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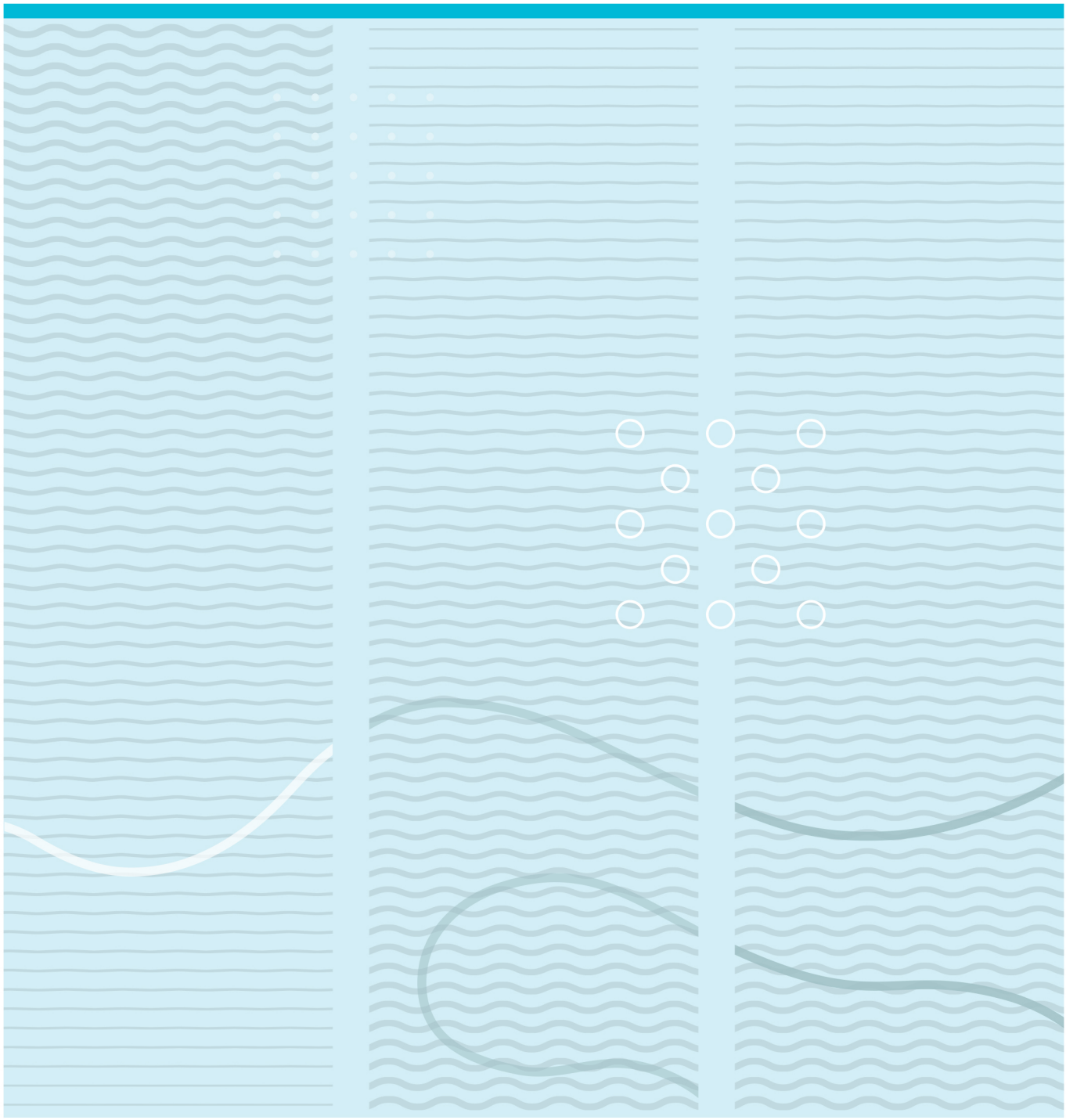
Pregnancy outcomes in non-Western Women In Norway

A population-based observational cohort study



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PART I

Pregnancy Outcomes in non-Western Women in Norway

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Abstract

Introduction: The aim of the study was to compare the pregnancy outcome of women originating from non-Western countries with ethnic Norwegian women, all selected from a low-risk group.

Material and methods: A population-based observational study with a retrospective cohort design. Conducted at Stavanger University Hospital, Norway, with approximately 4800 deliveries annually, from 2009 to 2015. Births to women with a non-Western origin (*n*=1413), born in Africa (*n*=224), Asia (*n*=439), Eastern Europe (*n*=499), Middle East (*n*=138), South America (*n*=85), Western (*n*=979), and ethnic Norwegian women (*n*=7028) in a low risk group were studied. The relative risk of emergency cesarean section or postpartum hemorrhage by country of origin was estimated by odds ratios with 95% confidence intervals using logistic multiple regression.

Results: In total, the pregnancy outcomes of 9392 women were analyzed. Risk of emergency cesarean section was significantly higher for women originating from Asia (aOR: 1.887), followed by Africans (aOR: 1.705). Lowest risk was found in women originating from South America (aOR: 0.480). Risk of postpartum hemorrhage was significantly higher in women originating from Asia (aOR: 1.744) compared to Norwegians.

Conclusion: Even in a low-risk population, women originating from Asia and Africa had an elevated risk of adverse pregnancy outcome compared to the Norwegian group. The elevated risk should be considered by obstetric care providers, and we suggest that women originating from Asia and Africa would benefit from a targeted care during pregnancy and childbirth.

Key words: Immigrants, Pregnancy Outcome, Emergency Cesarean Section, Vacuum Extraction, Postpartum Hemorrhage

Abbreviations: NW, non-Western; RG1, Robson group 1; ECS, emergency cesarean section; PPH, postpartum hemorrhage; OV; operative vaginal delivery, EDA, epidural analgesia; BMI, Body Mass Index; SUS, Stavanger University Hospital.

Key Message

Even when selected into a low risk group women originating from Asia and Africa have a significantly higher risk of emergency cesarean section and postpartum hemorrhage during childbirth, in comparison with ethnic Norwegian women, in Norway.

Introduction

In a globalized world migration is omnipresent. There are about 214 million international immigrants around the world today. International immigrants and refugees from across the world comprise a growing share of the European population, and create new challenges for European health systems (1). The health challenges associated with migration are, according to the World Health Organization (WHO), a crucial public health matter (1). Immigrants constitute vulnerable groups, and pregnant women and children are the most vulnerable in the society, yet their health needs are often poorly understood. Health outcomes seem to vary greatly between immigrants and ethnic native women.

Almeida, Mulready-Ward (2) found that some migrant groups have better pregnancy outcome than the ethnic native women, yet most studies have shown the opposite; that immigrants form non-Western (NW) countries have a higher prevalence of adverse pregnancy outcome than women from the receiving countries. Also in a developed country, NW women seem to have greater perinatal health risks than native women (3, 4). Epidemiological research in England has shown that women originating from a NW country were more likely to access antenatal care late in pregnancy than ethnic English women. They were also likely to have fewer antenatal controls, with less chance to detect any pregnancy complications, and were more likely to end up with emergency cesarean section (ECS) when in labor (5).

Compared to European women, there seem to be a severe increased risk of post-partum hemorrhage (PPH) in women born in Southeast Asia (6). Somali women in Sweden had a larger risk of ECS (7) and the risk of stillbirth was higher in a Pakistani population than in an ethnic Norwegian population (8). In a population-based study in Sweden, it was found that the risk of stillbirth was increased for women with an African or Middle East origin (9). The risk was higher in primiparous women and in women who had lived less than five years in Sweden (9).

Norway can be described as a multiethnic society. Socioeconomic status and the level of education vary among the NW population in Norway. The antenatal healthcare program in Norway is designed to detect pregnancy complications and possible risks associated with childbirth. It is free of charge and aims to offer equal healthcare to all pregnant women. Still we experience a trend among NW women where the use of antenatal care seems to be less frequent than for ethnic Norwegian women (4, 7). Women originating from NW countries also

seem to attend antenatal care later in pregnancy than native women with less chance to detect any pregnancy complications (7).

January 2016 the immigrant population in Norway represented 223 countries. The NW immigrants constituted 9.1 percent of the total Norwegian population (475 340 persons) of which 359 085 persons (6.9 percent) were first-generation immigrants (10). Of all children born in 2015, 15 percent were born to immigrant parents (11). At Stavanger University Hospital (SUS) the NW immigrants constituted approximately 25 percent of the maternity population in 2015. As for the rest of Norway; all maternity services at SUS are free of charge.

Updated research on pregnancy outcomes among NW women is an important part of the obstetrics to improve health outcomes and work evidence based. Several studies have been conducted on pregnancy outcomes among NW women, but few of these differentiate between induced pregnancies and women with spontaneous onset of labor. Furthermore, few studies differentiate between primiparous; first birth, and multiparous; second, or higher birth order. It will be of great importance to see if the differences found in previous research remain when selecting the women into a low-risk group, based on Robson Group 1. The ten Robson Groups were developed by M. Robson in 2001 (12), and is used to classify risk factors in women pre delivery. The aim of this study was to compare the pregnancy outcomes of women in Robson Group 1 (RG1); primiparous women ≥37 weeks of gestation, a singleton pregnancy with cephalic presentation, spontaneous onset of labor, originating from a NW country with pregnancy outcome in ethnic Norwegian women in RG1, who gave birth at SUS in the study period.

Material and Methods

The study was conducted at the Department of Obstetrics and Gynecology at SUS, Norway, which serves an unselected population of 395 000 citizens, with approximately 4800 deliveries annually. Country of origin was classified as country of birth of the woman. Based on the M49 standard; conducted by the United Nations Statistics Division's on geographical regions for statistical use (13), the women were divided into seven groups: Norway; Western; Eastern Europe; Middle East; South America, Asia and Africa (Table IV).

We performed a population-based observational study with a retrospective cohort design (14). Data was extracted from information registered during pregnancy, birth and the early postpartum period, by the hospitals' electronic birth registration system (*Natus®)*. To detect the country of origin of the NW women, we used the electronic journal system DIPS ASA®. Data was collected after delivery. The study period was from 1 January 2009 through 31 December 2015. The study was performed in accordance with the Declaration of Helsinki (15) and permission from the Regional Ethics Committees for Medical and Health Research, REK West, was gained 9 May 2016, approval no. 2016/573.

The study population comprised of all women selected in RG1 who gave birth at SUS during the study period. 9571 births were registered. Women with missing origin (*n*=136) were excluded from the study. Furthermore, women erroneously registered in RG1 were excluded (*n*=43). In total 179 women were excluded from the study, and 9392 was selected into the final study group. Women defined as "NW" were all born in a NW country and included internationally adopted women.

