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# BMJ Open

## Satisfaction with maternity care among recent migrants: an interview questionnaire-based study

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## ABSTRACT

**Objective** To examine factors associated with recently migrated women's satisfaction with maternity care in urban Oslo, Norway.

**Design** An interview-based cross-sectional study, using a modified version of Migrant Friendly Maternity Care Questionnaire

**Setting** Face-to-face interview after birth in two maternity wards in urban Oslo, Norway, from January 2019 to February 2020.

**Participants** International migrant women,  $\leq 5$  years length of residency in Norway, born in low or middle-income countries, giving birth in urban Oslo.

**Primary outcome** Dissatisfaction of care during pregnancy, birth and postpartum, measured using a Likert scale, grouped into satisfied and dissatisfied, in relation to socio-demographic/clinical characteristics and healthcare experiences.

**Secondary outcome** Negative healthcare experiences and their association with reason for migration.

**Results** A total of 401 women answered the questionnaire (87,5% response rate). Overall satisfaction with maternal healthcare was high. However, having a Norwegian partner, higher education and high Norwegian language comprehension, were associated with greater odds of being dissatisfied with care. One third of all women did not understand the information provided by the healthcare personnel during pregnancy, birth or postpartum. More women with refugee background felt treated differently because of factors such as religion, language and skin colour, than women who migrated due to family reunification.

**Conclusions** Although the overall satisfaction was high, for certain healthcare experiences such as understanding information, we found more negative responses. The negative healthcare experiences and factors associated with satisfaction identified in this study, have implications for health system planning, education of healthcare personnel and strategies for quality improvement.

**Keywords:** migrants, maternal health, antenatal care, health literacy, communication

## ARTICLE SUMMARY

### Strengths and limitations of this study

- Face-to-face interviews with interpreter, enabling all women to participate, regardless of language proficiency and literacy.
- The use of the questionnaire tool MFMCQ enables comparability across countries.
- Timing of questionnaire shortly after birth may introduce a bias as birth outcome might influence perception of maternal health care.
- As the interviews were conducted by health staff in the postnatal ward, some women may have been reluctant to share negative experiences about in-patient care.

## INTRODUCTION

With rising proportions of births to migrant women across Europe, there is a growing need for more knowledge about the reproductive health of migrants<sup>1</sup>. Many migrants are of childbearing age and some have their first contact with the healthcare system in the new country when seeking maternity care. Higher maternal mortality and morbidity have been found among migrants compared to the host population in a number of European countries<sup>2-5</sup>. Several reasons for the elevated risk of adverse obstetric outcomes exist, such as substandard care and varying risk profiles for subgroups of migrants<sup>2</sup>. Other reasons include late initiation of antenatal care and fewer antenatal visits among migrants, which in turn can be caused by low health literacy<sup>6-10</sup>.

Satisfaction with care is considered a key predictor of utilization of health care services, which in turn can be a modifiable risk factor for adverse outcomes<sup>2 11-14</sup>. The World Health Organization recommends measuring maternal satisfaction of care to improve quality of health care<sup>15</sup>. Sitzia and Wood define 'satisfaction' as both a measure of the care received and a reflection of the patients as it consist of the patient's personal preferences, the expectations and the actual care received<sup>16</sup>. Litterature suggest that different experiences of care, for instance support from healthcare personnel and involvement in decision-making, are the most important predictors of maternal satisfaction<sup>17-19</sup>. Reproductive history, age and socioeconomic status are other known factors influencing perceived maternal satisfaction<sup>20</sup>.

Socioeconomic status is a predictor of inadequate antenatal care among migrants and as such, women born in low- or middle-income countries are at a higher risk<sup>10</sup>. Recently arrived pregnant women are particularly vulnerable. In addition to their migration experience, that for many implies a loss of social network and socioeconomic disadvantage, they are more likely to have less majority language proficiency and health system literacy<sup>21</sup>. Discrepancies exist within subgroups of migrants, where refugees and asylum-seekers seem to have higher risk for adverse outcomes, in contrast to people who migrate because of work and education, who tend to be wealthier and have better health<sup>22</sup>.

A literature gap exists regarding determinants of migrated women's satisfaction with maternity care, especially for the most recently arrived groups of migrants. The main objective of this study was to examine factors associated with recently migrated women's satisfaction with maternity care in Norway. The secondary objective was to examine the association between healthcare experiences and subgroups of migrants by reason for migration. We examined these factors among women in urban Oslo, the region with the highest proportions of migrants in Norway, in a setting of free universal access to maternity care.

## METHODS

### Study design and setting

This interview questionnaire-based study is part of the Mipreg-project and was conducted between January 2019 and January 2020. The Mipreg-project is a multidisciplinary, mixed method project that seeks to identify factors that explain disparities in pregnancy outcomes among recently migrated women giving birth in urban Oslo, Norway. Eligible women were recruited from the two public hospitals that serve urban Oslo with approximately 14 800 births annually: Oslo university hospital and Akershus university hospital.

### Study participants

We included internationally migrated, recently pregnant women of reproductive age (15-49 years) born in a low or middle-income country and with a length of stay in Norway  $\leq 5$  years, giving birth in urban Oslo.

### Questionnaire

We applied a quantitative questionnaire, using a modified version of the Migrant Friendly Maternity Care Questionnaire (MFMCQ) (Supplementary 1). MFMCQ is a structured questionnaire on maternity care from pregnancy, through labour and birth, to postpartum care developed to be used in migrant populations<sup>23</sup>. It includes information on maternal socio-demographic, migration and obstetric characteristics as well as perceptions of care during pregnancy, birth and postpartum. The original questionnaire was adapted to the health system setting of Norway. After pilot-testing, the questionnaire was forward-translated by a certified translating company with extensive knowledge about medico-technical- and pregnancy-related terms. The back-translating was performed blinded. We further systematically compared the back-translated questionnaire with the source language version, noting all discrepancies and adjusted accordingly. An interview guidebook was produced and training workshops for all the interviewers were conducted. The interviewers met regularly to discuss challenges and experiences.

### Data collection

Norway has universal health coverage and essential healthcare before, during and after birth is free of charge for members of the Norwegian National Insurance Scheme, as a rule of thumb meaning all legal citizens in Norway. Persons without legal residence have right to healthcare but must pay for it<sup>24</sup>. Pregnant women can choose between follow-up by a general practitioner or a midwife at a maternity and child healthcare centre<sup>25</sup>. The standard antenatal package includes eight consultations, including one routine ultrasound examination around week 17-19. Almost all births in Norway occur in public hospitals. After discharge from hospital the maternity and child healthcare centre provide the postnatal follow-up<sup>26</sup>. The maternal health care in Norway is fragmented, meaning the healthcare before, during and after birth is administered by independent institutions. Therefore, to elicit responses from hard-to-reach groups that we would otherwise miss, the eligible women were recruited either upon admission for delivery or at the postnatal ward (figure 1). The midwives informed about the study in the women's language of choice and a written consent was obtained. One medical doctor and three midwives conducted the interviews face-to-face in the women's own language of choice postpartum, using an interpreter when

needed. A copy of the written translations of the interview questions were given as a supplement to the women to aid an understanding of the structure of the question and the answer options.

