 2/22, in hospital 2). Five delivered by CS due to fetal distress and one due to twin pregnancy, all were assessed as doubtful indications. Of these five, one developed life-threatening intra-abdominal hemorrhage and four developed severe PPH. The sixth woman, who delivered by elective CS on maternal request, developed lung emboli postnatal (the analysis of CS audits is ongoing and not included in the present MNM audit study).

Provider-related factors were involved in 85% (46/54) of MNM cases with preventable events. Patient-related (31%, 17/54) and health system-related (26%, 14/54) factors could also have contributed to the prevention of near-miss morbidities. The following sections include some examples of missed opportunities to provide high-quality care.

Severe PPH was the most common complication leading to MNM (37%, 28/76); however, the amount of blood loss was neither estimated nor adequately assessed in 82% (23/28) of the cases. Auditors identified delayed recognition of the severity of hemorrhage and inadequate stepwise management in 57% (16/28) of cases.

Initially, 61% (16/26) of near-miss mothers with hypertensive disorders were inadequately assessed. Moreover, emergency CS due to severe preeclampsia was performed in 21 MNM, of these 71% (15/21) were before the stabilization of and treatment for severe hypertension.

Placenta previa was the third most common obstetric complication (10%, 8/76) that resulted in near-miss morbidity. Nevertheless, a preoperational assessment and the recording of the decision for taking a surgical approach was not completed in 50% of the cases.

Three mothers with epilepsy and preterm pregnancy arrived at hospital with uncontrollable fits due to either discontinuation of

medication or irregular use of anticonvulsive therapy. They were delivered by emergency CS with suspicion of eclampsia while opportunities for sufficient history-taking, adequate initial assessment, and making a relevant management plan were missed.

In both groups of MNM cases, potentially preventable factors at patient level, including low education and health literacy, delays in care seeking, refusal to follow clinical recommendations, not attending antenatal care, and financial constraints, were associated with developing near-miss events. Furthermore, costly care services, non-functional referrals, medication shortage, and unavailable ICU beds, at health system level, also compounded the potential effect of other factors on developing near-miss morbidities. The following Tables present three MNM cases and their related clinical judgments.

Table 7. Audit findings linked to care items for MNM case 1

<b>Case 1</b>	A 24-year-old Afghan mother, 3P, illiterate, arrived at hospital in pre-shock status. Having high fever and long-lasting bleeding for one week after home birth with stillbirth baby, the initial hemoglobin was reported 5.6 g/dl. She was resuscitated with crystalloids infusions, blood transfusion, and intravenous antibiotic was prescribed. After three days continued fever and tachycardia, ultrasound examination was done and the retained placental tissues were detected. Fever decreased after evacuation and curettage in the fourth day of admission. She decided to leave the hospital before planned recommendation. Interviewing her after successful recovery, she disclosed that costly services and her living condition in poverty prevented her from hospital birth and timely access to obstetric services.
<b>Care items</b>	<b>Audit findings</b>
1. Antenatal care	Inadequate, partially attended midwifery consultations.
2. Referral system	–
3. Initial assessment	Despite national guidelines regarding home birth and PPH, uterus cavity was not examined.
4. Recognition	Retained placenta was identified with delays.
5. Care plan	Evacuation of uterus cavity was done with delays.
6. Monitoring	–
7. Follow up	–
8. Documentation	Inadequate for antenatal care, childbirth, and PPH.
<b>Preventability of near-miss events</b>	Potentially preventable by affordable hospital birth (health system, patient), timely care-seeking (patient). Pre-hospital and hospital care were also suboptimal.

Table 8. Audit findings linked to care items for MNM case 2

<b>Case 2</b>	<p>A 32-year-old Iranian mother, 1P, with high school diploma, had antenatal care of obstetrician and twin pregnancy. Arrived at hospital due to labor pain and rupture of membrane in 37 weeks of gestation. She delivered by CS, while the documented indication was breech-cephalic presentation in active phase of labor. Thirteen hours after operation, while she was pale and had low blood pressure and oliguria, intra-abdominal hemorrhage was diagnosed. She underwent re-operation and eight units of blood products were transfused and intensive care was provided afterward. She and her husband were interviewed three months after successful recovery. She claimed that she was about to give birth but doctor pushed the baby up to perform CS. She referred her claim to the cephalohematoma the first baby had, documented even in her summery discharge notes. Moreover, she heard some midwives said she could even deliver vaginally. She experienced delayed recognition of her problem after CS. She said doctors came to her when she felt bad and assessed the condition but could not identify the hemorrhage in her belly. She was not satisfied with the obstetric care.</p>	
	<b>Care items</b>	<b>Audit findings</b>
1. Antenatal care	—	
2. Referral system	—	
3. Initial assessment	Inadequate assessment for possibility of vaginal birth.	
4. Recognition	Delayed recognition of intra-abdominal hemorrhage.	
5. Care plan	The indication for CS was in doubt.	
6. Monitoring	Postpartum monitoring was inadequate.	
7. Follow up	—	
8. Documentation	Inadequate and contradictory documentation of care process.	
<b>Preventability of near-miss events</b>	Potentially preventable by evidence-based care (provider).	

Table 9. Audit findings linked to care items for MNM case 3

<b>Case 3</b>	<p>A 34-year-old Iranian mother, 0P, with high school diploma, worked at the Department of Radiology, had normal pregnancy and regular antenatal specialist consultations. She delivered by elective CS, indicated by maternal request in term pregnancy. She was admitted to ICU due to severe dyspnea and tachypnea on the day after operation and was treated there for five days. Pulmonary embolus was confirmed by computed tomography angiography of the lungs. She was interviewed after recovering from acute phase of her illness, while staying at obstetric ward. She reported that she and her husband scared of vaginal birth. They considered CS as a safe mode of delivery and she claimed that her obstetrician accepted her request with no hesitation. The couple was not aware of the potential risks in relation to surgical birth. Moreover, she did not really know about what that had happened to her. She was also very sad because she could not be with and breast-fed her baby during those days.</p>	
	<b>Care items</b>	<b>Audit findings</b>
	1. Antenatal care	Inadequate counseling.
	2. Referral system	—
	3. Initial assessment	—
	4. Recognition	—
	5. Care plan	—
	6. Monitoring	—
	7. Follow up	—
	8. Documentation	—
	<b>Preventability of near-miss events</b>	Potentially preventable by adequate counseling, effective patient-professional communication, choosing the right mode of delivery (provider).

## Maternal experiences of Afghan near-miss survivors

Our interviewees were between 18 and 31 years old. Almost half of them had more than three children. Their SES was commonly low and none of them owned any property in Iran. They had lived in Iran between three and twenty years. They attended antenatal consultations, underwent blood tests, and the recommended ultrasound examinations during pregnancy. About half of the interview participants had either arrived at the hospitals in a moribund condition or developed near-miss morbidity within six hours of their admission at hospital.

### Care experiences

Discrimination was a key theme with many references within the interview data of Afghan women and men. They felt that they had received different treatment not only in the health system but also in society. They referred in their interviews to lacking health insurance despite living and working for many years in Iran. A number of participants expressed their deep dissatisfaction over discriminatory behavior, mistreatment and verbal abuse. Several recalled rude language while in direct contact with professionals that left them feeling deeply sad. Some other narratives suggested an inevitable acceptance of such treatment due to not having any voice in society with which to speak up.