Please insert Table I and Table II here.

The demographic variables are described in Table I and include maternal age, Body Mass Index (BMI), and maternal health before pregnancy. Maternal health in pregnancy, mode of delivery an PPH are described in Table II, and neonatal outcomes are shown in Table III. The definitions, categorization and classification of the variables used in this study are described in Table IV. Some of the variables were continues yet most of them were dichotomous; indicating the presence or absence of the specified condition or outcome. ECS and PPH >500mL was set as the main outcome measures. Secondary outcome was the frequency of operative vaginal (OV) procedures during delivery.

Please insert Table III here.

Statistical analysis

Background characteristics and differences in pregnancy outcomes of each immigrant group were compared with ethnic Norwegians calculated by logistic regression models. Differences in means of maternal age and BMI were analyzed using one-way analysis of variance. The threshold for statistical significance was $p = \leq 0.05$.

To calculate odds ratio (OR) with 95 percent confidence intervals (95% CI) we performed a multiple logistic regression analysis; using ECS, PPH and OV as a dependent variables and country of origin as the main variable.

The variables maternal age, BMI, smoking in pregnancy, EDA and oxytocin stimulation in labor were evaluated as possible confounders in the relation between country of origin, ECS, PPH >500mL and OV, and used as control variables (Table V).

Please insert Table V here.

Pregnancy outcomes included OV, ECS, PPH > 500 mL and Apgar score at 1 and 5 minutes (Table II and Table III). The five criteria of Apgar score are described in Table VI. Mean of Apgar score is presented in Table III and did not differ significantly between the ethnic groups.

Please insert Table VI here.

Statistical analyses were performed with the IBM SPSS Statistics, Version 24.0 (IBM Corp., Armonk, NY, USA.

Results

This study consisted of 9392 women originating from 96 different countries (Table IV). 7028 of the women were ethnic Norwegian, 979 Western, and 1385 NW women originated from Eastern Europe ($N = 499$), Middle East ($N = 138$), Asia ($N = 439$), Africa ($N = 224$) and South America ($N = 85$).

Please insert Table IV here.

The demographic data did not differ significantly in maternal age and BMI. Frequency of preeclampsia was highest in south American women and lowest in women originating from the middle east, but the differences were not significant.

Women originating from Eastern Europe and Middle East both had a higher use of EDA, but did not differ significantly from ethnic Norwegians in other outcomes. More than half of the South American women used EDA during delivery, and nearly half needed oxytocin stimulation. However, they had the lowest frequency of adverse pregnancy outcome in the study population. However, the differences were not significant.
Women originating from Asia and Africa had the lowest frequency of spontaneous vaginal delivery, and moreover a significantly higher risk of all adverse pregnancy outcome registered (Table II) when compared with ethnic Norwegians.

For women originating from Asia the risk of ECS was almost 13 percent; with an adjusted OR (aOR) of 1.887. African women had an increased risk of 11 percent with aOR 1.705, when compared with ethnic Norwegian women (Table IV). The frequency in use of OV delivery was high in all groups. However, it was found significant lower in women originating from eastern Europe (aOR: 0.683) and south America (aOR: 0.474)

Compared with ethnic Norwegians, women originating from Asia had an aOR 1.74 for postpartum bleeding >500mL. The aOR for PPH >500mL was lower in women originating from Middle east and south America when compared with ethnic Norwegian women.

Discussion

The results of this study supports a theory of an existing disparity in pregnancy outcomes between women with a non-western origin and ethnic Norwegian women, even when selected into a low-risk group. Women originating for Asia and Africa were at most risk of adverse pregnancy outcome. The reason for these disparities may be complex as these immigrant groups vary in many background characteristics. The migration and socioeconomic histories differ, as does religious and cultural preferences (4-6). Hence, maternity service should try to respond to the needs of these women rather than expecting them to adapt the Western values- and our cultural way of accessing healthcare services.

We found an aOR for ESC after spontaneous onset if labor, of almost 2.2 in Asian women and aOR 1.9 in African women. These results are consistent with previous findings (16-21). The elevated risk in Asian women has been considered associated with the high proportion of Asian

women married to Norwegian men (22). To investigate this possible correlation Vangen et al (23) examined the ethnicity of the father and the infant birth weight. They found an enhanced infant weight of 200 grams in mixed coupled compared to Asian couples. However; they found an increased risk of ECS also in Asian couples and concluded that the phenomenon behind the disparities were more complex. The risk of having an OV delivery was high; with over 30 percent risk for Asian (aOR 1.235) and African (aOR 1.256) women in this study. However; there was no significant difference between the groups. The aOR for PPH >500mL in African women in this study was 1.6 (95% CI: 1.261-2.504). This result is consistent with previous findings (21). In addition, Almeida et al. (24) found that women with a non-Western origin had significant fewer antenatal visits. This has also been seen among African women in Sweden (7).

Background characteristics like female genital mutation were not controlled for in this study. The practice of female genital mutation is common in Africa, and according to UNICEF 98 percent of women in childbearing age in Somalia are subjected to mutilation (25). Female genital mutation is known to increase the risk of adverse pregnancy outcomes as ECS and PPH (16, 26). Further this risk is suggested to increase with more extensive maiming. It is a possibility that some of the NW women in this study has undergone mutilation and thus are more vulnerable to adverse pregnancy outcomes. But limited information make these suggestions speculative.

Previous studies have shown that women with a non-Western origin seem to be prone to late antenatal control, with fewer antenatal care visits during pregnancy compare to the native women (4, 7). One possible explanation for the disparities in pregnancy outcomes could be the late attendance to antenatal care, as it may cause a delay in referral to routine ultrasound followed by a delay in detection of possible pathology in pregnancy. It can also delay life adjusting habits or medical treatment. Late attendance to antenatal care followed by late detected anemia in pregnancy has been reported among Somali women in Sweden (7). Failure in detecting and treating anemia can make the women more vulnerable, as anemia in pregnancy is known to be a risk factor for PPH (6).

Barriers as poor language proficiency and cultural differences could be an explanation for the late attendance (4). Inadequate communication and cultural differences may be an impediment of proper care, causing misunderstandings and inadequate treatment. The use of an interpreter

may reduce these barriers (27). Suboptimal antenatal care with lack of professional interpreters has been associated with maternal death and stillbirth in Sweden (9, 28), underscoring the importance of adequate communication during pregnancy and delivery to reduce the likelihood of an adverse pregnancy outcome. Interpreting is, according to national and international statements, the communication responsibility of the caregiver (29) but is not of common use in the delivery ward at SUS, hence misunderstandings due to challenges in communication can result in adverse pregnancy outcome (27, 29).

Another reason for the disparities in pregnancy outcomes could be failure in integration of NW women. A strong integration policy is known to play an important role in pregnancy outcome (30). In a review made of a total of 18 million women, Bollini et al (30) strongly suggested that NW women are, and have been disadvantaged across generations as several studies, conducted in different countries, has shown disparities in pregnancy outcomes in the same ethnic group. Minority women also reported an insufficient involvement in decision making (5). Given this, it is possible that the disparities in pregnancy outcome can be ascribed different social position in the receiving country.

The main strength of the study was that it included only primiparous women in a low risk group, making the comparison more reliable. The study period was long, reducing the risk of seasonal changes. Moreover, all women included in the study gave birth in the same hospital; minimizing the risk of great changes in guidelines for care and indicating that all women most likely have been given the same standard of care. The selection of women into a low risk group well suited for the purpose, the large number of participants and the large number of origin present, makes this study population well suitable for examining disparities between women with a NW origin and ethnic Norwegians.

The study was also subject to limitations. First, an increased number of participants in the non-Western groups would have made it possible to compare differences between countries rather than continents. Moreover, information that could be useful as control variables like antenatal care attendance, pre-gestational health of the woman, nutrition status, socioeconomic status and the need for an interpreter was not available for this study. Hence, the findings should be interpreted with caution.

Conclusion

In summary, an increased risk of emergency cesarean section after spontaneous onset of labor, and postpartum hemorrhage >500mL was present in women originating from Asia and Africa in comparison with ethnic Norwegian women, even in an obstetric low-risk group. A strong integration policy may reduce these disparities in pregnancy outcome.

The goal of equality in healthcare is challenged by these persisting differences in pregnancy outcomes and more targeted care during pregnancy and labor for women with a non-Western origin should be considered. Furthermore, caretakers should use interpreters during pregnancy and labor to reduce the likelihood of an adverse pregnancy outcome.

Further research including language proficiency may be helpful to investigate the relation between communication barriers and adverse pregnancy outcome. Moreover, more targeted antenatal care, including professional interpreters, is needed to respond to the needs of the NW women and hence reduce disparities in pregnancy outcome.