### Outcome variable

Satisfaction of care was assessed using the question “Overall, were you satisfied with the care you received?” combined for the three time periods; care during pregnancy, care during birth and care postpartum, with the response options “always”, “sometimes”, “rarely” and “never”. As the distribution of satisfaction data was strongly skewed, we categorized the data to be binary, with “satisfied” (including “always satisfied”) and “dissatisfied” (combining “sometimes”, “rarely” and “never”). There were no missing values.

### Explanatory variables

Country of birth was grouped into super-regions following the global burden of disease (GBD) classifications, based on epidemiological similarity and geographic closeness; Latin America & Caribbean; Sub-Saharan Africa; North Africa & Middle East; South East Asia, East Asia & Oceania; South Asia; Central Europe, Eastern Europe & Central Asia; High-income<sup>27</sup>. As to reason(s) for migration, we used the national classification based on the legal grounds for immigration. We grouped women into one out of three categories: refugee, work/education and family reunification. Maternal education was classified into three groups: No completed education, primary and secondary school, or university. Economic status was measured by asking the women if she had experienced difficulties making ends meet and paying monthly expenses, with responses “yes often”, “yes occasionally” or “no never”. Having a Norwegian partner implied that the partner was born in Norway, regardless of ethnicity.

### Statistical analysis

Since the proportion of satisfaction was unknown before study start, maximum number of women required was estimated to 385 assuming a width of 10% for the estimated proportion with a 95% confidence interval (CI)<sup>28</sup>. The analyses were performed with IBM SPSS version 25. Descriptive statistics as mean with standard deviation (SD) and frequencies with percentages were calculated for categorical and continuous variables. The difference between two independent proportions of “always satisfied” and “not-always satisfied” was tested by using a chi-squared test. Association between socio-demographic and clinical variables with primary and secondary outcomes were examined by using univariable and multivariable logistic regressions. The association was expressed as the odds ratio (OR) with 95% CI and the Hosmer-Lemeshow test was used to inspect global goodness of fit for the logistic regression models. Two-sided p-values were reported, and the significance level was set at 0.05. Chi-square was used for the healthcare experiences among different migrant groups and if a significant association was found we conducted a pairwise z-test post hoc analysis with Bonferroni correction.

### Ethics/Participant and public involvement

This study was approved by each hospital’s ethical review committee (approval 18/15786 + 18/05310). A written consent was obtained from those who volunteered to participate in the study. This study is part of a larger MiPreg-project which has, from the design phase throughout the implementation phase, involved user-representatives from NGOs and relevant migrant communities within the greater Oslo-area.



## RESULTS

### Socio-demographic and clinical characteristics of study participants

In total 401 women completed the interview, 160 women from Akershus University Hospital and 241 women from Oslo University Hospital, giving an 87, 5% response rate (Figure 1). The 57 non-participating women did not differ from the participants in terms of age, length of residence or region of birth. The main reason for not participating was “being tired” and “not having the time”. The mean completion time for the interview was 44 mins (SD 13). All boroughs in the city of Oslo were represented, including surrounding counties which constitute the “greater Oslo region”. The median age for primiparous women was 29 years and 31 years for multiparous women. In total, the women originated from 66 different countries. 28% of the women had lived in Norway for up to 1 year and 11 months, 37% for 2 years up to 3 years and 11 months and 35% for four years up to five years. The majority of women were primiparous. Almost one in four women had induction of labour and a bit less than every fifth women had a caesarean section (Table 1).

*Table 1: Socio-demographic and clinical characteristics of all study participants and for overall dissatisfaction, N (%) or mean (SD)*

Socio-demographic and clinical characteristics	All (n= 401)	Dissatisfied (n=131)
<b>Socio-demographic characteristics</b>		
Age (years), mean (SD)	29.8 (4.7)	30.4 (4.9)
Mother's region of birth (GBD), n (%)		
Central Europe, Eastern Europe and Central Asia	132 (32.9)	41 (31.3)
Latin America and Caribbean	13 (3.2)	8 (6.1)
North Africa and Middle East	76 (19.0)	31 (23.7)
South Asia	81 (20.2)	24 (18.3)
Southeast Asia, East Asia and Oceania	37 (9.2)	10 (7.6)
Sub-Saharan Africa	62 (15.5)	17 (13.0)
Partner's region of birth (GBD), n (%) <sup>1</sup>		
Central Europe, Eastern Europe and Central Asia	123 (30.7)	35 (26.7)
High-income	65 (16.2)	31 (23.7)
Latin America and Caribbean	1 (0.2)	1 (0.8)
North Africa and Middle East	74 (18.5)	26 (19.8)
South Asia	68 (17.0)	21 (16.0)
Southeast Asia, East Asia and Oceania	15 (3.7)	3 (2.3)
Sub-Saharan Africa	54 (13.5)	13 (9.9)
Partner Norwegian, n (%)		
Yes	54 (13.5)	25 (19.1)
No	347 (86.5)	106 (80.9)
Length of residency (months), mean (SD)	35.6 (19.4)	36.4 (18.1)
Education, n (%)		
No completed education	16 (4.0)	6 (4.6)
Primary/secondary school	151 (37.7)	33 (25.2)
University	234 (58.4)	92 (70.2)

Marital status, n (%)		
Single/divorced	21 (5.2)	5 (3.8)
Cohabitant/married	380 (94.8)	126 (96.2)
Economic status, n (%)		
Very low – low	19 (4.7)	8 (6.1)
Low – moderate	60 (15.0)	22 (16.8)
High	313 (78.1)	98 (74.8)
Unknown	9 (2.2)	3 (2.3)
Employment status, n (%)		
Employed	228 (56.9)	79 (60.3)
Unemployed	173 (43.1)	52 (39.7)
Reason for migration, n (%)		
Refugee	41 (10.2)	14 (10.7)
Family reunification	183 (45.6)	62 (47.3)
Work/education	177 (44.1)	55 (42.0)
Norwegian comprehension, n (%)		
None	69 (17.2)	22 (16.8)
With difficulties	149 (37.2)	48 (36.6)
Good	158 (39.4)	46 (35.1)
Fluently	25 (6.2)	15 (11.5)
<b>Clinical characteristics</b>		
BMI, mean (SD)	23.2 (4.0)	23.6 (4.2)
Number of children, mean (SD)	1.6 (0.8)	1.5 (0.8)
GA first antenatal visit, mean (SD)	9.5 (4.5)	9.1 (4.1)
Care received by*, n (%)		
General practitioner	328 (81.8)	109 (83.2)
Midwife	331 (83.0)	113 (86.9)
Obstetrician	114 (28.4)	42 (32.1)
Parity, n (%)		
Primiparous	229 (57.1)	86 (65.6)
Multiparous	172 (42.9)	45 (34.4)
Evaluation of own health, n (%)		
Good	363 (90.5)	119 (90.8)
Neither good nor bad	33 (8.2)	10 (7.6)
Bad	5 (1.2)	2 (1.5)
Comorbidity, n (%)		
Yes	79 (19.7)	20 (15.3)
No	322 (80.3)	111 (84.7)
Pregnancy complication, n (%)		
Yes	213 (53.1)	77 (59.2)
No	187 (46.6)	53 (40.8)
Obstetric interventions, n (%)		
Induction	97 (24.2)	39 (29.8)
Vacuum	52 (13.0)	18 (13.7)
Caesarean section	72 (18.0)	29 (22.1)
Episiotomy	91 (22.7)	29 (22.1)
Epidural	242 (60.3)	84 (64.1)
Pudendal	21 (5.2)	10 (7.7)