Ineffective counseling was perceived as leading cause for delays in recognition of the critical illness despite repetitive care-seeking. Some mothers claimed that obstetric professionals were busy and careless and paid insufficient attention to women's complaints. They felt as though professionals did not hear their voices. Some women referred the severe complications they developed to inadequate competency of care professionals. Some of the participants said that doctors were unqualified for making an accurate diagnosis. In addition to somatic complications, the experience of being subject to ignorance caused several mothers to experience intense spiritual suffering.

Mothers commonly perceived that inadequate information was exchanged during the visits. Women were generally unaware of potential risks during pregnancy and childbirth. They often recalled that only their blood pressure had been taken, fetal heart rates had been heard, and they were given iron pills during antenatal consultations. They felt as though professionals were not interested in their health or the health of their babies. Rarely did participants know what was happening to them and the reasons they had been delivered by CS, even after they had recovered from the near-miss events and had been discharged from hospital.



## Experiences of barriers to accessing care

Various intertwined factors were found among the narratives that suggested the complex situation that mothers were confronted with during pregnancy and childbirth. Economical constraint was commonly mentioned as a challenge within the family during interviews and was particularly highlighted in relation to low income and lack of health insurance. Although a number of women mentioned costly services as a burden, they had attended antenatal visits and underwent the costly blood tests and ultrasound examinations.

Some women considered low education as a barrier to understanding what the obstetric professional recommended within antenatal visits. They thought that illiterate women hardly dared to ask questions of the obstetric professionals.

Inadequate perceptions of clinical illness and decisions made by parents-in-law were other challenges perceived in achieving maternal care. However, these factors appeared to be compounded by other factors such as the financial situation of Afghan families and their health illiteracy.

## Experiences of MNM consequences

Some women talked about the long-lasting consequences of MNM. Their husbands had to undertake some healthcare tasks and were unable to work, as they should. Many women reported that their husbands were burdened with huge debt, which they considered a damaging consequence of MNM. Moreover, some women felt guilty due to the adverse outcome of the pregnancy and the lost baby. One woman said that her in-laws forced her husband to divorce her. Infertility due to obstetric hysterectomy was also cited as a stressor for surviving mothers, which affected the women's ability to function in the home.

# Discussion

The results of this thesis demonstrate suboptimal obstetric practice in the hospitals studied. CS rates may vary widely due to differences in the case mix of the obstetric population [34]. However, our results highlight the usage of CS that was unjustified by evidence in the study sites. A disparity in maternal care for Afghan migrants was found, while language and religion could hardly explain this observation. In addition to obstetric professionals' qualifications, their communication skills and caring behavior were found to be fundamental to care quality and positive experiences.

## Auditing obstetric care quality

### Audit and feedback associated with a decline in CS rates

Introducing a clinical audit of CSs and feedback in a general hospital was feasible and practical. CS indications for one-third of surgeries were found to be questionable. During the audit period, women delivering at the study site had a 27% decrease in risk of primary CS (155 operations during seven months) compared to women delivered before the audit introduction. In line with other studies, auditing CS indication and informing obstetricians about their performance resulted in a clinically significant reduction in primary and overall CS rates [14]. However, intentionally subjecting obstetricians' performance to scrutiny while supporting and encouraging specific practice and financial incentives could have enhanced the effect of the audit in the reduction of CS rates. We acknowledged that maternal and medical factors could influence CS rates and that the lack of a comparable control group prevented us from attributing the decline in CS rates in 2005 solely to the clinical audit.

Recent publications from Taiwan and Chile show that using CS audit is associated with a significant reduction in the CS rate even after controlling for maternal factors and gestational age [128,129]. The application of CS audit is well suited for obstetric wards with large numbers of women with repeatable events and its usefulness has been

reported even in earlier publications [50,130]. A cluster-randomized trial to reduce CS rates in Canada using professional training with audits and feedback shows a significant reduction not only in CS rates but also in minor and major neonatal morbidity among women with low-risk pregnancies [131].

In Iran, children start the first grade of school in September when they are seven years old. Babies born after the first of October start the first grade with those babies born in the first half of the next year. Therefore, mothers like to choose a delivery date on this basis in favor of delivering in September when the due date is close. This could partly explain the increased number of CS deliveries in September and the considerable decline of CS births in 2005 while the audit was used.

Other publications in different settings report that continuous surveillance of audits is challenging [50,129]. Sustainable change in care performance is a matter of attitudes, inter-professional relations, and leadership [132]. Sustainability requires a change in mentality and a long-term strong commitment by the health system so that obstetricians routinely practice based on evidence [50,132]. A unique example of continuous quality improvement interventions, including audit and feedback, has been running for years at the Linköping University Hospital. The CS rate among nulliparous women with single cephalic term pregnancy at this hospital is almost the lowest rate in Sweden without increasing adverse neonatal outcomes [133].

## MNM audit identified suboptimal care

Auditing obstetric care for mothers with near-miss morbidity generated evidence on current practice. MNM survivors disclosed first-hand information about care experiences that was unseen within patients' records. The mothers' input even uncovered some experiences of sociocultural and behavioral challenges.

A majority of women faced pre-hospital delays, or so-called near miss upon arrival. This was a surprising finding in a setting with high coverage of antenatal care and hospital birth. Previous publications show correlations between pre-hospital delays and poverty, non-affordability of services, lack of antenatal care, low education levels, and rural residency [62,134]. Given that Iranian and Afghan mothers with different socioeconomic and health insurance status had a similar proportion of late hospital arrivals, these factors could hardly explain the pre-hospital delays that the women faced in our setting.

MNM survivors and their husbands commonly claimed that they sought medical attention repeatedly with perceived illness but their problems were not recognized in a timely manner. Moreover, they generally thought doctors were busy, careless, and inadequately qualified to make precise diagnoses and to provide appropriate information. These findings agree with previous publications that suggest the quality of patient-professional communication and the information exchanged within antenatal consultations are as important as care provision in preventing undesirable outcomes [134,135].

Moreover, MNM cases generally resulted from common severe complications that could have effectively been managed at teaching hospitals. However, auditors frequently identified suboptimal care and agreed that, in the majority of cases, near-miss events could have been prevented or become less severe with the provision of high-quality obstetric care. This finding is in line with other studies that identify the contribution of deficient care in developing near-miss morbidities [8,126]. Although national guidelines relating to the management of major obstetric complications were available at all hospitals included in the study, obstetric practice did not correspond with these guidelines in general terms. There were areas in the management of severe PPH, severe preeclampsia, and placenta previa that commonly required improvement. According to the literature, the audit strategy not only monitors clinical practice, but also is used as an educational tool to teach health professionals [136]. Drill training and teamwork skills paired with the implementation of an audit strategy can markedly improve obstetric practice. Dumont et al show that audit and feedback is one of the most effective strategies for guideline implementation [137]. However, researchers in Latin America demonstrate that institutional culture and beliefs have the greatest impact on health professionals' adherence to guidelines [138].

In our setting, MNM audits not only monitored the current care provision, but also provided evidence on preventable attributes to MNM. Determining the preventability of near-miss events is crucial for planning tailored actions and strategies to change the trends [139]. In line with prior publications, our findings emphasized the importance of the providers' role in the prevention of MNM [3,8,139]. For instance, their competence in making a timely diagnosis and effectively managing complications could reduce the severity of PPH or severe preeclampsia. There were women whose near-miss events correlated with CS, while indications of surgical birth were doubtful. For instance, 23% of MNM cases in the secondary hospital, where women with low-risk pregnancy

were mostly admitted, had critical conditions associated with CS births. This finding agrees with a recent publication that shows that CS complications can be directly attributed to near-miss events [23].

The second most common preventable attributes to near-miss events related to patients. Women's health literacy and financial status could affect decisions to seek care [62]. Some cultural factors, such as women's self-blame, illness stigma, and the authority of parents-in-law, have been proven to contribute to delayed reactions for seeking care and can compound the effect of other factors on delays in maternal healthcare [70,140].