References

1. World Health Organization. Health of Migrants - the way forward, Report of a global consultation 2010 [cited 2016 07.09]. Available from: http://www.who.int/hac/events/consultation_report_health_migrants_colour_web.pdf
2. Almeida J, Mulready-Ward C, Bettegowda VR, Ahluwalia IB. Racial/Ethnic and Nativity Differences in Birth Outcomes Among Mothers in New York City: The Role of Social Ties and Social Support. Maternal and Child Health Journal. 2013;18(1):90-100.
3. Gissler M, Alexander S, MacFarlane A, Small R, Stray-Pedersen B, Zeitlin J, et al. Stillbirths and infant deaths among migrants in industrialized countries. Acta Obstet Gynecol Scand. 2009;88(2):134-48.
4. Saastad E, Vangen S, Froen JF. Suboptimal care in stillbirths - a retrospective audit study. Acta Obstet Gynecol Scand. 2007;86(4):444-50.
5. Henderson J, Gao H, Redshaw M. Experiencing maternity care: the care received and perceptions of women from different ethnic groups. BMC Pregnancy Childbirth. 2013;13:196.
6. Al-Zirqi I, Vangen S, Forsen L, Stray-Pedersen B. Prevalence and risk factors of severe obstetric haemorrhage. Bjog. 2008;115(10):1265-72.
7. Råssjö EB, Byrskog U, Samir R, Klingberg-Allvin M. Somali women's use of maternity health services and the outcome of their pregnancies: A descriptive study comparing Somali immigrants with native-born Swedish women. Sexual & Reproductive Healthcare. 2013;4(3):99-106.
8. Sørbye IK, Stoltenberg C, Sundby J, Daltveit AK, Vangen S. Stillbirth and infant death among generations of Pakistani immigrant descent: a population-based study. Acta Obstetricia et Gynecologica Scandinavica. 2014;93(2):168-74.
9. Ekéus C, Cnattingius S, Essén B, Hjern A. Stillbirth among foreign-born women in Sweden. The European Journal of Public Health. 2011;21(6):788-92.
10. SSB. Immigrants and Norwegian-born to immigrant parents, 1 January 2016. 2016.
11. MFR. Medisinsk Fødselsregister. 2016.
12. Robson MS. Classification of caesarean sections. Fetal and Maternal Medicine Review. 2001;12(1):23-39.
13. United-Nations. Geographical region and composition 2016 [cited 2016 06.10]. Available from: https://unstats.un.org/unsd/methodology/m49/
14. Field A. Discovering statistics using IBM SPSS statistics : and sex and drugs and rock 'n' roll. 4th ed. ed. Los Angeles: SAGE; 2013.
15. World Medical A. World medical association declaration of helsinki: Ethical principles for medical research involving human subjects. Jama. 2013;310(20):2191-4.
16. Vangen S, Stoltenberg C, Johansen RE, Sundby J, Stray-Pedersen B. Perinatal complications among ethnic Somalis in Norway. Acta Obstet Gynecol Scand. 2002;81(4):317-22.
17. Gagnon AJ, Zimbeck M, Zeitlin J. Migration to western industrialised countries and perinatal health: a systematic review. Soc Sci Med. 2009;69.
18. Small R, Gagnon A, Gissler M, Zeitlin J, Bennis M, Glazier RH, et al. Somali women and their pregnancy outcomes postmigration: data from six receiving countries. Bjog. 2008;115(13):1630-40.
19. Malin M, Gissler M. Maternal care and birth outcomes among ethnic minority women in Finland. BMC Public Health. 2009;9:84.
20. Merry L, Small R, Blondel B, Gagnon AJ. International migration and caesarean birth: a systematic review and meta-analysis. BMC Pregnancy Childbirth. 2013;13:27.

21. Bakken KS, Skjeldal OH, Stray-Pedersen B. Higher risk for adverse obstetric outcomes among immigrants of African and Asian descent: a comparison study at a low-risk maternity hospital in Norway. Birth. 2015;42(2):132-40.
22. Vangen S, Stoltenberg C, Skrondal A, Magnus P, Stray-Pedersen B. Cesarean section among immigrants in Norway. Acta Obstet Gynecol Scand. 2000;79(7):553-8.
23. Vangen S, Stray-Pedersen B, Skrondal A, Magnus P, Stoltenberg C. High risk of cesarean section among ethnic Filipinos: an effect of the paternal contribution to birthweight? Acta Obstet Gynecol Scand. 2003;82(2):192-3.
24. Almeida LM, Santos CC, Caldas JP, Ayres-de-Campos D, Dias S. Obstetric care in a migrant population with free access to health care. Int J Gynaecol Obstet. 2014;126(3):244-7.
25. UNICEF. Female genital mutilation and cutting. 2014 [Available from: http://data.unicef.org/child-protection/fgmc.
26. Banks E, Meirik O, Farley T, Akande O, Bathija H, Ali M. Female genital mutilation and obstetric outcome: WHO collaborative prospective study in six African countries. Lancet (London, England). 2006;367(9525):1835-41.
27. Thomas PE, Beckmann M, Gibbons K. The effect of cultural and linguistic diversity on pregnancy outcome. Aust N Z J Obstet Gynaecol. 2010;50(5):419-22.
28. Bakken KS, Skjeldal OH, Stray-Pedersen B. Immigrants from conflict-zone countries: an observational comparison study of obstetric outcomes in a low-risk maternity ward in Norway. BMC Pregnancy Childbirth. 2015;15:163.
29. Trude Nergård BB, Reidun Brunvatne. Migrasjon og helse – utfordringer og utviklingstrekk. 2009.
30. Bollini P, Pampallona S, Wanner P, Kupelnick B. Pregnancy outcome of migrant women and integration policy: a systematic review of the international literature. Soc Sci Med. 2009;68(3):452-61.

Table I. Demographic data (*N* = 9392)

	Ethnic Norwegian	**Eastern Europe**	**Middle East**	**South America**	**Asia**	**Africa**	**Western**	
	N =7028	*N* = 499	*N* = 138	*N* = 85	*N* = 439	*N* = 224	*N* = 979	F
Maternal age-*mean* (min-max)	27.6 (16-46)	27.3 (17-41)	25.7 (18-38)	30.2 (19-41)	28.9 (18-41)	26.6 (16-39)	29,1 (17-43)	33.87
Body Mass Index (*mean*)	23.4 (15-46)	22.0 (15-42)	23.0 (16-32)	23.1 (16-31)	21.5 (14-34)	22.7 (16-37)	22,7 (15-45)	21.73

Table II. Pregnancy outcomes (*N* = 9392)

	Ethnic Norwegian	**Eastern Europe**	**Middle East**	**South America**	**Asia**	**Africa**	**Western**		
	N = 7028	*N* = 499	*N* = 138	*N* = 85	*N* = 439	*N* = 224	*N* = 979		
	% *(n)*	% *(n)*	% *(n)*	% *(n)*	% *(n)*	% *(n)*	% *(n)*	*p-value*	F
Maternal health in pregnancy;									
Preeclampsia mild	1%	0%	1%	0%	0%	0%	1%	0,989	0,152
Preeclampsia severe	5%	4%	3%	6%	5%	5%	3%	0,869	0,416
Gestational diabetes									
Cigarette smoking in pregnancy	6.1% (429)	5.4% (27)	1.4% (2)	2.4 (2)	3% (13)	0.5% (1)	3.8% (37)	Not applicable	
Use of anesthesia (EDA)	43%	52%	46%	60%	47%	47%	47%	<0,01	4,882
Use of oxytocin stimulation	32%	38%	39%	48%	43%	44%	37%	<0,01	8,634
Delivery method; when Adjusted for maternal age, Body Mass Index, smoking in pregnancy, EDA, Oxytocin stimulation									
Operative vaginal delivery	**24.5%**(1722)	**21.0%** (105)	**27.5%** (38)	**18.8%** (16)	**33.3%** (146)	**31.3%** (70)	**26.5%** (259)		
Df	1	1	1	1	1	1	1		
p-value		0.002	0.382	0.011	0.065	0.150	0.389		
aOR		0.683	1.199	0.474	1.235	1.256	0.930		
Emergency cesarean section	**7%** (489)	**7%** (35)	**5.1%** (7)	**4.7%** (4)	**12.8%** (56)	**11.2%** (25)	**8.3%** (81)		
Df	1	1	1	1	1	1	1		
p-value		0.988	0.553	0.158	<0.01	0.018	0.650		
aOR		0.997	0.790	0.480	1.887	1.705	1.061		
95% CI		0.803-1.649	0.401-1.872	0.215-1.632	1.595-2.918	1.203-2.894	0.893-1.479		
P.P hemorrhage >500mL	**13%**	**16%**	**12%**	**8%**	**22%**	**19%**	**18%**		
Df	1	1	1	1	1	1	1		
p-value	<0.01	0.047	0.615	0.034	<0.01	0.007	0.002		
aOR		1.294	0.868	0.402	1.744	1.609	1.340		
95% CI		1.086-1.797	0.546-1.622	0.203-1.083	1.497-2.432	1.261-2.504	1.168-1.680		

Table III. Neonatal outcomes (*N* = 9392)

	Ethnic Norwegian	**Eastern Europe**	**Middle East**	**South America**	**Asia**	**Africa**	**Western**		
	N = 7028	*N* = 499	*N* = 138	*N* = 85	*N* = 439	*N* = 224	*N* = 979	*p-value*	F
Neonatal outcome;									
Apgar score 1min *(mean)*	8.78 (0-10)	8.87 (3-10)	8.84 (3-10)	8.94 (6-10)	8.83 (2-10)	8.56 (1-10)	8.82 (0-10)	0,019	2,528
Apgar score 5min *(mean)*	9.48 (0-10)	9.54 (4-10)	9.54 (6-10)	9.59 (7-10)	9.50 (5-10)	9.40 3-10)	9.50 (0-10)	0,340	1,13

Table IV. Immigrant groups including countries (*N* = 9392)

Immigrant group n (% of total population)	**Countries included in the group**
Norway *N*=7028 (72.6)	Norway
Western *N*=979 (10.3)	Western- northern- and southern Europe (excluding Albania, Bosnia and Herzegovina, Estonia, Latvia, Lithuania and Serbia), North America, Australia, and New Zealand
Eastern Europe *N*=499 (5.2)	Albania (*n*=8), Belarus (*n*=5), Bosnia and Herzegovina (*n*=11), Bulgaria (*n*=12), Chechen Republic (*n*=14), Czech Republic (*n*=3), Estonia (*n*=5), Kosovo (*n*=23), Kurdistan (*n*=10), Latvia (*n*=16), Lithuania (*n*=129), The former Yugoslav Republic of Macedonia (*n*=3), Moldova (*n*=1), Poland (*n*=84), Romania (*n*=58), Russian Federation (*n*=72), Serbia (*n*=15), Slovakia (*n*=5), Ukraine (25)
Middle East *N*=138 (1.4)	Afghanistan (*n*=32), Iraq (*n*=35), Iran (*n*=28), Jordan (*n*=1), Kuwait (*n*=1), Lebanon (*n*=4), Pakistan (*n*=37), Palestine (*n*=8), Syria (*n*=16), Yemen (*n*=3)
South America *N*=85 (0.9)	Argentina (*n*=3), Bolivia (*n*=3), Brazil (*n*=24), Chile (*n*=5), Colombia (*n*=9), Ecuador (*n*=2), El Salvador (*n*=2), Guatemala (*n*=3), Mexico (*n*=4), Nicaragua (*n*=1), Peru (*n*=11), Uruguay (*n*=1), Venezuela (*n*=16), Paraguay (*n*=1)
Asia *N*=439 (4.5)	Azerbaijan (*n*=6), Bangladesh (*n*=3), Philippines (*n*=80), India (*n*=47), Indonesia (*n*=22), Cambodia (*n*=1), Kazakhstan (*n*=12), Kina (*n*=55), Kirgizstan (*n*=2), Malaysia (*n*=4), Myanmar (*n*=22), Nepal (*n*=3), Sri Lanka (*n*=10), South-Korea (*n*=11), Thailand (*n*=72), Turkey (*n*=46), Uzbekistan (*n*=1), Vietnam (*n*=35), St Lucia (*n*=1), Singapore (*n*=1)
Africa *N*=224 (2.3)	Algeria (*n*=8), Burundi (*n*=4), Cape Verde (*n*=1), Congo (*n*=5), Egypt (*n*=5), Eritrea (*n*=50), Ethiopia (*n*=28), Gambia (*n*=1), Ghana (*n*=4), Guinea (*n*=4), Ivory coast (*n*=1), Kameron (*n*=3), Kenya (*n*=3), Libya (*n*=3), Madagascar (*n*=4), Mali (*n*=1), Malawi (*n*=1), Morocco (*n*=11), Nigeria (*n*=15), Rwanda (*n*=1), Senegal (*n*=1), Somalia (*n*=47), Sudan (*n*=9), South Africa (*n*=3), Tanzania (*n*=4), Tunisia (*n*=4), Uganda (*n*=3)