Complications during birth, n (%)		
Postpartum haemorrhage	19 (4.7)	9 (6.9)
Transfer to NICU	27 (6.7)	11 (8.4)
Antibiotic treatment	55 (13.7)	18 (13.7)
Planned pregnancy, n (%)		
Yes	300 (74.8)	93 (71.0)
No	101 (25.2)	38 (29.0)

\*More than one healthcare provider possible

<sup>l</sup>one missing

### Socio-demographic and clinical factors associated with women's dissatisfaction

Women with a non-Norwegian partner had decreased odds of being dissatisfaction with overall care, compared to women with a Norwegian partner (adjusted OR 0.39, 95% CI 0.19-0.83, Figure 2). Having completed primary and secondary education reduced the odds of being dissatisfied compared to those with higher education (adjusted OR 0.39, 95% CI 0.22-0.70). Women with a Norwegian language comprehension categorized as “good” or “with difficulties”, as compared to “fluently”, had decreased odds of being dissatisfied (adjusted OR 0.29 and 0.22, 95% CI 0.11-0.81 and 0.09-0.59). Being primiparous, not having a planned pregnancy and having a caesarean section, were associated with greater odds of being dissatisfied with care. No significant association was found between satisfaction and migrant-specific variables such as mother’s region of birth, reason for migration and length of residency.

Overall dissatisfaction with care was most pronounced during pregnancy (23%) as compared to during birth (12%) and postpartum (13%). For “dissatisfaction in pregnancy” all the variables from Figure 2 were significantly associated, apart from “caesarean section” (Supplementary 2). When analysing “dissatisfaction during birth” none of the variables from Figure 2 were significant, including birth-related factors “complications during birth” and “induction”. For “dissatisfaction in post-partum period”, only the variables “caesarean section” and “education” were significantly associated.

### Negative healthcare experiences and their association with women's dissatisfaction

We found a higher proportion of negative responses for different healthcare experiences as compared to the overall dissatisfaction of care (Table 2). One third of women (134 women) had not understood the information provided by the healthcare personnel during a consultation or while being admitted to hospital. Of these, 85% said that they would have understood the information better in another language. Among the one-third there was a higher proportion of less fluency in Norwegian and lower education, compared to the two-thirds who understood the information. More than one fourth of the women experienced that healthcare personnel did not ask if they had questions and did not spend enough time providing explanations. Half of the women had experienced prolonged waiting time before receiving care. One in every five women had experienced that healthcare personnel made a decision without taking their wishes into account either during pregnancy, birth or postpartum.

Healthcare personnel not spending enough time providing information (OR 6.9, 95% CI 4.3-11.1), the women’s concerns not being taken seriously (OR 6.8, 95% CI 4.2-11.2) and prolonged waiting time (OR 6.2, 95% CI 3.8-9.9) increased the odds of being overall dissatisfied the most (Figure 3).

### Negative healthcare experiences and their association with reason for migration

More refugee women felt treated differently by healthcare personnel compared to other women because of religion, skin colour, language etc. (24.4% vs 9.3%,  $p$  0.022) and understood less information (51.2% vs 27.2%,  $p$  0.008) compared to women who migrated due to family reunification and work/education, respectively (Table 2). Women who migrated due to family reunification were more dissatisfied with the pain management (17.5% vs 7.3%,  $p$  0.01) and felt that decisions were made without their wishes being taken into account (24.6% vs 14.1%,  $p$  0.03), compared to women who migrated due to work/education.

*Table 2: Negative healthcare experiences for all participants and for subgroups of migrants with refugee, family reunification and work/education, with frequency and percentage.*

Negative healthcare experiences	All (n=401) N (%)	Refugee (n=41) N (%)	Family reunification (n=183) N (%)	Work/ Education (n=177) N (%)
HCP did not spend enough time providing explanations	123 (30.7)	14 (34.1)	58 (31.7)	51 (28.8)
Concerns were not taken seriously by HCP	101 (25.2)	12 (29.3)	52 (28.4)	37 (20.9)
Prolonged waiting time	201 (50.1)	17 (41.5)	89 (48.6)	95 (53.7)
Decisions were made without my wishes taken into account	80 (20.0)	10 (24.4)	45 (24.6)	25 (14.1)
There are things HCP could do differently	160 (39.9)	13 (31.7)	74 (40.4)	73 (41.2)
Preferences for care were not followed	17 (4.2)	3 (7.3)	8 (4.4)	6 (3.4)
Felt treated differently to other people by HCP	50 (12.5)	10 (24.4)	17 (9.3)	23 (13.0)
HCP did not ask if I had any questions	106 (26.4)	14 (34.1)	52 (28.4)	40 (22.6)
Dissatisfied with pain management	50 (12.5)	5 (12.2)	32 (17.5)	13 (7.3)
Dissatisfied with length of hospital stay	71 (17.7)	11 (26.8)	22 (12.0)	38 (21.5)
Did not understand information by HCP	134 (33.4)	21 (51.2)	65 (35.5)	48 (27.1)

## DISCUSSION

This study identified factors associated with maternal satisfaction with healthcare for recently arrived migrants. A substantial proportion of participants were satisfied with the received healthcare. However, the degree of dissatisfaction was higher among primiparous women and those with unplanned pregnancy, higher education, good language skills and a Norwegian partner. One third of all women reported not to understand the information provided by the healthcare personnel during pregnancy, birth or postpartum. In addition, more women with refugee background felt treated differently by the healthcare personnel because of factors such as religion, language and skin colour, than women who migrated due to family reunification.

Measures of satisfaction are important because it is assumed that they reflect quality of care. In consonance with the definition of satisfaction of care, “high satisfaction” can indicate good care received but also low expectations “and vice versa”<sup>29</sup>. This is especially true for the perinatal period where it may be difficult to distinguish between the childbirth experience and the actual care received<sup>30</sup>. The recently arrived migrant women’s varying background can highly affect their expectations, depending on for example previous experience with healthcare in other countries, cultural context and knowledge about Norwegian healthcare system<sup>31</sup>. This is reflected in our results; even though the overall satisfaction was high, consistent with existing literature<sup>32 33</sup>, we found a high rate of negative responses for some health care experiences. This emphasise that an overall satisfaction score may not be adequate to measure quality of care. In agreement with our study, a recent review article on maternity care in Nordic countries also found experiences of care-related discrimination among refugees<sup>34</sup>. This may indicate implicit bias among healthcare personnel. However, this needs to be further explored, especially since negative implicit bias among healthcare personnel has the potential to contribute to disparities in health<sup>35</sup>.