The health system also provides leadership and system alignment for the provision of high-quality care and the prevention of MNM [3,8]. Health system resources support timely medical managements. For instance, life-threatening conditions in a woman with severe PPH can result from limited blood bank capacity and transfusion possibility [3,126]. Moreover, medication shortage and inadequate ICU beds as well as high costs of obstetric care create barriers to high-quality care provision and correlate with maternal morbidity and mortality [126].

Preventable factors at all these levels can interact with each other either to save or to put lives at risk of MNM. Audits provide good-quality data to track areas in need of improvement. Implementing MNM audits as a routine program ensures continuous monitoring of care quality without overloading health professionals with too much data [60]. Addressing care quality and equity gaps can effectively avoid the majority of preventable adverse maternal and neonatal outcomes [141].

## MNM audit identified inequitable care for Afghans

Obstetric care at hospital was more suboptimal for Afghan mothers than Iranians. Migrants with health illiteracy or a low education level might have difficulties in explaining their medical problems, and health professionals consequently underestimated the severity of their conditions [9]. Therefore, a patient-professional miscommunication could lead to delays in care provision and, consequently, worse outcomes [142]. Afghan MNM had an increased odds of receiving suboptimal care even after adjusting for education, income, and insurance status. In contrary to other publications, the maternal health profiles and medical and obstetric backgrounds were not different between Iranians and Afghans to explain the disparity observed [9]. The majority of Afghan mothers attended public antenatal midwifery consultations. Despite low SES and lacking insurance coverage, the proportion of Iranian and

Afghans who developed critical events before hospital arrival were similar. Afghans generally are Muslim and speak Dari, which is similar to the religion and language of Iranians. Therefore, socioeconomic differences and communication barriers that migrants face in high-income settings could hardly explain the disparity identified in our setting [9,143,144]. While a number of publications present disproportionate obstetric care delivery to migrants in high-income countries, such disparity was identified, to our knowledge, for the first time in Iran [142,144,145].

Care experiences of Afghan MNM survivors might suggest provision of discriminatory and differential treatment to these mothers. This finding is in line with the perception of inequity and disrespectful healthcare among Afghan migrants in Mashhad, Iran and contradicts the national guidelines for obstetrics and the patients' bill of rights enacted by MOHME [105,146,147]. The health authorities who established the bill aimed at emphasizing high-quality care delivered with dignity and respect, regardless of individual background [146]. A systematic review also suggested the reported maternal experiences of discriminative care based on ethnicity while delivering at health facilities worldwide [81].

Ineffective counseling and inadequate information exchange during antenatal visits was another theme revealed within the interview data. The shortage of obstetric professionals, inadequate qualification, and careless attitude can lead to ineffective patient-professional communication and poor practice [81,148]. Our interviewees thought obstetric professionals paid insufficient attention and trifled with Afghans. Therefore, repeated visits to these professionals could not prevent mothers from delays in diagnosis. A recent study of the healthcare experiences of Afghans in Iran shows the inferiority of the migrants' position among health workers [147]. These findings also agree with maternal experiences in Western settings that suggest the inadequate attention of care providers to migrants [149,150]. Health psychologists suggest that professionals' behavior is crucial for the achievement of desirable outcomes [151]. Adequate antenatal counseling is important for the timely recognition of obstetric complications and their effective management [152,153].

The WHO vision for maternal care quality specifies the importance of competent and motivated professionals to effectively communicate with women and inform them about their rights [1]. Moreover, the FIGO ethical committee clearly states that informing mothers on the potential risks and management alternatives and providing them with the opportunity to ask questions and obtaining their consent with regards to

decision making is a duty for professionals [43]. However, the mothers' narratives showed that rarely did they know about what had happened to them or they were not informed in an understandable format.

## MNM approach

The MNM approach shines light on the current situation of obstetric care quality and determined the frequency and causes of MNM at the university hospitals included in the study. Moreover, the results indicated that inequity of access to childbirth care, which was created by a lack of insurance coverage, put both Iranian and Afghan women at increased risk of severe morbidity. The MNM ratio of 6.3/1,000 live births is in line with the ratio (6.1/1,000 live births) reported by the WHO multicounty survey for countries with a moderate MMR, such as Iran [2]. According to the WHO experts, the data from the application of the MNM approach may facilitate comparing situation analyses across settings and for varied geographical areas over time [60,64]. However, the differences between the obstetric resources available and the health profiles of women admitted to medical institutions make the comparison between institutions unjustifiable. Employing a standard MNM approach assists in the monitoring and improving of care quality at a facility level over time. Moreover, at regional and national levels, application of this approach may mirror obstetric care resources and care quality in place. Validity of the MNM organ dysfunction criteria for limited-resource settings has been questionable [154]. In the Netherlands, the MNM tool even fails to identify all cases with severe morbidity in national data retrospectively because limited document in the patient records relates to the organ dysfunction criteria [155].

## Near-miss causes

The majority of MNM cases resulted from severe PPH and preeclampsia, a finding that is in accordance with earlier studies [2,156,157]. However, to our knowledge, placenta previa/AIP has not been reported previously as the third most common obstetric cause of MNM. Placental complications are well-known consequences of CS for subsequent pregnancies and often lead to massive hemorrhage and obstetric hysterectomy [16,28]. The latter findings may be explained by the high rate of CS in the study hospitals (65%; rate of prior CS 22%), compared

with the WHO multi-country survey (CS 28.6%; rate of prior CS 12%) [2].

The most frequent near-miss events in our study were coagulation-hematologic, cardiovascular, and respiratory dysfunctions, in agreement with other investigations [2,158]. However, obstetric hysterectomies were frequently performed due to placenta previa/AIP, rather than due to uterine atony, in the hospitals included in the study [159]. This finding, which is in line with publications from other countries with high frequency of CS, may be another instance of the adverse consequences of CS overuse [160].

### Near-miss risk factors

As other studies show, older age, multiparity, a lack of health insurance and antenatal care, nationality, antepartum CS, and comorbidity were single risk factors for MNM [125,143].

Comorbidity, antepartum CS, and a lack of health insurance were independent risk factors for MNM in our study. The prevalence of CS due to severe preeclampsia, placenta previa, and placental abruption in MNM cases were higher than controls. These findings might suggest that the existing association between antepartum CS and MNM could be due to obstetric complications, rather than CS surgery. To attribute MNM solely to CS, in an ongoing CS audit study we review obstetric process in relation to CS and near-miss events. Earlier publications, however, agree with the significant association between CS and MNM, even after adjusting for confounding variables and CS indications [23,24,161].

Previous CS and severe anemia were both included in the category of comorbidity in our data; therefore, we did not separately control for the effect of these variables.

The increased risk of undesirable maternal and perinatal outcomes for migrants in high-income countries is evident [9,162–164]. Moreover, different studies suggested the disparity of maternal care for migrants in Europe [142,144]. Our finding showed that the association between MNM and Afghan nationality arose through a lack of health insurance and suboptimal care. Unequal access to maternal care is established as a contributing factor to healthcare disparity among migrants [165]. Home childbirths among Afghan cases (9%, 2/22) were more common than Iranians (4%, 2/53), which can be another indication of unequal access to care. However, home birth data for Iranians and Afghans in the whole population were not available to us for comparison. Universal access to reproductive health is a part of human rights in the 21st Century [166].