Table V. Variables ($N = 9392$)

Variable	Abbreviation	Variable	Definition	Dichotomous or Continues
Maternal health pre-pregnancy; Hypertension Diabetes type 1		**Independent**	Maternal health issues before pregnancy. Used as confounders. Information about maternal health was set as independent variables.	Dichotomous: Yes or no
Maternal health in pregnancy; Pregnancy diabetes Preeclampsia		**Independent**	Maternal health issues during pregnancy. Used as confounders. Information about maternal health was set as independent variables.	Dichotomous: Yes or no
Cigarette Smoking in Pregnancy*			Associated with fetal growth restriction, preterm birth, stillbirth, placental abruption. Smoking during pregnancy is an important risk factor for maternal and fetal outcomes during pregnancy (1).	Dichotomous: Yes or no in 2nd trimester
Country of Origin		**Dependent**	Maternal country of birth. Main Exposure variable for the study.	Categorical: Seven categories
Maternal age		**Independent**	Mothers age at delivery. Independent variable. Used as confounder.	Continues: numeric in years
Body Mass index	**BMI**	**Independent**	Maternal overweight has been associated with increased risks of gestational diabetes, pre-eclampsia, emergency cesarean section, and postpartum hemorrhage (2-4). Used as confounder.	Continues: numeric in score
Epidural analgesia	**EDA**	**Independent**	Woman may lose the desire and the ability to push, which may result in increased use of vacuum or forceps extractions (5)	Dichotomous: Yes or no
Oxytocin Infusion		**Independent**	To stimulate contractions to be more sufficient during labor. Increasing risk of operative vaginal delivery and low apgar score (6). Used as confounder.	Dichotomous: Yes or no
Delivery Method;		**Dependent**		
Spontaneous Vaginal Delivery			Delivery by midwife.	Dichotomous: Yes or no
Emergency Cesarean Section	**ESC**		Decided after onset of labor; degree 1, 2 or 3. Main outcome variable.	Dichotomous: Yes or no
Operative Vaginal Delivery	**OV**		Use of Vacuum or Forceps during delivery	Dichotomous: Yes or no
Postpartum Bleeding	**PPH**	**Dependent**	Amount of bleeding within two hours after delivery, estimated or weighed by midwife.	Dichotomous: <500 mL or ≥500 mL
Apgar Score		**Independent**	Evaluation of the infant one, five and ten minutes after delivery. Rates from zero to ten (7).	Continues: numeric in score

*Voluntary to give information about habits

Table VI. The five criteria of the Apgar Score (7)

	Score of 0	Score of 1	Score of 2	Component of backronym
Skin color	Blue or pale all over	Blue at extremities, body pink	No cyanosis, body and extremities pink	**A**ppearance
Pulse rate	Absent	<100 beats per minute	>100 beats per minute	**P**ulse
Reflex irritability grimace	No response to stimulation	Grimace on suction or aggressive stimulation	Cry on stimulation	**G**rimace
Activity	None	Some flexion	Flexed arms and legs that resist extension	**A**ctivity
Respiratory effort	Absent	Weak, irregular, gasping	Strong, robust cry	**R**espiration

References

1. Anderka M, Romitti PA, Sun L, Druschel C, Carmichael S, Shaw G. Patterns of tobacco exposure before and during pregnancy. Acta Obstet Gynecol Scand. 2010;89(4):505-14.
2. Athukorala C, Rumbold AR, Willson KJ, Crowther CA. The risk of adverse pregnancy outcomes in women who are overweight or obese. BMC Pregnancy and Childbirth. 2010;10(1):56.
3. Rahman MM, Abe SK, Kanda M, Narita S, Rahman MS, Bilano V, et al. Maternal body mass index and risk of birth and maternal health outcomes in low- and middle-income countries: a systematic review and meta-analysis. Obesity reviews : an official journal of the International Association for the Study of Obesity. 2015;16(9):758-70.
4. Schummers L, Hutcheon JA, Bodnar LM, Lieberman E, Himes KP. Risk of adverse pregnancy outcomes by prepregnancy body mass index: a population-based study to inform prepregnancy weight loss counseling. Obstet Gynecol. 2015;125(1):133-43.
5. Silva M, Halpern SH. Epidural analgesia for labor: Current techniques. Local and Regional Anesthesia. 2010;3:143-53.
6. Oscarsson ME, Amer-Wahlin I, Rydhstroem H, Kallen K. Outcome in obstetric care related to oxytocin use. A population-based study. Acta Obstet Gynecol Scand. 2006;85(9):1094-8.
7. Apgar V. The newborn (Apgar) scoring system. Reflections and advice. Pediatric clinics of North America. 1966;13(3):645-50.

PART II

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Foreword

Many different people have made it possible for me to write this master thesis.

First, I wish to express my gratitude to the Department of Obstetrics and Gynecology at Stavanger University Hospital for giving me the time needed to finish my masters' thesis.

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Finally, the support and love of my family have been indispensable and the most important reason that I have been able to complete this thesis;

> My dearest husband Gunnar and our three beautiful children; Isak, Oskar and Ida;
> You have all inspired me to finish what I started. Thanks a million!
> I love you to the stars and back!

Stavanger, February 2017
Karolina S. Mæland

Abstract

Background: More than anytime in human history a great number of people are on the move today. Immigrants with a non-Western origin are often suggested to have a poorer health status than the native population. The health status of pregnant women is said to be a crucial challenge and studies indicate that women originating from non-Western countries are more prone to adverse pregnancy outcomes, than the average population. Approximately 25 percent of the women in the delivery ward at Stavanger University Hospital, Norway, are non-Western.

Main Objective: To compare pregnancy outcomes for primiparous women originating from non-Western countries with ethnic Norwegians, all selected from a low-risk group.

Aim: I aimed at illuminating whether the risk of adverse pregnancy outcome was increased in women with a non-Western origin, selected from a low-risk group, when comparing to ethnic Norwegian women.

Material and methods: This study was a population-based observational study with a retrospective, cohort design. Data was extracted from information recorded in the birth journal system used during delivery, registered during pregnancy and labor. Information regarding country of origin was extracted from another patient journal system of the hospital. The relative risk of emergency cesarean section or postpartum hemorrhage by country of origin was estimated by odds ratios with 95% confidence intervals using multiple logistic regression.

Main outcome variables: Country of origin, emergency cesarean section, operative vaginal delivery and postpartum hemorrhage >500mL.

Setting: Stavanger University Hospital, Norway, with approximately 4800 deliveries annually.

Population: The study population comprised of all primiparous women, selected into a low risk group, who gave birth at Stavanger University Hospital, between January 1, 2009 and December 31, 2015. Ethnic Norwegian women (*n*=7027), Western (*n*=979), non-Western origin (*n*=1413); born in Africa (*n*=224), Asia (*n*=439), Eastern Europe (*n*=499), Middle East (*n*=166), South America (*n*=85).

Results: Pregnancy outcome of 9392 women were analyzed. Asian women had a statistically significant higher risk of emergency cesarean section (aOR: 1.887), followed by Africans (aOR: 1.705). Risk of postpartum hemorrhage was highest in women originating from Asia (aOR: 1.744). Lowest risk in South America women (aOR: 0.474). These results were statistically significant.

Conclusion and clinical implications: The results from this thesis indicates that even in an obstetrical low-risk population, the disparities in adverse pregnancy outcome differ significantly in non-Western women relative to ethnic Norwegians. The elevated risk should be taken into account by midwifes and obstetricians, and I suggest that women originating from Asia and Africa would benefit from a targeted care during pregnancy and childbirth.

Abstract in Norwegian

Hensikt: Sammenligne svangerskapsutfall for førstegangsfødende kvinner med opprinnelse fra ikke-vestlige land med etnisk norske kvinner, alle selektert i en lav-risikogruppe.

Design: Populasjonsbasert observasjonsstudie med en retrospektiv kohort design.

Omgivelser: Stavanger Universitetssykehus, Norge, med cirka 4800 fødsler årlig.

Studie populasjon: Førstegangsfødende kvinner i en lavrisiko gruppe fra 2009 til 2015. Etnisk norske kvinner (*n*=7028), vestlige (*n*=979), ikke-vestlige (*n*=1413); født i Afrika (*n*=224), Asia (*n*=439), Øst-Europa (*n*=499), Midtøsten (*n*=138), Sør-Amerika (*n*=85).

Metoder: Den relative risikoen for akutt keisersnitt eller postpartum blødning etter opprinnelsesland ble estimert ved odds ratio med 95% konfidensintervall ved å bruke logistisk multippel regresjon.

Hoved utfall: Opprinnelsesland, akutt keisersnitt, operativ vaginal fødsel og postpartum blødning> 500 ml.

Resultater: Svangerskapsutfall hos totalt 9392 kvinner ble analysert. Risiko for akutt keisersnitt var signifikant høyest hos kvinner som stammer fra Asia (aOR: 1,887), etterfulgt av afrikanske kvinner (aOR: 1,705). Fare for postpartum blødning var høyest hos kvinner som stammer fra Asia (aOR: 1,744). Laveste risiko hos var hos søramerikanske kvinner (aOR: 0,474). Begge resultatene var statistisk signifikante.

Konklusjon: Selv i en obstetrisk lavrisiko befolkning har kvinner som stammer fra Asia og Afrika en forhøyet risiko for uønskede svangerskapsutfall sammenlignet med etnisk norske kvinner. Denne risiko bør vurderes under svangerskapet, og det foreslås at kvinner som kommer fra Asia og Afrika vil dra nytte av en målrettet behandling under svangerskap og fødsel.