Care during pregnancy was the time-period with highest proportion of dissatisfaction in our study. Contrary, a Dutch study showed that non-western migrants were most satisfied with the antenatal care<sup>36</sup>, while a British study found little difference in satisfaction between the three periods<sup>32</sup>. These differences might be explained by different ways of organizing the maternity care between countries, for instance a more non-intervening approach to perinatal care and more homebirths in the Netherlands compared to Norway.

In our study women with high education were less satisfied, compared to those with some education. This difference can be explained by different expectations, which in turn can be influenced by health system literacy. A study specifically measuring expectations with antenatal care among vulnerable women, including migrants, found low expectations among women with a lower level of education<sup>33</sup>. Contrary to our finding, studies not looking specifically at migrants have suggested the opposite<sup>37</sup> and no association between education and satisfaction<sup>38</sup>. Indeed, several studies from developing countries have showed that women who are illiterate or with only primary education were more satisfied compared to those with higher education<sup>39 40</sup>, in line with our findings.

Communication and language barriers have been pointed out as main obstacles in achieving high quality care for migrant women<sup>2 41-43</sup>, yet few quantitative studies have included language proficiency as a determinant for satisfaction. We did indeed find that a high proportion of women had not understood the information delivered by healthcare personnel and the majority of them believed they would have better understanding in a different language. This language barrier is a worrying finding in terms of quality of care. In agreement with our finding, a recent study indicate “*effective communication*” to be one of the strongest associated factor with overall satisfaction<sup>44</sup>. Hence, increased satisfaction among women with less fluency in Norwegian language as shown in

our study, can be due to lower expectations. Gürbüz et al. who also used the questionnaire tool MFMCQ surprisingly found no association between language proficiency and satisfaction<sup>45</sup>. In order to ensure high quality of care there is a need for migrant-friendly communication which includes access to professional interpreter services, provision of written materials for migrants in their language and training of healthcare personnel in intercultural communication.

Having a Norwegian partner increased the odds of being dissatisfied in our study. A recent study from Norway found increased odds for adverse outcomes for babies with two migrant parents compared to one and linked it to disadvantages such as communication problems and levels of health system literacy<sup>46</sup>. Our findings may therefore reflect expectations rather than actual quality of care. We found no association between overall satisfaction and mother's region of birth in our study, in agreement with other studies<sup>19 47 48</sup>, including one conducted in Norway<sup>49</sup>. Whilst some studies have found higher satisfaction among migrants compared to non-migrants<sup>35 41 42</sup>, other studies have found the opposite<sup>37</sup>. However, we did not include non-migrants, as our aim was not to compare migrant women to the majority population.

### Strength and limitations

A strength of this study was the use of face-to-face interviews with interpreter when needed, enabling all women to participate, not limited by language or literacy. In this way we were also able to reduce the chance of missing data and limiting misinterpretation of questions. The use of the questionnaire tool MFMCQ enables comparability across countries. The clinical characteristics of study participants were comparable with national statistics on obstetric interventions and complications during birth<sup>50</sup>. As this is a cross-sectional study, true cause and effect relationship cannot be assessed. The questionnaire was administered within some days after birth to ensure responses from hard-to-reach groups but also potentially introducing bias. Immediately after birth women tend to show high satisfaction levels, the so-called "*halo effect*", where the women are filled with relief for having a healthy baby<sup>51</sup>. Social desirability bias could also affect the answers, especially since the interviews were held at the ward by healthcare personnel. However, there is no consensus as to the right time for a survey<sup>19</sup>. The lack of measurement of expectations may have limited our understanding of some of the variables such as education and parity<sup>52</sup>.

### Practical implications of the study and recommendations for future research

The findings of this study provide usable information for the improvement of maternal care to become "migrant-friendly". Healthcare personnel assessing the pregnant women's literacy, expectations and pregnancy intention, would assist in better identifying the women in need for additional support services to ensure higher satisfaction with care and better use of healthcare services. To ensure optimal communication, tools such as provision of professional interpreter, support material in various languages and intercultural mediation are required. This study emphasises that in migrant population, specific health care experiences rather than overall satisfaction may be important to evaluate quality of care. Including more women from certain vulnerable subgroups such as refugees and undocumented migrants in future studies would assist in deeper and more fully understanding of factors associated with dissatisfaction. Additionally, it would be important to understand the relationship between being dissatisfied and the use of healthcare services as well as between dissatisfaction and maternity outcomes. Including the partner's perception of care and predictors for satisfaction would further assist in understanding pathways to achieve higher quality of care.

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**Author contributions:**

SB modified the questionnaire, collected survey data, conducted the analysis, interpreted results and wrote the first draft of the manuscript.

JS developed the idea for the study, secured the funding, contributed to results interpretation and contributed to manuscript revisions.

BVL developed the idea for the study, secured the funding, helped interpreted results and contributed to manuscript revisions.

SV developed the idea for the study, secured the funding, helped interpreted results and contributed to manuscript revisions.

LMD contributed to data and statistical analysis and manuscript revision.

KMO helped interpreted results and contributed to manuscript revisions.

IKS developed the idea for the study, secured the funding, interpreted results and revised manuscript.

All authors approved the final version of the manuscript

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**Competing interests:**

None declared.

**Ethics approval:**

This study was approved by Oslo University hospital's ethical review committee (approval 18/15786) and Akershus University hospital's ethical review committee (approval 18/05310). The overall MiPreg-study was approved by Regional Committees for Medical and Health Research Ethics (approval 2018/1086).

**Data sharing statement:**

The data that support the findings of this study are available from the corresponding author, SB, upon reasonable request. The data are not publicly available due to their containing information that could compromise the privacy of research participants.