The health system has the responsibility to protect this right during pregnancy and childbirth by promoting a supportive infrastructure and effective organization to ensure high-quality care provision [11]. The new health insurance scheme that covers the basic care services for all Iranian nationals and registered migrants in Iran will potentially contribute to the reduction of poor outcomes.

## Methodological considerations

This thesis has the advantage of employing a standard approach to study care quality in settings with too much use of obstetric interventions. Moreover, for the first time in three decades of hosting an Afghan migrant population, this research shines light on the provision of maternal care and experiences of such care by migrants in Iran. The combination of various scientific methods in maternal care inquiry was very useful to assist a better understanding of healthcare challenges. The results found by each method complemented the others and yielded a remarkable insight into the complex maternal healthcare phenomena. The methodological challenges and the measures taken to minimize the limitations are below considered for each study individually.

### Study I

This study presented the possibility of changing practice in settings with high rates of CS. The retrospective nature and a lack of a comparable control group limited us to attribute the reduction of CS rates solely to clinical audits. Moreover, promoting vaginal birth by other activities, along with the application of the clinical audit intervention, could have increased the effect of the audit component on the observed decline in CS rates.

To minimize the secular trend or extraneous events that could account for the effect observed, a three-year dataset of delivery statistics from other general hospitals affiliated with SSO for comparisons was considered. To minimize selection bias caused by temporal trends, a comparable length of time relating to the audit and the control period as well as the four-year delivery statistics of the study hospital were used. To minimize information bias, the data relating to the delivery statistics for all measures were extracted only from the Tehran Health Directorate database. These methodological measures could increase the internal validity of the inferences. As the high rates of CS at hospitals in Tehran

are mostly not grounded in evidence, setting clinical criteria to review the obstetric performance with scientific and respectful feedback may decrease the number of CS births in similar settings [114].

## Study II

This study applied the WHO MNM approach in a middle-income context with overuse of CS and a huge influx of refugees. All women with near-miss events from early pregnancy to six weeks postnatal were included for case identification. The results verified feasibility of using the WHO criteria prospectively in the settings studied. Moreover, identification of cases was practical and the burden of data collection for this protocol was found to be reasonable, even with routine usage.

Case-control studies can be subjected to several potential sources of bias, such as the selection of participants, information retrievals, and confounding variables. For the selection of cases, we modified the WHO MNM criteria in cases of two indicators to include those mothers whose lives could potentially be under threat, even at a lower threshold of the defined criteria at the secondary hospital. Research team members identified cases during daily morning reports, where all new admissions and critical events were reported, to minimize selection bias. One MNM case was identified while collecting data from the control sample, while seven over-reported cases were excluded. Moreover, it was impractical to follow the patients after they were discharged from hospital. Some of the women who might have developed complications at home (eligible MNM cases) and were subsequently admitted to other hospitals might have been lost. Therefore, the small sample size and underreporting of MNM cases could potentially affect the outcome measures in our study.

Women's SES and BMI have associations with MNM [143]. The SES and BMI of MNM cases were cross-checked for the subgroup of mothers interviewed in Study III to validate the collected data during hospitalization. However, there was no such information recorded in patients' records in the control group to make comparisons. Therefore, issues related to the completeness and accuracy of hospital records affected our results by introducing differential information bias.

Maternal factors (age, parity, health insurance, and nationality) and medical characteristics (antenatal care, comorbidity, CS) could have correlations. Therefore, the logistic regression models were built to find independent risk factors for MNM by controlling for these correlations.

Our results might be representative of other university hospitals in Tehran, as they serve women from similar socio-demographic groups

and have comparable health resources. However, these findings might not be transferable to other public or private hospitals in Iran because of the differing background characteristics of the clientele and the wide variation in healthcare capability at those health facilities.

### Study III

The results presented the current situation in obstetric care within a migration perspective at university hospitals in Tehran. Auditors identified areas of obstetric care that require improvement. Interviewing MNM survivors disclosed valuable input that might not have been identified by reviewing the case notes alone. Moreover, assessing care quality with mothers' input may hopefully provide a possibility to engage women in the process of improving care in the future [167].

The employed audit framework enabled the evaluation of care quality before and after hospitalization. Moreover, combining the concept of preventability with auditing care provision might have a qualitative value in relation to areas in need of improvement interventions [60, 87]. The criteria-based audit of MNM cases with severe PPH and preeclampsia facilitated clinical judgments for the audit panel, while more discussion was required to reach consensus for other complications. Differences in maternal socioeconomic variables (education, income, and health insurance) between Iranian and Afghans could potentially influence quality care provision. The analytical models we developed assisted us to measure the associations, while adjusting for the potential modification effects of independent variables on care provision.

The main limitation of the audit study, in line with other publications, was incomplete and inadequate documentation [8]. Little information from antenatal consultations and the first institute or professionals who referred women to the tertiary hospitals was recorded. Antenatal cards were mostly unavailable. Therefore, the evaluation of care quality, particularly at pre-hospital level, could be underestimated and was affected by information bias. Furthermore, the narratives of several women contradicted the information documented in the hospital records. Crucial documents related to the women's condition and laboratory results in some cases did not match the obstetric professionals' notes, making clinical judgment a challenging process.

The small sample of MNM cases was another limitation that could explain the wide CIs of the outcome measures and the insignificant results relating to the preventability of near-miss events among Iranians and Afghans, despite excessive suboptimal care for migrants.

As similar inadequate care items were repeatedly found in relation to managing common obstetric complications at all hospitals surveyed, the results might be transferable to other university hospitals in Tehran.

## Study IV

This interview-based qualitative study, to the best of my knowledge, is the first to provide increased insights into the maternal healthcare of Afghan migrants in Iran. Women's accounts uncovered some aspects of care providers' behavior that were linked to equity and dignity in healthcare. It is essential that obstetric professionals are made aware and actively address these issues. Including the voices of Afghan men added additional information to the interview data. The position of the researcher as an obstetrician, yet situated outside of clinical and managerial practice, who knew the language and directly communicated with participants, appeared to provide trust during interviews. However, we are aware that a non-obstetric professional interviewer could have received other responses or made other analyses.

The selection of interviewees based on a hospital study could have prevented us from reaching the experiences of those women who could not afford hospital care at any price. Holding interviews at hospital might have affected the results by introducing information bias due to either having to recall the critical illness or the inconvenience of talking freely about obstetric professionals. As a hospital-based study, we missed the voices of obstetric professionals, which may have added further depth to the whole concept.

# Conclusion

This thesis entailed the studying obstetric care quality in settings with CS overuse and a huge influx of Afghan migrants. Although the appropriateness of CS attracts more concern than its frequency, extremely high rates of CS at the study hospitals suggest low quality of care and inappropriate use of surgical procedure. Placenta previa/AIP was found to be the third most common complication that threatened mothers' lives in our setting. Disparity in insurance coverage put disadvantaged women at increased risk of MNM. Our findings represent a clear need to divert health resources from providing unnecessary CS to providing unconditional high-quality maternal care to all women.

The MNM approach adopted in this thesis determined suboptimal care provision and the areas that required improvement. Moreover, a disparity in care provision for Afghan mothers, who are burdened with social and economic disadvantages, was found. Adding the mothers' input to the audit data enabled us to account for some hidden aspects of care provision. Experiences of deficient care in terms of professionals' qualifications, communication skills, and caring attitudes proved to be very valuable. Women uncovered the potential effects of discrimination, insufficient attention, and ineffective counseling on delays in seeking and accessing care in a metropolis. The combination of quantitative and qualitative research findings were particularly important in our setting, which has limited information on obstetric care processes, and could essentially be a baseline for further improvement plans. Quality is a multidimensional concept in healthcare. Our findings could shed light on the current situation within each dimension of obstetric care at the university hospitals in Tehran. To improve maternal care quality, it is critical that an evidence-based surveillance system is employed to promote the continuous production of relevant evidence, work with that evidence, and plan actions that target all dimensions of high-quality care. As the human rights of women are imbedded in care quality, including these rights within quality improvement programs may ensure the realization of human rights in maternal care provision in the post-2015 era.