Abbreviations

BMI	Body Mass Index
EDA	Epidural Analgesia
ECS	Emergency Cesarean Section
NW	Non-Western
OV	Operative Vaginal Delivery
PPH	Postpartum Hemorrhage
RG1	Robson Group 1
SUS	Stavanger University Hospital

Definitions

Country of Origin	Maternal country of birth.
Ethnic Norwegian	Women born in Norway, regardless of parents' origin.
Immigrants	People born abroad of two foreign-born parents and included internationally adopted women. In this thesis used for women with a non-Western country of origin, based on the M49 standard.
Natives	Women born in a specified place or country, in this thesis used for women with a western country of origin, when receiving immigrants.
Primiparous women	First childbirth.
Multiparous women	Second, or higher birth order.
Pregnancy outcomes	Delivery Method and initial postpartum period of mother and newborn.

1. Introduction

This master thesis presents results from a study investigating pregnancy outcome in women with a non-Western (NW) origin compared with ethnic Norwegians. The women selected were all categorized as low-risk in terms of their pregnancy and the deliveries took place in Norway.

The thesis consists of two sections; part I is an observational study, structured after authors guidelines for Acta Obstetrica et Gynecologica Scandinavia (appendix 1). The article comprises summary, introduction, method used, results, analysis, discussion and conclusion.

Part II is written and structured in accordance with the requirements of University College of Southeast Norway and it starts with a summary, to give the reader a background of the thesis. After this introduction and the aim of the study, there is an extended review of the methodological choices including power analysis, variables, statistical analysis, inclusion- and exclusion criteria for the study population. Since the results of the study are well discussed in the article I have chosen only to mention them briefly in this part. The selection of "Norwegian" "Western" and "non-Western" are done by midwifes in the electronic journal system, but since there were no significantly differences between the "western" group when compared to the Norwegian group, I have chosen not to discuss these results in the thesis. The ethic assessments are presented as well as a discussion and finally the conclusion of my thesis. Due to the importance of the subject and limited space in the article, I have extended the discussion of communication and cultural sensitivity in context of patient safety and user involvement in this part.

1.1. Background

Immigrants and refugees comprise a growing part of all societies. More than three percent of the worlds' population, do not live in their country of origin (UN, 2015). The World Health Organization addresses the health of immigrants as crucial health challenges (WorldHealthOrganization, 2005). Cultural differences, socioeconomic status, social network and living conditions may limit the access to healthcare services in immigrants (Bollini, Pampallona, Wanner, & Kupelnick, 2009; Nielsen, Hempler, & Krasnik, 2013; Thomas, Beckmann, & Gibbons, 2010). Previous research has discovered significant differences between pregnancy outcome in NW women and the host population (Alderliesten et al., 2008;

Almeida, Santos, Caldas, Ayres-de-Campos, & Dias, 2014; Bakken, Skjeldal, & Stray-Pedersen, 2015; Ekéus, Cnattingius, Essén, & Hjern, 2011; Råssjö, Byrskog, Samir, & Klingberg-Allvin, 2013). Impediments like limited language proficiency and cultural diversity may be a great communication barrier increasing the risk of adverse pregnancy outcomes (Lyons, O'Keeffe, Clarke, & Staines, 2008; Thomas et al., 2010). Different studies have focused on the importance of communication in antenatal care;

In a qualitative study Essén et al. (2000) interviewed 15 Somalian women living in Sweden. The result of this study illuminated that the use of antenatal care was misunderstood as many women found it unnecessary to consult a doctor or a midwife in pregnancy when they felt heathy. They were also prone to misunderstand information given during pregnancy and child birth and did not recall getting useful advice or recommendations. Minority women were also reporting a perception of insufficient involvement in decision making (Essén et al., 2000; Henderson, Gao, & Redshaw, 2013). Norwegian researcher has illuminated some of the same communication barriers, only from the perspective of some healthcare professionals. In a Norwegian study, midwifes were interviewed about the challenges in management of antenatal care for non-Western women (Lyberg, Viken, Haruna, & Severinsson, 2012). The midwifes reported great challenges in enhancing non-Western women, as their knowledge in cultural sensitivity was limited and hence, establishing trust and confidence with the women was difficult. It was also a common understanding among the midwifes that poor language proficiency in the pregnant women was a great impediment in their work. The midwifes expressed a need for better cultural knowledge, and it was said that social integration of the immigrant women should be promoted.

Akhavan & Karlsen (2013) emphasize the same; in their qualitative study in Sweden five interviewed physicians discussed discrimination of immigrants in the Swedish health system. Inexperience of cultural disparities was suggested to result in interpersonal discrimination. Further they outlined a structural discrimination where interpreters were too expensive to use adequately. Inadequate communication with healthcare professionals has been described to play an important role in the relationship between the non-Western women and the health worker (Akhavan & Karlsen, 2013; Balaam et al., 2013; Lyberg et al., 2012). In a qualitative review, Balaam et al. (2013) illuminated the needs and experiences of the immigrant women associated with pregnancy and childbirth. Due to communication challenges, the feeling of insecurity, being misunderstood and stigmatized increased in the women. These challenges

made the women shameful and afraid of searching for advice from midwifes. The researcher demonstrated that access to maternity services, and more targeted care for immigrant women, needs to be improved.

Furthermore, integration has also seen to be important for pregnancy outcomes. A systematic review of 65 studies from 12 western countries, including 18 million women, showed a significant disparity in outcomes in NW immigrants (Bollini et al., 2009). When compared to the natives of the different countries the NW women had a 24 percent higher risk of pre-term delivery and a 50 percent higher risk of perinatal mortality. The researcher strongly suggested that NW women are, and have been, disadvantaged across generations as the results of the study showed disparities in pregnancy outcomes in the same ethnic groups in the different countries. Strong integration has been seen to play an important role in pregnancy outcome as women in countries with a strong integration policy had a significantly reduced risk of adverse outcomes (Bollini et al., 2009).

Studies suggest that compared to Norwegians, NW women are experiencing more adverse pregnancy outcomes than the natives (Bakken et al., 2015; Sorbye, Stoltenberg, Sundby, Daltveit, & Vangen, 2014; Saastad, Vangen, & Froen, 2007). However, this has not been verified in low-risk primiparous women. Norway can be described as a multiethnic society and pregnant women with a NW ethnicity are increasing in Norway. To gain a deeper understanding of this phenomenon, I aimed at investigating if these disparities also can be found in a low-risk population. My personal interest in this topic has played an important role for the thesis and will be illuminated in the next chapter.

1.2. Preface

We live in a globalized world and working as a midwife at Stavanger University Hospital, I meet a lot of NW women in birth. Providing healthcare with respect and cultural sensitivity is challenging yet most important. My own, previous experiences as an expatriate midwife in Africa has helped me overcome some of the cultural barriers one may face encountering non-Western women. However, the non-Western population is not heterogeneous and there are still great barriers to overcome in terms of language challenges and cultural sensitivity. Attitudes and behavior are correlated in many ways. This may affect the way healthcare workers interact with women and hence result in adverse pregnancy outcomes.

The feeling of insufficiency in terms of cultural differences and limited language proficiency in challenging situations is profound, and probably familiar to most midwifes. The desire to be able to explain difficult situations well and at an early stage of labor is great, but challenging.

Immigration is omnipresent and throughout the country midwifes will experience these barriers over and over. Targeted care during pregnancy and childbirth, interpreters and enhanced knowledge about the disparities may help us to a greater understanding and reduce the impediments for trust and understanding.

The wish to reduce these barriers and reduce inequalities in health- and perinatal outcome has been the most important inspiration for me in writing this master thesis.

1.3. Research question

The aim of this study was to compare the pregnancy outcome for women with different ethnic origin by focusing the following:

> *What is the incidence of adverse pregnancy outcomes during labor for non-Western women in a selected low-risk group, compared with ethnic Norwegian women in the same selected group?*

To answer the research question and predict the association between mothers' origin and emergency cesarean section I formulated a null hypothesis[1] and an alternative hypothesis[2]:

Null Hypothesis (H_0)

There is no significantly difference in pregnancy outcome between women with ethnic Norwegian origin and women with non-Western origin in Robson Group 1[3].

[1] Predicts no difference in pregnancy outcome between non-Western and ethnic Norwegian women
[2] Predicts a difference in pregnancy outcome between non-Western and ethnic Norwegian women
[3] Robson Group 1: primiparous woman, a single cephalic pregnancy ≥37 weeks' gestation with spontaneous onset of labor.

Alternative Hypothesis (H_a)

Non-Western women in Robson Group 1 have a significantly higher risk of adverse pregnancy outcome during childbirth when compared with women of ethnic Norwegian origin in Robson Group 1.

2. Methodological choices

2.1. Power analysis

A power analysis was preformed to find the correct size of the study group to reduce the risk of Type I and Type II errors. Type I error will give a false positive result and a conclusion of an, for my study, existing relationship between increased risk of adverse pregnancy outcome for non-Western women when compared to Norwegians, when this relationship does not exist. This error occurs when we believe that the H_0 is false when it is in fact true. Type II error gives a false negative result and concludes that there are no differences between the groups when there in fact is one. This error occurs when we believe that the H_a is true, when it is in fact false. I aimed at reducing the risk of Type II error to 20 percent, which is set as the standard to aim for (Field, 2013) and hence, get a statistical power of 80 percent. For my study this would give 80 percent chance of detecting a discrepancy in emergency cesarean section in non-Western women when compared with ethnic Norwegians; *if* the differences actually existed (Altman, 1991; Polit & Beck, 2017).

To include the right number of participants to investigate the magnitude of the association between mothers' origin and emergency cesarean section I was taught how to use a computer program calculating the number of participants needed to achieve significant disparity in the independent variable *"emergency cesarean section"* between the groups.

The *p*-value for this thesis was the *probability-value of detecting disparity in pregnancy outcome between the ethnic groups*. A small *p*-value, will limit the risk of Type I error and increase the chance of a true H_a. I wanted to find out if there was a significant difference in *"emergency cesarean section"* between the ethnic groups. I chose to set the threshold for statistical significance, and hence limit the risk of Type I error, to equal to or less than 0.05 (i.e. $p = \leq 0.05$). Based on statistics of incident of emergency cesarean section at the hospital I needed to include 7000 ethnic Norwegian primiparous women and 1400 women with non-Western

origin; equal to seven years, this gave me a statistical power of detecting discrepancy of 86 percent.

2.2. Study design

This was a population-based observational study with a retrospective, cohort design (Polit & Beck, 2017). To get an overview of the possible disparities in pregnancy outcome, I chose a quantitative method. The choice of doing a register study made it possible to include and investigate a considerable number of participants in my study population, and hence, making the results more reliable and increasing the possibility to generalize the results in a way that would not be possible in a qualitative study.