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10 **Legends for figures:**  
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12 Figure 1: Flowchart inclusion  
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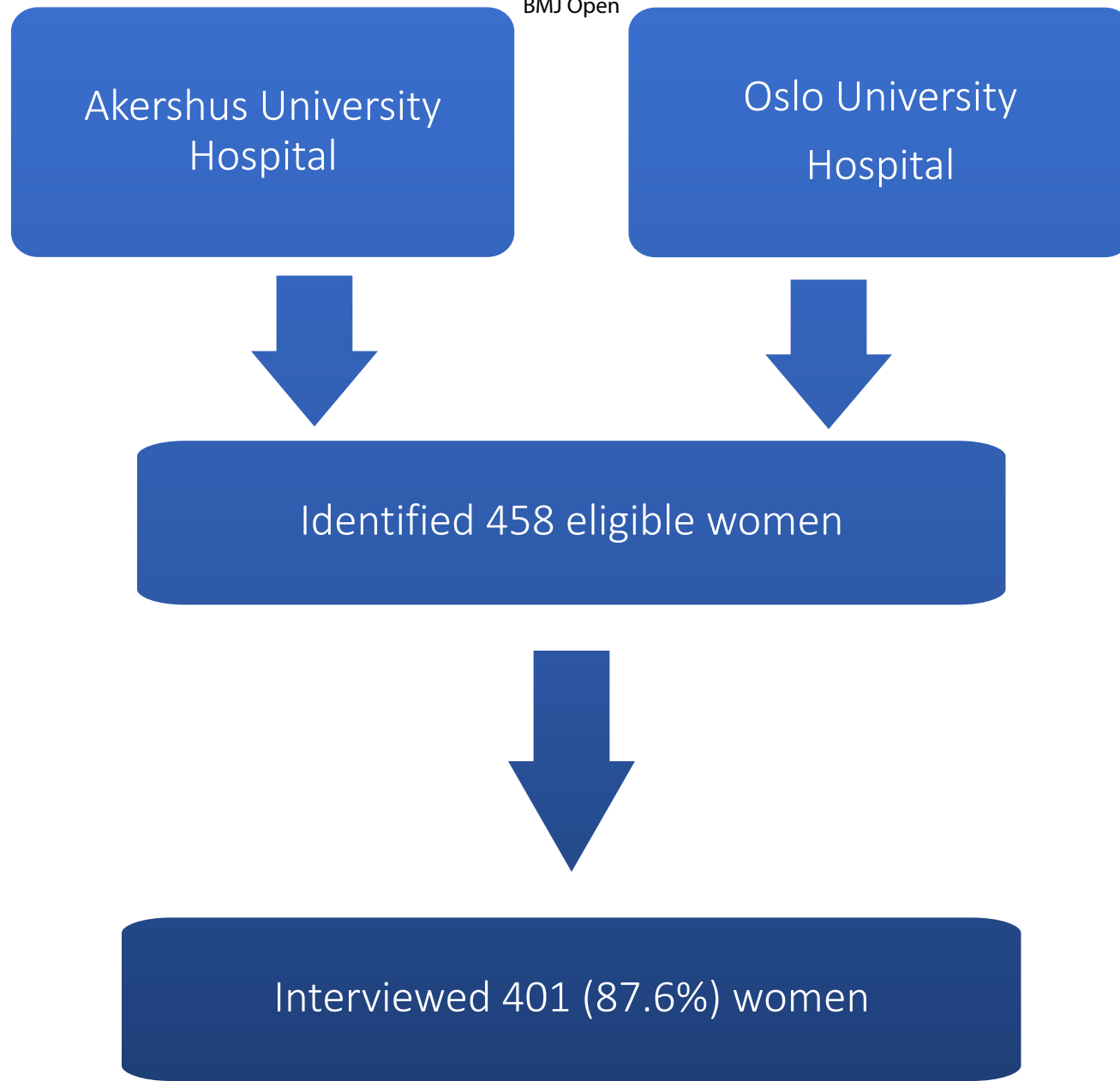
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15 Figure 2: Association between socio-demographic and clinical factors with overall dissatisfaction  
16 with care (combined for during pregnancy, birth and postpartum), with adjusted OR and 95% CI.

17 <sup>a</sup> Adjusted for partner Norwegian, education, Norwegian comprehension, parity, planned  
18 pregnancy, caesarean section, mother's region of birth, reason for migration, maternal age and  
19 length of residency.

20 Abbreviations: CI; confidence interval. aOR; adjusted odds ratio.  
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23 Figure 3: Association between negative healthcare experiences and overall dissatisfaction with  
24 care (combined for during pregnancy, birth and postpartum), with crude OR and 95% CI.

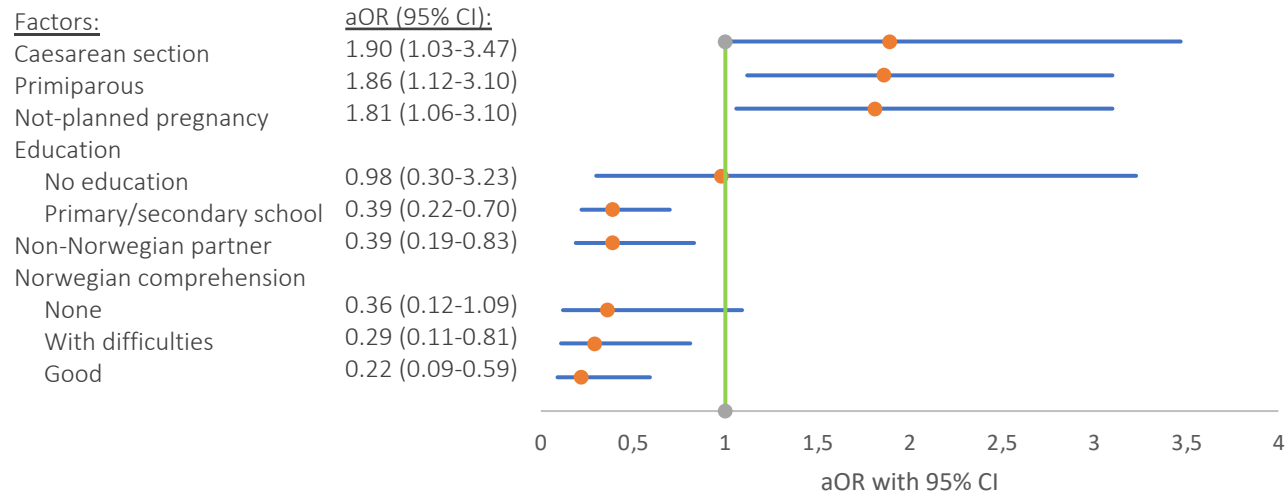
25 Abbreviations: CI; confidence interval. OR; odds ratio  
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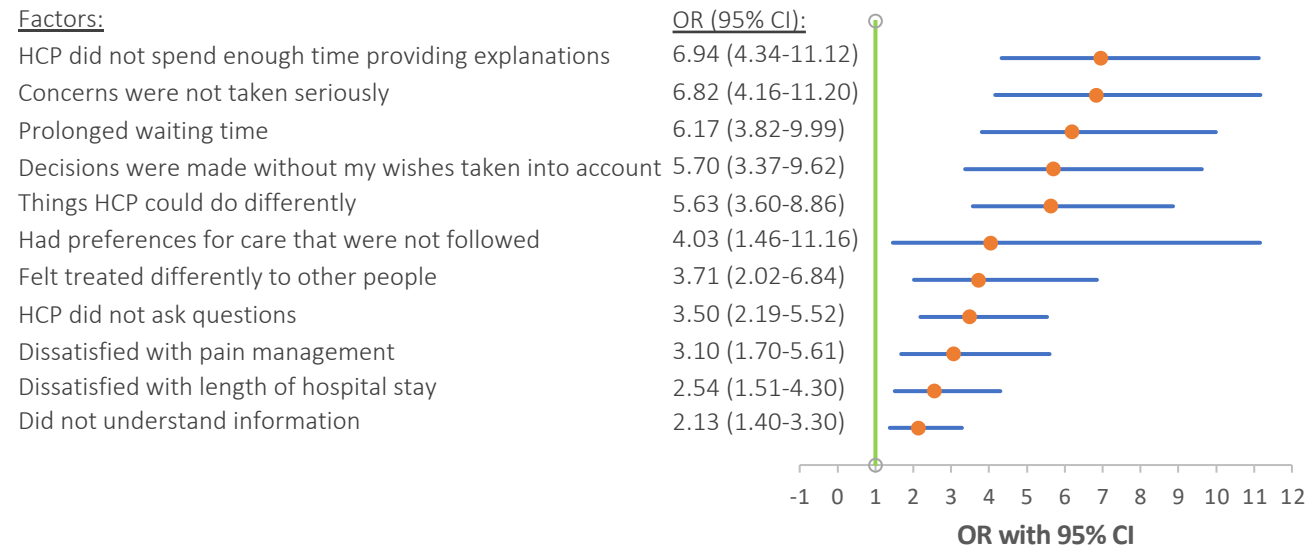
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### Socio-demographic and clinical factors and overall dissatisfaction



### Negative healthcare experiences and overall dissatisfaction



## MIPREG QUESTIONNAIRE

## 1. GENERAL

1.1 What country were you born in?

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1.2. What country was the father of your child born in?