# Recommendations

There is obviously no magic action, and no single intervention can solve all problems. The MOHME has the major responsibility and the greatest power for high-quality care provision. As Professor Fathalla clearly states, healthy motherhood can be made a reality if the will and the wallet make it happen [168]. Firstly, evidence on maternal ill health is required. Then, problems should be prioritized and addressed with the best possible context-specific strategies. Based on field experience and the research evidence, some recommendations for improving maternal healthcare in Iran can be considered.

## Health system level

- The most important long-term action is to restore midwives' responsibility for low-risk pregnancy and childbirth through a health system reform. This action will assist in reducing obstetric interventions and their related complications considerably.
- The health system should change financial policies, provide reimbursement to obstetric professionals for vaginal birth, and run audit programs that assist in the reduction of CS births at hospitals.
- Antenatal consultations provided throughout the country need to be enriched by women-centered education packages.
- As Afghan migrants are affected by many social, economic, and humanitarian challenges, family planning and health literacy problems of this minor population should gain additional attention within primary healthcare service programs.
- The MOHME, in collaboration with the National Association of Iranian Gynecologists and Obstetricians must integrate the FIGO curriculum, including the human rights competency, in the obstetrics education programs.
- The health system, in cooperation with other related agencies, should raise awareness in society about women's human rights during childbearing age. Moreover, monitoring and ensuring that these

rights are being respected in care practice is an essential responsibility for the MOHME.

- The health system should provide the required infrastructure and organize health information databases to strengthen quality improvement programs at hospitals.
- Further studies are needed to test the new hypotheses created in this thesis. The first hypothesis is that discriminative and differential treatment for Afghans leads to disparity in migrants' maternal care and outcomes and the second one is that suboptimal practice leads to pre-hospital delays in settings with high availability of obstetric care services.

## Hospital level

- As repeat CS is the main indication for CS in Iran, attempting vaginal birth after CS in well-resourced hospitals is a major recommendation.
- Auditing CS births has proven to be practical and beneficial to the reduction of CS rates. Therefore, a sustainable decline in CS births can be achieved through the effective implementation of an audit strategy with real leadership.
- The implementation of an MNM surveillance system at hospitals is highly recommended to monitor obstetric care quality over time. Making a strong commitment to focusing on improving care provision rather than identifying guilty culprits to blame is crucial for producing satisfactory audit outcomes.
- Obtaining good-quality data is an essential component for evaluating, monitoring, and improving care quality. Therefore, maintaining hospital administrative discharge databases that include patient socio-demographics, diagnosis, procedures, and other information to evaluate obstetric care is needed.
- Adequate and accurate documentation is part of care quality. Hospital records are the main source of data for audit interventions. An effort to optimize the quality of documentation is required, while the audit strategy allows for the periodic assessment of the outcome of such efforts.

## Provider level

- Evidence-based practice should be cultivated and encouraged among obstetric professionals. Maintaining an MNM surveillance system and CS audit strategy will provide scientific evidence and feedback to obstetric professionals in relation to their performance.
- Based on our findings, professional practice in relation to the management of severe PPH and preeclampsia, interpretation of CTG trace, and decision making for surgical birth needs to be improved. Team training and communication and counseling skills for the optimization of performance should be practiced.
- The antenatal period is a valuable time and is adequately long to carefully engage with women and tackle their individual needs. Obstetricians and midwives can utilize this opportunity and provide appropriate information in a women-friendly manner to reduce delays in achieving timely care. Moreover, antenatal counseling for women who choose elective CS should be improved. Obstetric professionals should provide suitable information in relation to the underlying reasons for CS choice and the consequences of unnecessary CS birth.

I hope that by addressing the quality and equity gaps, the majority of preventable factors that are attributed to maternal ill health will reduce.



## Summary

Considerable efforts have been made to scale up coverage of antenatal care and hospital birth in Iran. This country, with a huge influx of Afghan refugees, achieved the goal of reducing the MMR by 75% in 2015. However, the increased availability of obstetric services has been accompanied by the over-medicalization of normal pregnancy and childbirth that is not grounded in evidence. Overuse of CS in low-risk pregnancies potentially exposes mothers and babies to MNM without providing any additional health benefits. Migration can further challenge maternal outcomes.

This doctoral project started to investigate whether auditing CS indications and providing feedback in a general hospital was associated with a reduction in CS rates. Therefore, a retrospective before-after study was designed to explore the influence of an audit strategy on CS rates at one general hospital in Tehran. The number of deliveries, before and after the institution of clinical audits, were tabulated and compared in the audited hospital. Furthermore, CS rates in three other general hospitals with same affiliation and during the same time period were measured for comparison. Chi-square test was used for statistical analysis. We found that when this intervention was in place at the audited hospital the overall CS rate dropped significantly from 40% to 33% and the primary CS rate from 29% to 21%, accounting for a reduction of 27% in the risk of primary CS. Furthermore, a similar decline in CS rates was not found in the other three hospitals.

For the second study, the aim was to explore the frequency, causes, risk factors, and perinatal outcomes of MNM in settings with high rates of CS. An incident case-control study was thus carried out between March 2012 and May 2014 at three university hospitals in Tehran where the public population, including Afghan migrants, received obstetric services. The WHO near-miss criteria were modified and used to identify cases prospectively. A control sample of 1,024 women delivering at the study sites was recruited randomly to represent the source population. A standardized mortality/morbidity module calculated the MNM ratio. Chi-square test compared the maternal and medical characteristics of cases

and controls. Logistic regression models adjusted for the potential correlations between maternal and medical variables and MNM. A total of 12,965 live births were recorded during the 26-month period surveyed of which, 82 mothers developed MNM and 12 died. The MNM ratio was 6.3/1,000 live births. Severe PPH (35%, 29/82), severe preeclampsia (32%, 26/82), and placenta previa/AIP (10%, 8/82) were the most frequent causes of MNM. Antepartum CS, comorbidity, and a lack of health insurance (found for almost all Afghans) were independent risk factors for MNM. Stillbirth and extremely preterm birth were the most prominent adverse perinatal outcomes associated with MNM.

In the third phase of this project, we aimed at evaluating whether MNM care quality differed between Iranians and Afghans. Furthermore, the preventability of near-miss events was assessed. A MNM audit study was conducted. A team of auditors in obstetrics evaluated care quality provision for 76 cases (54 Iranians, 22 Afghans); of those, 82 MNM cases identified from the previous study. Auditors used an audit framework and reviewed patients' records, while interviewing some patients and professionals provided additional input to the clinical audits. The main outcomes were frequency of suboptimal care and the preventable attributes of MNM. Chi-square test and logistic regression models examined the independent predictors of suboptimal care at hospitals. The results showed that Afghan mothers faced disproportionately more suboptimal care than Iranians. In 71% (54/76) of cases, near-miss events were potentially preventable. Preventable factors were mostly attributed to the professionals' practice (85%, 46/54), while patient- (31%, 17/54) and health system-related factors (26%, 14/54) could also prevent near-miss morbidity. Delays in diagnosis, inappropriate obstetric care plan, delays in care seeking, and poverty were potentially preventable attributes contributing to MNM.