The disparities focused on in this thesis are neither physically- nor ethically possible to investigate through experimental trials, and thus, an observational study was chosen. Observational study means it is non-experimental; the pregnancy outcomes were just observed, without interfering in any way.

I investigated different designs to accommodate my study. The choices I ended up with were cross-section; collecting data at one specific time, or cohort study. Finally, I chose to call it a cohort since a cohort can be characterized as *"a group of people"*. Moreover, a cohort defines a design that takes a certain group of people and follows them prospective in order to measure the outcome (Altman, 1991; Polit & Beck, 2017). The cohort of this study was women in Robson Group 1. The literature often refers to cohort studies as *prospective* (Altman, 1991; Polit & Beck, 2017). Prospective however is not synonymous with *longitudinal* but is also used when the dependent variable, in my study *"country of origin",* exists prior to the outcome measured; the *"pregnancy outcome"* for this study (Altman, 1991; Polit & Beck, 2017). Since the study is a register study, I chose however to make it retrospective in order to collect a considerable number of data in a limited period of time.

2.3. Data sources

Stavanger University Hospital

The study was conducted at the Department of Obstetrics and Gynecology at Stavanger University Hospital, Norway. This is the only labor ward in the region and serves an unselected

population of 395 000 citizens, with around 4800 deliveries annually. The study period was from 1 January 2009 until 31 December 2015.

Natus®

Data was detected and extracted from information registered by midwifes and doctors in the electronic birth registration journal, *"Natus®"*, used at Stavanger University Hospital. The information was registered during pregnancy and at the admission of the woman. Natus® is a data based electronic journal system suitable for pregnancy and childbirth and midwifes register women as "Norwegian" "Western" or "non-Western" in Natus, based on country of origin. From Natus® it is possible to extract systemized data into Excel format, making it possible to identify pregnancy outcomes from already registered data.

To collect the data of the study I exported information recorded in Natus® to Excel and further, imported it from Excel to the statistical program; SPSS. In SPSS I recoded the variables to suite the setup of this program. Crosstab descriptive analysis were made to control the recoding, and the risk of electronic errors are small. The selection to Robson Group 1 (Robson, 2001) is made automatically by Natus®, based on the information registered by midwifes and gynecologists' during pregnancy and childbirth.

Dips

To find the country of origin of the non-Western women the electronic journal system *"Dips"* was used. I collected all women registered as "non-Western" in SPSS and searched in DIPS to find their country of origin. The countries were registered in the seven predefined groups, and all countries were registered with a specific number. The key to this number was also recorded in SPSS. The variable *"country of origin"* was controlled to minimize the risk of bias.

Study population

The population included in the study was primiparous women with a single cephalic pregnancy ≥37 weeks' gestation with spontaneous onset of labor, defined as women in Robson Group 1 (Robson, 2001). All primiparous women in Robson Group 1 (RG1) who gave birth at Stavanger University Hospital between 2009-2015 were included. I chose the inclusion of RG1, as it is clinically relevant and suggested by WHO to be used as a global standard for comparison (World Health Organization, 2015a, 2015b). This selection is based on obstetrical characteristics rather than maternal characteristics, which is important to be able to generalize

any results. I have not been able to find any European studies selecting women this specific, making my selection even more important. Women with induced labor, preterm birth <37 weeks gestation, or elective caesarean section were excluded from the study.

It is said that since the study group in observational correlation studies is preexisting, the risk of selection bias is increased and hence, disparities in pregnancy outcome could be explained by background characteristics rather than the outcomes (Polit & Beck, 2017). However, the study group of this thesis comprised all women in RG1 that gave birth during the study period, minimizing the risk of selection bias.

3. Variables

3.1. Exposure variable: maternal country of origin

Country of origin was classified as country of birth of the woman. Immigrants and non-Western women were defined as people born abroad of two foreign-born parents and included internationally adopted women. Women born in Norway, regardless of parents' origin, were classified as ethnic Norwegians. Based on the United Nations Statistics Division's on geographical regions (United-Nations, 2016) the women were divided into seven groups: Norway; Eastern Europe; Middle East, South America, Asia and Africa, Western (Table IV).

Table IV. Immigrant groups including countries (*N* = 9392)

Immigrant group n (% of total population)	**Countries included in the group**
Norway *N*=7028 (72.6)	Norway
Western *N=979* (10.3)	Australia, New Zealand, North America, Northern- Western- and Southern- Europe *(excluding Albania, Bosnia and Herzegovina, Estonia, Latvia, Lithuania and Serbia)*
Eastern Europe *N*=499 (5.2)	Albania (*n*=8), Belarus (*n*=5), Bosnia and Herzegovina (*n*=11), Bulgaria (*n*=12), Chechen Republic (*n*=14), Czech Republic (*n*=3), Estonia (*n*=5), Kosovo (*n*=23), Kurdistan (*n*=10), Latvia (*n*=16), Lithuania (*n*=129), The former Yugoslav Republic of Macedonia (*n*=3), Moldova (*n*=1), Poland (*n*=84), Romania (*n*=58), Russian Federation (*n*=72), Serbia (*n*=15), Slovakia (*n*=5), Ukraine (25)
Middle East *N*=138 (1.4)	Afghanistan (*n*=32), Iraq (*n*=35), Iran (*n*=28), Jordan (*n*=1), Kuwait (*n*=1), Lebanon (*n*=4), Pakistan (*n*=37), Palestine (*n*=8), Syria (*n*=16), Yemen (*n*=3)
South America	Argentina (*n*=3), Bolivia (*n*=3), Brazil (*n*=24), Chile (*n*=5), Colombia (*n*=9),

N=85 (0.9)	Ecuador (*n*=2), El Salvador (*n*=2), Guatemala (*n*=3), Mexico (*n*=4), Nicaragua (*n*=1), Peru (*n*=11), Uruguay (*n*=1), Venezuela (*n*=16), Paraguay (*n*=1)
Asia *N*=439 (4.5)	Azerbaijan (*n*=6), Bangladesh (*n*=3), Philippines (*n*=80), India (*n*=47), Indonesia (*n*=22), Cambodia (*n*=1), Kazakhstan (*n*=12), Kina (*n*=55), Kirgizstan (*n*=2), Malaysia (*n*=4), Myanmar (*n*=22), Nepal (*n*=3), Sri Lanka (*n*=10), South-Korea (*n*=11), Thailand (*n*=72), Turkey (*n*=46), Uzbekistan (*n*=1), Vietnam (*n*=35), St Lucia (*n*=1), Singapore (*n*=1)
Africa *N*=224 (2.3)	Algeria (*n*=8), Burundi (*n*=4), Cape Verde (*n*=1), Congo (*n*=5), Egypt (*n*=5), Eritrea (*n*=50), Ethiopia (*n*=28), Gambia (*n*=1), Ghana (*n*=4), Guinea (*n*=4), Ivory coast (*n*=1), Kameron (*n*=3), Kenya (*n*=3), Libya (*n*=3), Madagascar (*n*=4), Mali (*n*=1), Malawi (*n*=1), Morocco (*n*=11), Nigeria (*n*=15), Rwanda (*n*=1), Senegal (*n*=1), Somalia (*n*=47), Sudan (*n*=9), South Africa (*n*=3), Tanzania (*n*=4), Tunisia (*n*=4), Uganda (*n*=3)

The demographic variables are described in Table I and include maternal age, Body Mass Index (BMI), and maternal health before pregnancy. Maternal health in pregnancy, mode of delivery an PPH are described in Table II. The definitions, categorization and classification of the variables used in this study are described in Table V. Some of the variables were continues yet most of the variables were dichotomous; indicating the presence or absence of the specified condition or outcome. ECS and PPH >500mL were set as the main outcome measures. Secondary outcome was the frequency of operational vaginal procedures during delivery.

3.2. Statistical analyses

Data was recorded during pregnancy and childbirth and was extracted after delivery. This information is obtained from all pregnant women in the department and no additional data was collected in conjunction with participation in the project.

The collected data was checked for errors in SPSS. Errors in the data file were traced and the value corrected, left blank or deleted. Statistical analysis was conducted in the statistics program IBM SPSS Statistics for Windows, version 24.0 (IBM Corp., Armonk, NY, USA).

The means of the numerous continues variables; Body Mass Index, maternal age and apgar score were compared using the parametric test: one-way analysis of variance (ANOVA), since the assumption of normality was fulfilled. Using ANOVA I could test whether the differences in means were significantly different between the ethnic groups. *F*-ratio was used to explore

difference in variability between the ethnic groups, with Norwegians as a reference. *F*-ratio is based on the relationship of the described variance in pregnancy outcome between the groups and is used to compare this variation. *F*-ratio should be $F = >1$, and the greater *F*-ratio the more reliable the H_a hypothesis of existing disparities in pregnancy outcomes between the groups (Altman, 1991; Field, 2013).

My ambition was to use multiple regression in order to analyze two or more variables at one time and further, remove possible confounders to study the relationship between only two variables at the time (i.e emergency cesarean section in non-Western women, or operational vaginal deliveries in non-Western women). Confounding variables can be described as "confusing variables" and were not essential to the research question. By using the independent variables (Table V) as confounders in the regression, their possible effect on the outcome was removed. This enabled a better overview of the disparities in pregnancy outcome in the different ethnic groups and moreover, making the result more generalizable as possible confounders were adjusted for (Altman, 1991; Field, 2013)

Multiple regression is a parametric test. Compared with non-parametric tests the parametric analysis are more powerful and preferred in large data samples as it increases the reliability of the results. In difference between the two, parametric tests require a normal distribution of data. This indicates that most scores of the data is distributed symmetrically around the mean. Due to the size of my study group the assumption of normally distributed data was fulfilled (Field, 2013), making it possible to use a parametric test; multiple regression, in my thesis. Binary logistic regression was used since the outcome variables in Table III, were dichotomous; indicating the presence or absence of the specified condition or outcome (Altman, 1991), and to compare OR with 95 percent Confidence Intervals (95% CI) in each immigrant group.

Odds Ratio (OR) enabled me to compare groups. In this study, OR indicated the risk (*odds*) of adverse pregnancy outcomes in non-Western women relative to ethnic Norwegians. OR of 1 signalizes that the risk is equal in both groups. A CI of 95% indicates that 95% of my study population, when normally distributed, will fall within these limits (Altman, 1991).