---

1.3. How long have you lived in Norway?

---

1.4. How old are you?

---

1.5. What language do you use most often at home?

---

1.6. How good is your Norwegian?

Oral –	Fluent	Good	Some difficulty	Not at all
Reading –	Fluent	Good	Some difficulty	Not at all
Writing –	Fluent	Good	Some difficulty	Not at all
Comprehension –	Fluent	Good	Some difficulty	Not at all

---

1.7. What is your postal code?

---

1.8. What is your marital status?

- Single
  - Married/cohabiting
  - Divorced
  - Widow
- 

1.9. Who do you live with?

- Partner
  - Your family (your mother/father, your brother/sister)
  - In-laws (parent in-law, your partner's brother/sister)
  - Friends/colleagues
  - Children (in addition to your newborn child)
  - None, I live alone
- 

1.10 a) Do you have anyone you trust with whom you can speak in confidence?

- Yes
  - No
- 

1.10 b) If the answer is YES, who is this person?

- Partner
  - Your family (your mother/father, your brother/sister)
  - In-laws (parent in-law, your partner's brother/sister)
  - Friends/colleagues
- 

1.11 What is the highest level of education you completed?

- I have no schooling
  - Begun, but not completed compulsory education
  - Primary/lower secondary school (first 7 to 10 years of schooling)
  - High school/upper secondary (the next 1-3 years of education)
  - Tertiary/university, short (up to 4 years)
  - Tertiary/university, long (4 years or more)
- 

1.12 Have you had paid work since coming to Norway?

- Yes
  - No
- 

1.13 In the course of the last 12 months, have you or your family had difficulties making ends meet and paying monthly expenses (food, transport, housing etc.)?

- Yes, often
- Yes, occasionally
- No, never
- Do not know/prefer not to answer

## 2. YOUR HEALTH BEFORE PREGNANCY

2.1. Did you have any illnesses or ailments before becoming pregnant?

- Yes
  - Diabetes
  - Heart/vascular disorder (including hypertension)
  - Autoimmune illness (rheumatoid illness, metabolic disorder, transplantation)
  - Systemic Lupus Erythematosus (SLE)
  - Anaemia (iron deficiency and thalassaemia)
  - Kidney disease
  - Treated tuberculosis
  - HIV, hepatitis
  - Overweight
  - Neurological illness (such as epilepsy)
  - Lung illness (such as asthma)
  - Mental disorder (such as depression)
  - Other: i) \_\_\_\_\_ ii) \_\_\_\_\_
- No

2.2 a) How much did you weigh before pregnancy?

2.2 b) What is your height?

2.3 How would you assess your health for the time being. How would you describe your health?

... good / neither good nor bad / poor?

2.4 Describe your situation: Not troubled, A little troubled, Very troubled or Extremely troubled ...

a)... being constantly afraid or anxious?

- not troubled / a little troubled /very troubled / extremely troubled

b)... a sense of hopelessness for the future?

- not troubled / a little troubled /very troubled / extremely troubled

c)... a sense of loneliness?

- not troubled / a little troubled /very troubled / extremely troubled

We have some questions about how you planned this pregnancy and if you used birth control/contraception.

2.5 Was this pregnancy planned?

- Yes (go to part 3)
- No
- Do not know/unsure

2.5 If the pregnancy was not planned or you are not sure if it was planned, did you use any form of contraception to avoid pregnancy?

Yes

No

2.7 What did you use?

- Barrier methods (condom, diaphragm)
- Non-hormonal methods/natural methods (interrupted intercourse/safe periods, breast feeding)
- Hormonal contraceptives (The pill, mini-pill, pregnancy prevention patches, vaginal ring)
- LARC (hormonal and/or copper spiral/IUD, contraceptive injection)
- Other (specify) \_\_\_\_\_

2.8 Why did you not want to use birth control?

- Too expensive
- Did not have enough information about different methods/options
- I did not know where I could get hold of these
- No access to doctor/nurse
- Side effects
- Religious reasons
- Husband/partner/family did not want it
- Other (specify) \_\_\_\_\_



## 3. OBSTETRIC CLINICAL HISTORY

3.1 How many children have you born, in total (including your new child)?

---

3.2 How many births have you had (past week 23)?

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3.3 How many of your children were born in Norway (including your newborn)?

---

3.4 Have you had difficulties in previous pregnancies and births?

• Yes, which:

- Cesarean section
- Nausea during pregnancy
- Hemorrhages/bleeding/anaemia
- High blood pressure
- Preeclampsia
- Deep vein thrombosis (blood clot in the leg)
- Gestational diabetes
- Low-lying placenta
- Abruptio placenta
- Urinary tract infection
- Symphysiolysis
- Premature birth (<37 weeks)
- Premature birth (<34 weeks)
- Early rupture of membrane
- Intrauterine growth retardation (decreasing growth indicated by series measurements)
- Foetal death
- Congenital abnormalities in foetus
- Sphincter rupture (grade 3+4)
- Postpartum depression
- Other (please specify): \_\_\_\_\_
  - No, first birth
  - No, I have not had any complications

## 4. CURRENT PREGNANCY

4.1 Were you pregnant with your newborn child when you came to Norway?

- Yes
  - No
  - Do not remember/do not know
- 

4.2 Did you receive any form of health care for the pregnancy before birth from a health care provider (doctor, nurse, midwife) in Norway?

- Yes
  - No
- 

4.3 Who provided health care for your pregnancy in Norway?

- GP/Family doctor
  - Specialist (obstetrician) at the hospital
  - The midwife at the health clinic
  - Other \_\_\_\_\_
- 

4.4 How many weeks pregnant were you when you first received health care for this pregnancy in Norway?

---

4.5 Did you experience any difficulties in this pregnancy?

- Yes, which
  - Cesarean section
  - Nausea during pregnancy
  - Anaemia
  - High blood pressure
  - Preeclampsia
  - Deep vein thrombosis (blood clot in the leg)
  - Gestational diabetes
  - Low-lying placenta
  - Abruptio placenta
  - Urinary tract infection

- Symphysiolysis
- Premature birth (<37 weeks)
- Premature birth (<34 weeks)
- Early rupture of membrane
- Intrauterine growth retardation (decreasing growth indicated by series measurements)
- Foetal death
- Congenital abnormalities in foetus
- Postpartum depression
- Other (please specify): \_\_\_\_\_
- No, I had no complications

4.6. Which of the following offers did you accept during pregnancy?

- Municipal help (pregnancy course, prepare for birthing course, parental guidance)
- Other offers from non-governmental organizations (Bydelismødre etc.)
- Contact with health care providers in your home country
- Alternative medicine/rituals
- Child Welfare Services
- Ultrasound foster diagnostics at the hospital (for special patient groups)
- Routine ultrasound, Week 18
- Other (please specify) \_\_\_\_\_

4.7. Of the offers mentioned above, are there any you would have liked to use but felt they were not available during your pregnancy?