Finally, the fourth study aimed at exploring the care experiences of Afghan MNM survivors to increase insight into migrants' healthcare in Iran. Therefore, a qualitative interview study was conducted from April 2013 to May 2014. Semi-structured interviews were conducted with a purposive sample of Afghan MNMs, identified in the previous phase, and their husbands (15 interviewees). Interviews were carried out when the mothers had recovered from critical morbidity but were either still at hospital or they returned to the hospital for interviews within six months after the critical illness. Thematic analysis was used and a data-driven approach was employed to organize data guided by the 'three delays model' as the theoretical framework. Participants had lived in Iran for between three and twenty years and most had low SES. They attended

antenatal visits but about 50% of them arrived at hospital in moribund condition or developed near-miss events within six hours of admission. Discrimination and mistreatment were key experiences found within the participants' narratives. Women perceived ineffective counseling, insufficient medical attention, and delays in diagnosis of maternal complications as leading reasons for causing the near-miss events. Costly care, a lack of insurance coverage, financial constraints, and low literacy reinforced the delays that Afghan mothers faced. Women experienced that the non-somatic consequences of MNM affected them and their families for a long period of time.

To conclude briefly, the overuse of CS contributes to a deficient quality of obstetric care and does harm to maternal health by increasing CS-related minor and major complications. As CS overuse poses extra costs to the health system, it appears to contradict the ideal of providing universal coverage of required care, particularly in resource-limited settings such as Iran. Suboptimal care provision is correlated with near-miss events. Therefore, teamwork skill training along with the implementation of an audit strategy that includes feedback can facilitate the monitoring of care quality and lead to improving obstetric professionals' competency. Professionals' communication skills and caring attitudes can not only promote positive experiences but can also reduce equity gaps and delays in achieving high-quality care.

# Sammanfattning

I Iran föder varannan kvinna barn med hjälp av kejsarsnitt. Överanvändning av kejsarsnitt i låg-risk graviditeter är utan större nytta och leder istället till en ökad risk för sjuklighet hos mödrar och barn. En stor grupp från Afghanistan har flytt till Iran de senaste tre decennierna, och det har varit en utmaning att tillhandahålla en jämlik och optimal mödra-och förlossningsvård för denna minoritetsgrupp. Det övergripande syftet med denna avhandling är att studera förlossningsvårdens kvalitet på sjukhus med höga kejsarsnittsfrekvenser i Teheran, Iran.

I studie I undersöktes om granskning (audit) av kejsarsnittsindikation med återkoppling till ansvarig läkare, var förknippad med en minskning av antalet kejsarsnitt. En retrospektiv studie genomfördes för att undersöka om denna granskning (audit) kunde sänka kejsarsnittsfrekvensen. Förlossningar med kejsarsnitt före och efter granskningen (audit) mättes i det granskade sjukhuset och i tre andra sjukhus för jämförelse. Sjukhuset med granskningen (audit) var det enda sjukhuset med en minskning av kejsarsnittsfrekvens. Minskningen beräknades till 27 % av risken för primära kejsarsnitt, vilket motsvarade 155 kejsarsnitt.

I studie II var syftet att undersöka frekvensen, orsaker, riskfaktorer samt obstetriska och perinatale utfall hos mödrar med livshotande tillstånd under graviditet och förlossning, s.k. 'maternal near miss' i en kontext med hög frekvens av kejsarsnittsförlossningar. Maternal near miss definieras som: "en kvinna som nästan dör men överlever livshotande tillstånd under graviditet, förlossning, eller inom sex veckor efter förlossning". En fall-kontrollstudie genomfördes mellan 2012 och 2014 vid tre offentliga universitetssjukhus i Teheran där den allmänna befolkningen, inklusive afghanska invandrare får förlossningsvård. Kriterier rekommenderade av Världshälsoorganisationen användes för att identifiera fall. Ett stickprov av 1,024 fall av förlösta kvinnor på de tre studiesjukhusen valdes slumpmässigt ut för att representera den totala förlossningspopulationen (kontroller). Med hjälp av chi-två test jämfördes bakgrundsfaktorer och innehav av sjukförsäkring samt medicinska utfall mellan fall och kontroller. Vi justerade för eventuella

potentiella korrelationer mellan mödrars bakgrundsfaktorer och medicinska utfall. Vi fann 82 mödrar med livshotande tillstånd under 26 månaders studieperiod. Lågt sittande moderkaka, inklusive andra komplikationer relaterad till fastsittande moderkaka var tredje största orsaken till svår mödrasjuklighet (near miss). Dessutom hade kvinnor som födde barn med kejsarsnitt och de som saknade sjukförsäkring (nästan alla afghanska migranter) ökad risk för drabbas av 'near miss' dvs svår sjuklighet under graviditet och förlossning.

I studie III var syftet att studera gradskillnad i vårdkvalitet mellan afghanska och iranska kvinnor och utvärdera om 'near miss' tillstånd var möjliga att förbygga. Två obstetrikare och en fostermedicinare utvärderade vårdkvaliteten för 76 (54 iranska och 22 afghanska) av 'near-miss' fallen som identifierades i studie II. Experterna använde sig av en granskningsmall och patienternas journaler samt intervjuer med patienter och personal. Resultatet visade att afghanska kvinnor fick sämre vård jämfört med de iranska kvinnorna trots att alla var lika svårt sjuka (near miss). En majoritet av alla 'near miss' fallen berodde på försening av diagnos och olämplig val av förlossningsvård.

Studie IV, är en kvalitativ intervjustudie med syfte att utforska hur de afghanska kvinnor som överlevt svår sjuklighet upplevde den vård de fått. Femton afghanska kvinnor och deras män intervjuades. De hade bott i Iran mellan tre och tjugo år och de flesta hade en låg socio-ekonomiska situationer. De deltog i mödravårdsbesöken under graviditeten men hälften kom till sjukhusen för sent, antingen döende eller utvecklade 'near miss' inom sex timmars på sjukhus. Diskriminering och särbehandling var betydelsefulla upplevelser bland deltagarna. Kvinnorna upplevde en ineffektiv rådgivning och otillräckligt läkarvård vilket tolkades leda till förseningar i diagnos som i sin tur ledde till utvecklingen av svår sjuklighet. Kvinnorna och deras män kopplade däremot, i mindre utsträckning, kostsam vård, bristande sjukförsäkring eller ekonomiska begränsningar till det livshotande tillståndet eller att de fördröjt vårdsockarbeteendet. Kvinnorna upplevde att de icke-medicinska konsekvenserna av svår mödra-sjuklighet (till exempel: skulder och skilsmässa pga sjukdom) hade påverkat dem och deras familj under lång tid.

Sammanfattningsvis fann vi att en överanvändning av kejsarsnitt har bidragit till mera komplikationer och en bristande kvalitet inom förlossningsvården i Teheran, Iran. Överanvändning av kejsarsnitt överbelastar ekonomiskt hälso- och sjukvårdssystemet vilket strider mot en effektiv resursanvändning särskilt i ett resurs-begränsat land som Iran. Bristande kunskap och kvalitet inom förlossningsvården är kopplad till

svår sjuklighet hos mödrar. Teamträning i kombination med implementering av en systematisk granskning (audit) av förlossningsvården kan förbättra personalens kompetens och höja vårdkvalitet. En professionalisering av vård mötet samt ett respektfullt bemötande främjar patienters förtroende för hälso- och sjukvårdssystemet i allmänhet och i synnerhet bland utlandsfödda patienter.

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# Appendices

Appendix 1. Inclusion criteria used to identify MNM at three university hospitals in Tehran, 2012–2014.