3.3. Missing values

The variable smoking during pregnancy had many missing values, since it has not been registered during the whole study period. In addition, women may reserve the right not to have their smoking habits recorded. The registration was made in second trimester and recorded as *"yes"* or *"no"*, Table II. If a variable has many missing values, the result can be less reliable. However, the number missing values in the variables were small in relation to the large study group, reducing the risk of interference with the result. In order to include all immigrant women in the analysis, missing values were left unregistered and included in the multiple regression. There was also missing information on Body Mass Index in ten participants. These participants were not excluded from analyses but the values were left blank.

3.4. Validity of the study

Internal validity of the study

Internal validity describes the degree of accuracy in the conclusion, with respect to the non-Western women in RG1 and the methodological choices. Validity of my study was ensured through careful and accurate data collection. To make the result of the study valid and generalizable I selected variables based on the findings of previous research. The comparison of pregnancy outcome was also made on a homogeneous group (RG1). I used only two different and powerful statistical analyses. Few but strong statistical analysis is limiting the risk of Type I error. This error may occur when many analyses are made as the risk of Type I error is five percent for each test when statistical significance is set to $p = \leq 0.05$.

My data material was large and comprised data over several years, limiting the risk of possible seasonal variations changes in the population. I also attended two courses in statistics to get a deeper understanding of the methods I choose to use, and to be able to analyze the results of my study. Moreover, a statistician was consulted during the power analysis and the analyses of the results. These tasks require appropriate skills and should be conducted in cooperation with qualified professions.

External validity

The possibility of generalizing the results in the study to a wider population is known as the external validity of the study (Polit & Beck, 2017). Stavanger is a large city in Norway and

Stavanger University Hospital serves a large, unselected population with an immigrant population of approximately 25 percent. The findings of this study are similar to results of previous studies. My overall aim was to investigate if the disparities in pregnancy outcomes remained in women in RG1 and hence, the results should be comparable to the same selected women in other large cities in Norway and to other European countries with similar maternity care service that is free of charge.

4. Research ethics assessments

An application for permission of the project was sent to the University Collage of Southeast Norway, the research department at Stavanger University Hospital, The Regional Ethical Committee on Health Research and Norwegian Center for Research Data. The study was performed in accordance with the World Medical Association Declaration Of Helsinki (WMA) (World Medical Association, 2013) and permission from the Regional Ethics Committees for Medical and Health Research, REK West, was gained 9 May 2016, approval no. 2016/573.

Project manager midwife and supervisor at University Collage of Southeast Norway are obliged to observe secrecy. Following the principles of WMA B 25 (World Medical Association, 2013); data was anonymized and recorded with a birth-protocol number in a local database at Stavanger University Hospital. The key to the birth-protocol number was kept separate from the recorded data in a local area in the database at Stavanger University Hospital, established by the research department for the author to use. To gain transparency, data will be kept for five years after publication. Once this time is over, all collected data material that can be linked to individuals in the study will be deleted.

WMA B 17 states that no research involving a vulnerable population should be done unless the population will benefit from the results (World Medical Association, 2013). The potential benefit of this study is great, as a better understanding of pregnancy outcomes among NW women will increase our knowledge and through better monitoring and targeted care of these women this knowledge may be an important step towards increased patient safety. Further, this information can have an important impact on maternal and infant morbidity and mortality. The information used in the study had already been collected and did not involve additional workload for the participants. Due to the size of the study group, the women would not be identifiable in the published material. In this light the research was considered to be ethical, of

significant interest to the community and that the interest of the participants' integrity was safeguarded.

The results of pregnancy outcomes in my study are well documented in the article and the Tables, and in the next chapter I have chosen not to repeat them, but only mention them briefly.

5. Results

Pregnancy outcomes of 9392 women, originating from 96 different countries were analyzed (Table II and Table III). 7028 of the women were ethnic Norwegian, 979 Western, and 1385 NW women originated from: Eastern Europe ($N = 499$), Middle East ($N = 138$), Asia ($N = 439$), Africa ($N = 224$) and South America ($N = 85$) (Table IV).

In my study, I found that women originating from Asia and Africa had a significantly higher risk of adverse pregnancy outcome; Asian women had the highest risk of emergency cesarean section (aOR: 1.887), followed by Africans (aOR: 1.705). Women originating from South America Lowest had the lowest risk of emergency cesarean section (aOR: 0.480). Risk of postpartum hemorrhage was highest in women originating from Asia (aOR: 1.744). Lowest risk in South America women (aOR: 0.474).

The reasons for these disparities may be complex. Some of the possible reasons for these disparities in pregnancy outcomes between the ethnic groups will be discussed in the next section.

6. Discussion

The result of this study supported the H_a of existing disparities in pregnancy outcome between women with a non-Western origin and ethnic Norwegian women. Women originating from Asia and Africa were at most risk of adverse pregnancy outcome. The non-Western women included in the study were all born abroad and, apart from the international adopted, the women were all likely to have a limited language proficiency. However, the reason for these disparities may differ as these immigrant groups vary in many background characteristics; the migration and socioeconomic histories differ, as does religious and cultural preferences. To get a better understanding of the disparities and the possible reasons for adverse pregnancy outcome in the

non-Western women, I wish to discuss the impact communication barriers could have on the access to antenatal care, user involvement and at the end; patient safety (i.e., adverse pregnancy outcome).

Antenatal care services in Norway are free of charge, yet the access may be limited. Attitudes and behavior are correlated in many ways, and attitudes may affect the way health workers encounters women and could further result in a limited access to antenatal care. It is suggested that poor language proficiency, structural impediments in the antenatal system and behaviors due to attitudes of the healthcare worker can comprise limited ability to access healthcare (Akhavan & Karlsen, 2013; Lyons et al., 2008; Thomas et al., 2010). Antenatal care may not be designed to meet the actual cultural diversity. Midwifes have reported that the antenatal care in Norway does not offer differentiated care to meet the needs of the non-Western women (Lyberg et al., 2012), and interpreters are not necessarily used when needed, increasing already existing communication barriers (Lyons et al., 2008; Thomas et al., 2010). Inexperience in cultural diversity and language challenges may influence the attitude in health workers towards NW women. This phenomenon could possibly result in prejudices and racism and lead to misunderstandings and insufficient treatment, and at long last entail limited access to healthcare (Feinstein, 1993; Henderson et al., 2013; Lyons et al., 2008; Thomas et al., 2010). This statement emphasizes the importance of good communication and the use of qualified interpreters in pregnancy and childbirth and is the responsibility of the healthcare worker (Trude Nergård, 2009).

Failure in integration of non-Western women could be another reason for these disparities. A strong integration policy is known to play an important role in health- and pregnancy outcomes (Bollini et al., 2009; Nielsen et al., 2013). Significant reduction in adverse pregnancy outcomes was found in women living in countries with a strong integration policy (Bollini et al., 2009). Further, it is suggested that enhanced participation of immigrants to adapt to the receiving society in terms of norms and values, is an important phenomenon that will profit from a strong integration policy (Bollini et al., 2009; Nielsen et al., 2013). A basis of language proficiency is important to be integrated and to adapt to the receiving society. Without an understanding of the importance of antenatal controls some women may not find it useful to attend and hence, limit the possibility to receive essential information. It is also of importance for information exchange, possibility for involvement in decisions, and at the end; to increase patient safety. Given this, it is possible that some of the disparities in pregnancy outcome can be ascribed

different social position, and the integration policy in the receiving country.

Patient safety is most important in pregnancy and childbirth. According to the Word Health Organization a definition of patient safety should include that the risk of injury leading to physical or mental harm to a patient receiving health care, is reduced and kept low (World Health Organization, 2009). Patient safety may be discussed in the context of equality in antenatal care and I think it should always include cultural sensitivity and communication proficiency. Language barriers increases the risk of misunderstandings and may lead to unsatisfying use of antenatal care. Moreover, this may limit the exchange of information between the women and the healthcare professional and the ability of the woman to recognize and describe important obstetric symptoms. These barriers will also reduce the involvement of the women in making decisions and increasing the vulnerability in terms of patient safety (Berggren, Bergstrom, & Edberg, 2006; Lundberg & Gerezgiher, 2008). Lyons et al. (2008) enhances this assumption when suggesting that a reduction of language and cultural barriers are important to ensure patient safety in pregnancy for non-Western women. This may include improvement and adjustment in antenatal- and obstetric care, and behaviors due to attitudes of the health worker (Lindsay, 2014). Culture may be described as the norms and behaviors of a particular group of people (Greene, 2007) and cultural sensitivity comprises the awareness of cultural similarities and differences without assigning the disparities a value (i.e., right or wrong, better or worse) (Leininger, McFarland, & Wehbe-Alamah, 2015). Pregnancy unites us across cultural differences, and providing equality in childbirth with respect to the cultural diversity, is the responsibility of every midwife (Cantwell et al., 2011; Greene, 2007). To gain a cultural sensitivity the health worker must obtain knowledge about the cultural believes and respect different cultural behavior of the patient (Greene, 2007).

The impact of education and inter-professional training in adverse complications in childbirth has been demonstrated to have a great impact on the patient safety of women (Egenberg et al., 2015). There is a possibility that education and training of health professionals in cultural sensitivity may play an equally important role in pregnancy outcome working with non-Western women. A diversity of cultural and ethnical variety may enrich our society and make it unique. By meeting cultural diversity with an open mind and encounter immigrant women with respect and dignity we are approaching the goal of cultural sensitivity considerably (Greene, 2007).

7. Conclusion

The result of my thesis indicates that the disparities in adverse pregnancy outcome differ significantly in non-Western women relative to Norwegians. Communication challenges may cause misunderstandings and lead to adverse pregnancy outcome. Midwifes and other caregivers are responsible for good communication. Antenatal care should be optimized and adapted to the needs of women in different ethnic groups. This should include qualified interpreters and increased knowledge in cultural sensitivity by the healthcare professionals.

Further research should include the user involvement during pregnancy and childbirth in non-Western women.

References

Akhavan, S., & Karlsen, S. (2013). Practitioner and Client Explanations for Disparities in Health Care Use Between Migrant and Non-migrant Groups in Sweden: A Qualitative Study. *Journal of Immigrant and Minority Health, 15*(1), 188-197. doi:10.1007/s10903-012-9581-y

Alderliesten, M. E., Stronks, K., van Lith, J. M., Smit, B. J., van der Wal, M. F., Bonsel, G. J., & Bleker, O. P. (2008). Ethnic differences in perinatal mortality. A perinatal audit on the role of substandard care. *European Journal of Obstetrics, Gynecology, & Reproductive Biology, 138*. doi:10.1016/j.ejogrb.2007.08.022

Almeida, L. M., Santos, C. C., Caldas, J. P., Ayres-de-Campos, D., & Dias, S. (2014). Obstetric care in a migrant population with free access to health care. *International Journal of Gynaecology & Obstetrics, 126*(3), 244-247. doi:http://dx.doi.org/10.1016/j.ijgo.2014.03.023

Altman, D. G. (1991). *Practical statistics for medical research*. London: Chapman and Hall.