- Yes, specify (from the options above) \_\_\_\_\_
- No

4.8. Have the following factors prevented you from taking advantage of an offer from the public health service?

- Practical limitations (transportation, work, lack of time) Yes – No
- Language barriers Yes – No
- Lack of information about offers (not aware they existed, did not know how Norway's health care system works, did not think I was entitled) Yes – No

- Afraid that it could affect my visa/residency application process Yes – No
- Afraid of medical examinations and tests Yes – No
- Other (please specify): \_\_\_\_\_

4.9. What were your 2 main sources of information about pregnancy and birth during this pregnancy?

- Previous pregnancies/births
- Family/friends
- Religious/spiritual leader
- Health care providers
- Offers from my neighbourhood/district (courses)
- Mass media (books, TV, internet)
- Other (please specify): \_\_\_\_\_

4.10. Did you get enough information about the following topics in the course of this pregnancy/birth?

- Physical changes during pregnancy Yes – No
- Emotional changes (feelings) during pregnancy Yes – No
- Recommended medical tests (HIV, hepatitis) Yes – No
- Nutrition during pregnancy Yes – No
- Signs that the birth had started Yes – No
- The various phases of birth Yes – No
- Pain relief during childbirth Yes – No
- Changes in mood after the birth Yes – No
- Breastfeeding Yes – No
- Infant formula Yes – No
- Where and who you could contact if you needed advice or had questions about your health or your newborn child's health Yes – No
- Family planning and birth control Yes – No

4.11. Did you take daily vitamin supplements during pregnancy?

- Yes (skip to question 4.12)
- No (go to next question)

## 4.12. If NO, why not?

- Did not know why it should be taken
- Could not find it at the store
- Too expensive
- Did not need it
- Was not told/asked about taking it
- Other (please specify): \_\_\_\_\_

## 4.13. Which of the following statements best describes your habits during pregnancy?

- Smoking: I did not smoke, I smoked occasionally, I smoked daily
- Snuff: I did not take snuff, I took snuff occasionally, I took snuff daily
- Alcohol: I did not drink alcohol, I drank alcohol occasionally, I drank alcohol every day

## 5. BIRTH

## 5.1. How many weeks were you pregnant before giving birth?

## 5.2. How many baby(is) were born?

## 5.3. Were any of the following procedures performed during the birth?

- Labour induction
- Use of a vacuum
- Use of forceps
- Cesarean section
- Episiotomy (cutting near the opening of the vagina)
- Epidural/Spinal anaesthesia as pain relief
- Pudendal blockade as pain relief
- Other (please specify): \_\_\_\_\_

## 5.4. Did you have any complications during the birth?

- Yes

- Sphincter rupture (grade 3-4)
- Bleeding that needed transfusion
- The infant was moved to the neonatal ward
- Use of antibiotics
- Other (please specify): \_\_\_\_\_
- No

## 5.5. If your child was born via caesarean section, what was the reason for it?

- It was scheduled because the doctor recommended it for medical reasons
- It was planned, but you do not know why
- It was scheduled because you wanted it, but not for medical reasons
- It was not planned, but the birth took a long time
- It was not planned but the baby/foetus was in danger
- It was not planned but you were in danger
- It was not planned and you do not know why it was done
- Other (please specify): \_\_\_\_\_

## 5.6. Are you satisfied with the help you received from the health care provider to relieve your pain?

- Yes
- No
- Not a vaginal birth, I had a caesarean section

## 5.7. Were you allowed to have a family member or other support person (including a doula) with you in the birthing room?

- Yes
- No

## 5.8. Do you feel that the duration of your hospitalisation after birth was:

- Too short
- OK/suitable
- Too long

6. OVERALL EXPERIENCE OF PREGNANCY CARE RECEIVED

6.1. Did the health care provider refuse any care, special practice or ritual during or after birth that you requested?

Yes

No (go to question 6.4)

6.2. If yes, what were these wishes?

i) \_\_\_\_\_ ii) \_\_\_\_\_

6.3. If YES, what reason did the health care provider give for not allowing your wishes?

i) \_\_\_\_\_ ii) \_\_\_\_\_

6.4. Is there anything you think the health care provider could have done differently or better during the pregnancy, birth or after birth?

- Yes, please specify what could have been done differently or better

and by

whom \_\_\_\_\_

- No

6.5. Overall, were you satisfied with the health care you got? Did you feel welcome, was the health care provider helpful and respectful?

a) During pregnancy – Always – Sometimes – Rarely – Never

b) During the birth – Always – Sometimes – Rarely – Never

c) After birth – Always – Sometimes – Rarely – Never

6.6. Did you understand the information the health care provider tried to convey to you?

a) During pregnancy – Always – Sometimes – Rarely – Never

b) During the birth – Always – Sometimes – Rarely – Never

c) After birth – Always – Sometimes – Rarely – Never

6.7. Do you think you would have understood the information that was conveyed to you better in another language, such as your native language?

- Yes
- No

6.8. Were you offered an interpreter?

a) During pregnancy – yes/no/did not need an interpreter

b) During the birth – yes/no/did not need an interpreter

c) After birth – yes/no/did not need an interpreter

6.9. If you had someone there to interpret for you, who was it?

- Partner/other adult family member/friend
- Child (<18 years)
- Health care provider
- Professional interpreter
- Other \_\_\_\_\_

6.10. Were you happy with their interpretation?

- Yes
- No

6.11. The health care provider asked me if I had any questions.

Always – Sometimes – Rarely – Never

6.12. I felt that my concerns were taken seriously by the health care providers

Always – Sometimes – Rarely – Never

6.13. I had to wait a long time before I got help.

a) During pregnancy – Always – Sometimes – Rarely – Never

b) During the birth – Always – Sometimes – Rarely – Never

c) After birth – Always – Sometimes – Rarely – Never

- 6.14. The health care providers made decisions without asking my opinion
- a) During pregnancy – Always – Sometimes – Rarely – Never
- b) During the birth – Always – Sometimes – Rarely – Never
- c) After birth – Always – Sometimes – Rarely – Never
- 

- 6.15. The health care provider spent enough time explaining things to me.
- a) During pregnancy – Always – Sometimes – Rarely – Never
- b) During the birth – Always – Sometimes – Rarely – Never
- c) After birth – Always – Sometimes – Rarely – Never
- 

- 6.16. Overall, do you feel that you were treated differently by the health care providers, compared with other people? (i.e. because of language, culture, religion)?
- Always – Sometimes – Rarely – Never
- 