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## **Potentially life-threatening conditions (severe complications)**

Hemorrhagic disorders

Severe postpartum hemorrhage

Placenta previa (includes abnormally invasive placenta)

Uterine rupture

Placental abruption

Others (includes abortion, ectopic pregnancy, obstetric hemorrhage)

Hypertensive disorders

Severe pre-eclampsia, eclampsia

Severe systemic infection or sepsis

Thromboembolic disorders

Other disorders or comorbidities

Diabetes; chronic hypertension; cardiac, pulmonary, renal, hepatic, and hematologic diseases, severe anemia, previous pelvic operations, uterine scar, and anesthetic complications

## **Life-threatening conditions (near-miss events)**

Hematological and coagulation dysfunction

Acute thrombocytopenia  $\geq 75,000/\text{ml}$ , transfusion of  $\geq 4$  units of blood, decreased hemoglobin  $\geq 4\text{g/dl}$

Cardiovascular dysfunction

Shock, cardiac arrest, cardiopulmonary resuscitation, pulmonary edema, use of continuous vasoactive medicine

Uterine dysfunction

Hysterectomy following hemorrhage or infection

Renal dysfunction

Oliguria non-responsive to fluids or diuretics, severe acute azotemia (creatinine  $\geq 3.5\text{ mg/dl}$ ), dialysis for acute renal failure

Respiratory dysfunction

Acute cyanosis, gasping, respiratory rate  $>40$  or  $<6$  bpm, intubation and ventilation  $\geq 60$  min not related to anesthesia

Hepatic dysfunction

Jaundice in the presence of pre-eclampsia, bilirubin  $>6\text{ mg/dl}$

Metabolic dysfunction

Loss of consciousness, ketoacidosis

Neurological dysfunction

Stroke, uncontrollable fits, prolonged unconsciousness  $\geq 12\text{ h}$

Others

Admission to ICU, laparotomy/reoperation for hemorrhage or infection

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Terminology adapted from reference [60].

## Appendix 2. Audit criteria for managing severe PPH

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### **1. Initial assessment / 6. Documentation**

Detailed past and present clinical status/risks should be documented on admission.

Complete blood count, typing cross matching should be taken routinely and coagulation test (prothrombin time, partial thromboplastin time, international normalization ratio (INR) with major hemorrhage.

### **2. Recognition**

Estimation of hemorrhage, control of hemodynamic stability should be documented.

### **3. Care plan**

Staff attendance, sequence of events, fluid-blood replacement, administration of pharmacological agents, surgical intervention should be documented stepwise.

Patient should be kept warm and take oxygen by mask. Two intravenous line with warm crystalloid infusion (Ringer) up to 3L.

Blood must be given with hemoglobin <8 g/dl or after infusion of up to 3L crystalloids.

Fresh frozen plasma (FFP) should be infused after 4 units of blood in a 1:1 ratio or with coagulation defect (INR >1.5).

With excessive hemorrhage (>4.5L) and/or fibrinogen <1g/L, 4:4:1 rule, infusion 1L FFP and 10 units cryoprecipitate should be considered before getting coagulation results.

Platelet transfusion with thrombocytopenia <50,000/ml, mostly 1–2 units.

Oxytocin should be given as first line choice, Ergotamin, Misoprostol, Tranexamic acid afterwards.

Genital tract exploration, manual removal of placenta, balloon tamponade of uterus, B-lynch suture, uterine artery ligation should be offered stepwise with no delay in progressing.

Second consultant obstetrician should be involved in the decision for hysterectomy.

### **4. Monitoring**

Continuous monitoring of vital signs (blood pressure, pulse, urine output, respiratory rate) should be done even postpartum.

### **5. Follow up**

Proper information about the event and the care process and the required follow up should be provided to patients by discharge.

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The criteria were collated from several guidelines: Royal College of Obstetricians and Gynecologists. Green-top guideline no. 52, 2011, WHO guidelines for the management of PPH and retained placenta, 2009, and Best practice in labor and delivery, 2009.

### Appendix 3. Audit criteria for managing severe preeclampsia

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#### **1. Initial assessment / 6. Documentation**

Detailed past and present clinical status/risks should be documented on admission.

#### **2. Recognition**

Blood pressure should be monitored every 15 minutes until stabilization.

Complete blood count, liver-renal tests should be taken. With thrombocytopenia  $<100,000/\text{ml}$  and/or impaired liver functions, coagulation screen (prothrombin time, partial thromboplastin time, international normalization ratio (INR), fibrinogen) should be monitored. Lactic dehydrogenase for HELLP confirmation should be taken.

Adequate fetal assessment should be done.

#### **3. Care plan**

Delivery should be considered after stabilization, preferably during working time. In eclamptic mothers, within 12 hours of the first convulsion. If fetal assessments are normal, there is no fetal indication for prompt delivery. "Best day, Best way".

If blood pressure  $\geq 160/110$ , treatment with Hydralazin as first line choice is indicated. Close fluid balance ( $1\text{ml/kg/h}$ ) and control of oxygen saturation before and within 48 hours after delivery should be considered.

Acceptable platelet count for surgery  $\geq 50,000/\text{ml}$ , for spinal anesthesia  $>50,000/\text{ml}$ , for vaginal delivery  $>25,000/\text{ml}$ . After surgery or delivery, prophylactic transfusion of platelet should be considered just if platelet  $>20,000$ . Platelet transfusion is recommended with platelet count of 20,000 in high-risk cases (uncontrolled hypertension, sepsis, severe anemia).

Magnesium Sulfate for prevention and treatment of seizures should be considered as first choice. With persistent seizure Diazepam and Phenytoin can be administered.

Prophylactic steroid should be administered if gestational age  $>34$  weeks. No steroid is indicated for treatment in HELLP syndrome.

#### **4. Monitoring**

Blood pressure, pulse rate, urine output, respiratory rate, and patellar reflex should be monitored hourly with infusion of Magnesium Sulfate. Platelet transfusion with

#### **5. Follow up**

Proper information about the developed events and the required follow up should be given to patients by discharge.

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The criteria were collated from several guidelines: National Institute for Health and Clinical Excellence, Hypertension in pregnancy, clinical guideline 107, 2010, WHO recommendations for prevention and treatment of preeclampsia and eclampsia, 2011, and Best practice in labor and delivery, 2009.

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و همسرانشان بدست آمد. بیشتر مادران ویزیت‌های غیرموثر دوران بارداری را آزموده بودند و از پزشکان ویرسلی که فرصت نداشتند یا اهمیت نداده بودند که از بیماری و اتفاقات رخ داده برای آنها صحبت کنند خاطره داشتند. با وجود ویزیت‌های متعدد دوران بارداری بیشتر بیماران تنها گرفتن فشار خون، شنیدن صدای قلب جنین، و مصرف ویتامین و آهن را بخاطرمی آوردند. این طرح تحقیقاتی نشان داد که علاوه بر عوامل شناخته شده قبلی، مهارت‌های ارتباطی و کیفیت تعامل پزشکان و ماماها با مادران در دوران بارداری و زایمان می‌تواند نقش بالقوه در پیشگیری از ایجاد عوارض داشته باشند. مادران افغان و همسرانشان عموماً از آمودن تبعیض بهنگام دریافت مراقبت‌های مامایی و زایمان سخن گفتند.