Bakken, K. S., Skjeldal, O. H., & Stray-Pedersen, B. (2015). Higher risk for adverse obstetric outcomes among immigrants of African and Asian descent: a comparison study at a low-risk maternity hospital in Norway. *Birth, 42*(2), 132-140. doi:http://dx.doi.org/10.1111/birt.12165

Balaam, M. C., Akerjordet, K., Lyberg, A., Kaiser, B., Schoening, E., Fredriksen, A. M., . . . Severinsson, E. (2013). A qualitative review of migrant women's perceptions of their needs and experiences related to pregnancy and childbirth. *J Adv Nurs, 69*(9), 1919-1930. doi:10.1111/jan.12139

Berggren, V., Bergstrom, S., & Edberg, A. K. (2006). Being different and vulnerable: experiences of immigrant African women who have been circumcised and sought maternity care in Sweden. *Journal of Transcultural Nursing, 17*(1), 50-57. doi:10.1177/1043659605281981

Bollini, P., Pampallona, S., Wanner, P., & Kupelnick, B. (2009). Pregnancy outcome of migrant women and integration policy: a systematic review of the international literature. *Social Science & Medicine, 68*(3), 452-461. doi:http://dx.doi.org/10.1016/j.socscimed.2008.10.018

Cantwell, R., Clutton-Brock, T., Cooper, G., Dawson, A., Drife, J., Garrod, D., . . . Springett, A. (2011). Saving Mothers' Lives: Reviewing maternal deaths to make motherhood safer: 2006-2008. The Eighth Report of the Confidential Enquiries into Maternal Deaths in the United Kingdom. *BJOG: An International Journal of Obstetrics & Gynaecology, 118 Suppl 1*, 1-203. doi:10.1111/j.1471-0528.2010.02847.x

Egenberg, S., Øian, P., Bru, L. E., Sautter, M., Kristoffersen, G., & Eggebø, T. M. (2015). Can inter-professional simulation training influence the frequency of blood transfusions after birth? *Acta Obstetricia et Gynecologica Scandinavica, 94*(3), 316-323. doi:10.1111/aogs.12569

Ekéus, C., Cnattingius, S., Essén, B., & Hjern, A. (2011). Stillbirth among foreign-born women in Sweden. *The European Journal of Public Health, 21*(6), 788-792. doi:10.1093/eurpub/ckq200

Essén, B., Johnsdotter, S., Hovelius, B., Gudmundsson, S., Sjöberg, N. O., Friedman, J., & Ostergren, P. O. (2000). Qualitative study of pregnancy and childbirth experiences in Somalian women resident in Sweden. *BJOG: An International Journal of Obstetrics & Gynaecology, 107*. doi:10.1111/j.1471-0528.2000.tb11676.x

Feinstein, J. S. (1993). The relationship between socioeconomic status and health: a review of the literature. *Milbank Q, 71*(2), 279-322.

Field, A. (2013). *Discovering statistics using IBM SPSS statistics : and sex and drugs and rock 'n' roll* (4th ed. ed.). Los Angeles: SAGE.

Greene, M. J. (2007). Strategies for Incorporating Cultural Competence Into Childbirth Education Curriculum. *The Journal of Perinatal Education, 16*(2), 33-37. doi:10.1624/105812407X191489

Henderson, J., Gao, H., & Redshaw, M. (2013). Experiencing maternity care: the care received and perceptions of women from different ethnic groups. *BMC Pregnancy & Childbirth, 13*, 196. doi:http://dx.doi.org/10.1186/1471-2393-13-196

Leininger, M. M., McFarland, M. R., & Wehbe-Alamah, H. B. (2015). *Leininger's Culture care diversity and universality : a worldwide nursing theory* (3rd ed. ed.). Burlington, Mass: Jones and Bartlett.

Lindsay, P. (2014). Maternity support workers and safety in maternity care in England. *Pract Midwife, 17*(10), 20-22.

Lundberg, P. C., & Gerezgiher, A. (2008). Experiences from pregnancy and childbirth related to female genital mutilation among Eritrean immigrant women in Sweden. *Midwifery, 24*(2), 214-225. doi:10.1016/j.midw.2006.10.003

Lyberg, A., Viken, B., Haruna, M., & Severinsson, E. (2012). Diversity and challenges in the management of maternity care for migrant women. *J Nurs Manag, 20*(2), 287-295. doi:10.1111/j.1365-2834.2011.01364.x

Lyons, S. M., O'Keeffe, F. M., Clarke, A. T., & Staines, A. (2008). Cultural diversity in the Dublin maternity services: the experiences of maternity service providers when caring for ethnic minority women. *Ethnicity & Health, 13*(3), 261-276. doi:10.1080/13557850801903020

Nielsen, S. S., Hempler, N. F., & Krasnik, A. (2013). Issues to consider when measuring and applying socioeconomic position quantitatively in immigrant health research. *International Journal of Environmental Research & Public Health [Electronic Resource], 10*(12), 6354-6365. doi:10.3390/ijerph10126354

Polit, D. F., & Beck, C. T. (2017). *Nursing Research : generating and assessing evidence for nursing practice* (10th ed. ed.). Philadelphia: Wolters Kluwer.

Robson, M. S. (2001). Classification of caesarean sections. *Fetal and Maternal Medicine Review, 12*(1), 23-39. doi:10.1017/S0965539501000122

Råssjö, E. B., Byrskog, U., Samir, R., & Klingberg-Allvin, M. (2013). Somali women's use of maternity health services and the outcome of their pregnancies: A descriptive study comparing Somali immigrants with native-born Swedish women. *Sexual & Reproductive Healthcare, 4*(3), 99-106. doi:http://dx.doi.org/10.1016/j.srhc.2013.06.001

Sorbye, I. K., Stoltenberg, C., Sundby, J., Daltveit, A. K., & Vangen, S. (2014). Stillbirth and infant death among generations of Pakistani immigrant descent: a population-based study. *Acta Obstetricia et Gynecologica Scandinavica, 93*(2), 168-174. doi:10.1111/aogs.12303

Saastad, E., Vangen, S., & Froen, J. F. (2007). Suboptimal care in stillbirths - a retrospective audit study. *Acta Obstetricia et Gynecologica Scandinavica, 86*(4), 444-450. doi:10.1080/00016340701207724

Thomas, P. E., Beckmann, M., & Gibbons, K. (2010). The effect of cultural and linguistic diversity on pregnancy outcome. *Australian & New Zealand Journal of Obstetrics & Gynaecology, 50*(5), 419-422. doi:http://dx.doi.org/10.1111/j.1479-828X.2010.01210.x

Trude Nergård, B. B., Reidun Brunvatne. (2009). *Migrasjon og helse – utfordringer og utviklingstrekk*. Retrieved from

https://helsedirektoratet.no/Lists/Publikasjoner/Attachments/696/Utviklingstrekkrapport-2009-migrasjon-og-helse-utfordringer-og-utviklingstrekk-IS-1663.pdf

UN, U. N. (2015). International migration report 2015. Retrieved from http://www.un.org/en/development/desa/population/migration/data/estimates2/estimates15.shtml

United-Nations. (2016). Geographical region and composition. Retrieved from https://unstats.un.org/unsd/methodology/m49/

World Medical, A. (2013). World medical association declaration of helsinki: Ethical principles for medical research involving human subjects. *Jama, 310*(20), 2191-2194. doi:10.1001/jama.2013.281053

World Health Organization. (2005). *Make every mother and child count. The World Health Report, 2005.* Retrieved from http://www.who.int/whr/2005/whr2005_en.pdf

World Health Organization. (2009). *More than words. Conceptual Framework for the International Classification for Patient Safety.* Retrieved from http://www.who.int/patientsafety/taxonomy/icps_full_report.pdf

World Health Organization. (2015a). *Sexual and reproductive health*. Retrieved from http://www.who.int/reproductivehealth/topics/maternal_perinatal/faq-cs-section/en/

World Health Organization. (2015b). *WHO Statement on Caesarean Section Rates.* Retrieved from http://apps.who.int/iris/bitstream/10665/161442/1/WHO_RHR_15.02_eng.pdf

Appendix 1:

Authors guidelines Acta Obstetrica et Gyneocologica Scandinavia

Format Requirements for AOGS Manuscripts

Title All text: Times New Roman, font size 12, line spacing 1.5

Running headline - max 49 characters

Authors' full names+ degrees +affiliation superscript[1, 2, 3 etc]
Affiliations - [1,2,3]Department, Institution, Town, Country (translation in English if necessary)

Corresponding author details: Full name
Professional address (preferably not home address)
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Conflicts of Interest statement – separate page

Abstract - 150 w block type for Commentaries, 250 w block type for State-of-the-art Reviews
250 w structured for Systematic Reviews and Original Research Articles (ORAs). RCTs include registration #:

Introduction
Material and methods
Results
Conclusions

Keywords - 5-8, MeSH terms are preferred

Abbreviations - use only if the term is used 5 ≥ times

Key message – required for all Commentaries, Reviews and ORAs, max 40 words

Main Text- ORAs max 3000 words, Reviews max 4000 w, Commentaries max 2000 w, Letters max 500 w.
ORAs and Systematic Reviews are divided into:

Introduction- no subheadings are allowed.
Material and methods – include Ethical approval ref. number and date of approval. RCTs include registration #. *Statistical analysis* as a separate subheading.
Results - only one level of subheadings (in *Italics)* allowed if needed.
Discussion - no subheadings are allowed in the discussion section.

Acknowledgements – Meant for individuals who have contributed but don´t qualify for authorship. Study participants cannot be acknowledged.

Funding Statement

References: ORAs max 30, Reviews max 60, Commentaries max 25, Letters max 5. Cite as (1), (2) in order of appearance. Straight Vancouver style.

Supporting Information legends: Tables, Figures, Appendices, Data, Video S1, S2, S3 etc. - upload the actual files separately accordingly named. Cite in the text as "Supporting Information Table S1" etc.

Legends of figures and tables – max 8, cite in numerical order.

Tables (may be uploaded separately)- must be tabulated – in Word table function or Excel, Define all abbreviations.

Figures (may be uploaded separately) - .tiff, .jpg, .gif, .bmp, .tif, .xls, .ppt or .eps (NO PDF). Line art must be scanned at a minimum of 800 dpi, photographs at a minimum of 300 dpi.

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