در این طرح تحقیقاتی، دانش تخصصی و تجربه محقق، تحصیل آکادمیک بهداشت با گرایش اختصاصی سلامت مادران، امکان مقایسه کمی و کیفی خدمات مامایی و زایمان در دو کشور ایران و سوئد، همگی فرصت کم نظیری برای بررسی و ارزیابی چند جانبه این مراقبت‌ها فراهم آورد. باشد که نتایج این تحقیق در افزایش آگاهی دانشگاهیان، دانشجویان، و کارشناسان بخش سلامت نقشی داشته باشد و در بهبود کیفیت خدمات مامایی و زایمان سهیم گردد. به امید اینکه هر مادری در هر زمانی از بارداری و زایمان و پس از آن به هر مرکزی مراجعه کرد نه تنها مراقبت اثربخشی که موجب سلامت خودش و جنین و نوزادش می شود دریافت کند، بلکه برای او و خانواده اش برای همیشه خاطره خوشایندی از فرآیند بارداری و زایمان باقی بماند.

در خاتمه لازم است از جناب آقای دکتر پرهیزگار، مدیرکل وقت اداره درمان استان تهران، همکاران مرکز تحقیقات باروری و ناباروری دانشگاه علوم پزشکی شهید بهشتی، سرکارخانمها دکتر فلاحیان، دکتر صالح گرگری و دکتر طاهری پناه برای همکاری صمیمانه در اجرای پژوهش قدردانی نمایم. همچنین از همکاران رزیدنت خانمها دکتر قدوسی، دکتر فریدون جاه، و دکتر علایی برای دقتشان در ثبت موارد مطالعه بسیار سپاسگزارم.

دکتر محمدی  
۲۶ شهریور ۱۳۹۵  
ایسالا

یک روز گرم تابستانی قرار بود اولین مصاحبه ام را در لباس محقق سلامت مادران، و نه متخصص زنان و زایمان، با مادری بستری در بیمارستان انجام بدهم. اولین مصاحبه، تجربه ای بسیار تلخ، غم انگیز و فراموش نشدنی شد. بخوبی چهره محبوب آن مادر را در لباس صورتی رنگ بیمارستان بیاد می آورم. روی تخت کنار پنجره نشسته، خیره به بیرون نگاه میکرد. ماه گل سه فرزند مدرسه ای در خانه داشت. همسرش برای تهیه داروهایی که به او تجویز شده بود، بیرون از بیمارستان بود. او برای زایمان چهارم، پس از سه زایمان در منزل، ۹ روز قبل به بیمارستان آمده بود، ولی هنگام زایمان دچار عوارض شدیدی شده بود. پس از یک هفته بستری در بخش مراقبتهای ویژه، دو روز قبل به بخش زنان منتقل شده بود. بسیار کمرو و کم حرف بود و تنها خواسته اش این بود که زودتر از بیمارستان مرخص شود. او نوزادش و رحم اش را در این بارداری از دست داده بود...

مادر، که دارای ویژگی اختصاصی تولید مثل می باشد، قلب خانواده و خانواده سنگ بنای جامعه است. اگرچه تامین سلامت همه افراد با اهمیت است، تامین سلامت مادران در اولویت است. تامین حقوق زنان به زندگی و سلامتی خصوصاً در دوران پر خطر تولید مثل نه تنها برای همه کارشناسان سلامت بلکه برای همه جوامع یک ضرورت می باشد. در قرن بیست و یکم، با وجود تمام پیشرفتهای علمی و تکنولوژیکی، مادران هنوز هم دچار عوارض قابل پیشگیری میگردند. حفظ سلامتی زنان و تامین مراقبتهای شایسته و با کیفیت در دوران بارداری و زایمان چالشی ادامه دار می باشد. از یکطرف، دسترسی بیشتر و آسانتر به امکانات پزشکی، الگوی طبیعی زایمان را تغییر داده است و پدیده سزارین به چالش نوین سلامت مادران تبدیل شده است. از طرف دیگر، افزایش جنگ و نا امنی و شرایط دشوار اقتصادی و اجتماعی سلامتی را با پدیده مهاجرت به چالش میکشد. مطالعات متعددی آسیب پذیری مادران و کودکان مهاجر را نسبت به عوارض بارداری و زایمان با پیامدهای وخیم تر از غیرمهاجرین نشان می دهند.

در ایران، هر دو پدیده، هم سلامت مادران و هم کارشناسان و متخصصان سلامت مادران را با چالشهای دشواری مواجه ساخته است. تلاشهای بی وقفه و آگاهانه دهه های اخیر، به یافتن رویکردهای علمی برای کاهش تاثیر این چالشها منجر شده است. استفاده مطلوب و موثر از این رویکردها و بکارگیری کلیه امکانات برای پیشگیری، و درمان بموقع عوارض بارداری و زایمان می تواند موجب ارتقای سلامت یکایک مادران گردد.

این پایان نامه حاصل طرح پژوهشی است که سرآغازش به سالها قبل باز میگردد. در آن زمان نویسنده، بعنوان پزشک متخصص یک بیمارستان بزرگ و قدیمی سازمان تامین اجتماعی در تهران، سودای بهبود کیفیت خدمات پزشکی را در سر می پروراند. آنجا انرژی جوانی با تلاشهای همه جانبه راه را برای بهبود کیفیت خدمات درمانی و رضایتمندی بیشتر بیماران هموار نمود. تلاشهای مذکور با موفقیتهای کوچک و بزرگی همراه شد و نویسنده، اولین زن و جوانترین رئیس آن بیمارستان گردید. مطالعه اول این کتاب نشان دهنده یکی از آن دسته فعالیت هاست، آمارجراحی سزارین در آن بیمارستان با استفاده از ممیزی بالینی با بازخورد به پزشکان کاهش چشمگیری یافت.

ادامه تلاشها برای ارتقای دانش علمی و آکادمیک راه را به مرکز تحقیقات مادروکودک و بخش زنان و زایمان بیمارستان دانشگاهی ارسالا درسوند بازکرد. درغالب یک پژوهش بین المللی در بیمارستانهای آموزشی دانشگاه علوم پزشکی شهید بهشتی، مطالعه دوم تا چهارم انجام گردید. این بار بعنوان محقق به بیمارستانهایی بازگشتم که بیست سال قبل مدرسه تحصیل پزشکی ام بود. با هدف بهبود سلامت مادران و با مشارکت همکاران، خدمات درمانی مادران با عوارض شدید دوران بارداری و حوالی زایمان، بررسی گردید. نتایج نشان داد که جفت سرراهی و چسبندگیهای جفت که ارتباط شناخته شده ای با سزارین دارند، سومین علت ایجاد عوارض شدید، برخلاف کشورهای دیگر، در بیمارستانهای دانشگاهی تهران میباشند. همچنین ریسک عوارض شدید در مادرانی که سزارین شده بودند و بیمه نداشتند، بیشتر بود. دراین مطالعه مشخص شد نسبت به مادران ایرانی دارای بیمه، مادران افغان، که هیچیک بیمه نبودند، درخطر بیشتری برای عوارض قرارداشتند. مطالعه سوم نشان داد که کیفیت علمی مراقبتهای مامایی در بیمارستانهای مورد مطالعه پایین بود. در بسیاری از موارد عوارض پیش آمده قابل پیشگیری بودند. مادران افغان باز هم بیش از مادران ایرانی، خدمات با کیفیت پایین دریافت کرده بودند.

در قدم آخر برای آگاهی بیشتر از آموده های دوران بارداری و درک بهتر عوامل مداخله گر در ایجاد عوارض، مطالعه ای کیفی صورت گرفت. داده های این مطالعه از مصاحبه مستقیم با تعدادی از این مادران، پس از بهبودی،



هر کس انسانی را از مرگ نجات دهد مثل آن است که همه انسانها را حیات بخشیده است .

سوره مائده، آیه ۳۲

تقدیم به همه مادران،

که نجات جانیشان حیات بخش نسلی است.