6.17. If yes, why do you think you were treated differently?

- Language
- Culture
- Ethnic background
- Skin colour
- Religion
- Migration status/immigrant background
- Other reasons (please specify): \_\_\_\_\_

## 7. MIGRATION

7.1. What was the legal basis for your residency permit in Norway? Is it ...

- Work/partner's work
- Reunion with family

- Marriage
  - Refuge (resettlement refugee, quota refugee, humanitarian grounds, asylum)
  - Education
  - Undocumented
  - Other (please specify): \_\_\_\_\_
- 

7.2. Did you live at a reception centre for asylum-seekers while you were pregnant with this child?

- Yes
  - No
- 

7.3. If yes, how long did you live there?

---

7.4. Do you have a work permit in Norway?

- Yes
  - No
- 

7.5 How satisfied or dissatisfied are you with your life after coming to Norway?

- Dissatisfied
  - Neither satisfied or dissatisfied
  - Satisfied
- 

7.6 How satisfied or dissatisfied were you with life in your home country before you came to Norway?

- Dissatisfied
- Neither satisfied or dissatisfied
- Satisfied

Socio-demographic and clinical factors	Overall dissatisfaction		Dissatisfaction in pregnancy		Dissatisfaction during birth		Dissatisfaction post-partum	
	Adjusted OR (95% CI) <sup>a</sup>	P-value	Adjusted OR (95% CI) <sup>a</sup>	P-value	Adjusted OR (95% CI) <sup>a</sup>	P-value	Adjusted OR (95% CI) <sup>a</sup>	P-value
Partner								
Non-Norwegian	0.39 (0.19-0.83)	*0.015	0.33 (0.14-0.74)	*0.007	0.70 (0.24-1.85)	0.438	0.46 (0.20-1.20)	0.105
Norwegian	1.00		1.00		1.00		1.00	
Education								
No completed education	0.98 (0.30-3.23)	0.974	1.93 (0.56-6.64)	0.298	0.71 (0.13-3.92)	0.691	0.21 (0.02-1.94)	0.170
Primary/secondary school	0.39 (0.22-0.70)	*0.002	0.36 (0.19-0.70)	*0.002	0.55 (0.25-1.23)	0.147	0.36 (0.16-0.81)	*0.013
University	1.00		1.00		1.00		1.00	
Norwegian comprehension								
None	0.36 (0.12-1.09)	0.071	0.30 (0.09-0.97)	*0.045	0.54 (0.13-2.28)	0.401	0.70 (0.16-3.14)	0.645
With difficulties	0.29 (0.11-0.81)	*0.018	0.29 (0.10-0.81)	*0.019	0.43 (0.12-1.60)	0.199	0.63 (0.17-2.32)	0.486
Good	0.22 (0.09-0.59)	*0.002	0.26 (0.10-0.69)	*0.007	0.39 (0.12-1.32)	0.129	0.60 (0.20-1.90)	0.344
Fluently	1.00		1.00		1.00		1.00	
Not planned pregnancy	1.81 (1.06-3.10)	*0.029	2.28 (1.27-4.09)	*0.006	0.93 (0.44-2.00)	0.858	1.11 (0.52-2.33)	0.792
Planned pregnancy	1.00		1.00		1.00		1.00	
Primiparous	1.86 (1.12-3.10)	*0.016	1.82 (1.04-3.20)	*0.037	1.69 (0.83-3.41)	0.147	1.30 (0.70-2.55)	0.437
Multiparous	1.00		1.00		1.00		1.00	
Caesarean section	1.90 (1.03-3.47)	*0.040	1.80 (0.86-3.30)	0.132	1.10 (0.46-2.53)	0.873	2.80 (1.33-5.80)	*0.006
Not caesarean section	1.00		1.00		1.00		1.00	

<sup>a</sup> Adjusted for partner Norwegian, Education, Norwegian comprehension, Parity, Planned pregnancy, Caesarean section, Mother GBD, Reason for migration, Age and Length of residency.

Abbreviations: CI; confidence interval. OR; odds ratio.

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Reported on page #
<b>Title and abstract</b>	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
<b>Introduction</b>			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	3
<b>Methods</b>			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5
Bias	9	Describe any efforts to address potential sources of bias	5
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	5
		(b) Describe any methods used to examine subgroups and interactions	5
		(c) Explain how missing data were addressed	Na
		(d) If applicable, describe analytical methods taking account of sampling strategy	Na
		(e) Describe any sensitivity analyses	Na
<b>Results</b>			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6-8
		(b) Give reasons for non-participation at each stage	6-8
		(c) Consider use of a flow diagram	Figure 1
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential	Table 1

		confounders	
		(b) Indicate number of participants with missing data for each variable of interest	Table 1
Outcome data	15*	Report numbers of outcome events or summary measures	6-8
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	8-9
		(b) Report category boundaries when continuous variables were categorized	Na
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Na
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	9
<b>Discussion</b>			
Key results	18	Summarise key results with reference to study objectives	10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	10-11
Generalisability	21	Discuss the generalisability (external validity) of the study results	11
<b>Other information</b>			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	12

\*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).



# BMJ Open

## Satisfaction with maternity care among recent migrants: an interview questionnaire-based study

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2  
3 1 **Title:** Satisfaction with maternity care among recent migrants: an interview questionnaire-based  
4  
5 2 study

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## 1 ABSTRACT

2 **Objective** To examine factors associated with recently migrated women's satisfaction with  
3 maternity care in urban Oslo, Norway.

4 **Design** An interview-based cross-sectional study, using a modified version of Migrant Friendly  
5 Maternity Care Questionnaire

6 **Setting** Face-to-face interview after birth in two maternity wards in urban Oslo, Norway, from  
7 January 2019 to February 2020.

8 **Participants** International migrant women,  $\leq 5$  years length of residency in Norway, giving birth  
9 in urban Oslo, excluding women born in high-income countries.

10 **Primary outcome** Dissatisfaction of care during pregnancy and birth, measured using a Likert  
11 scale, grouped into satisfied and dissatisfied, in relation to socio-demographic/clinical  
12 characteristics and healthcare experiences.

13 **Secondary outcome** Negative healthcare experiences and their association with reason for  
14 migration.

15 **Results** A total of 401 women answered the questionnaire (87.5% response rate). Overall  
16 satisfaction with maternal healthcare was high. However, having a Norwegian partner, higher  
17 education and high Norwegian language comprehension, were associated with greater odds of  
18 being dissatisfied with care. One third of all women did not understand the information provided  
19 by the healthcare personnel during maternity care. More women with refugee background felt  
20 treated differently because of factors such as religion, language and skin colour, than women who  
21 migrated due to family reunification.

22 **Conclusions** Although the overall satisfaction was high, for certain healthcare experiences such as  
23 understanding information, we found more negative responses. The negative healthcare  
24 experiences and factors associated with satisfaction identified in this study, have implications for  
25 health system planning, education of healthcare personnel and strategies for quality improvement.

26 **Keywords:** migrants, maternal health, antenatal care, health literacy, communication

## 27 ARTICLE SUMMARY

### 28 Strengths and limitations of this study

- 29 - Face-to-face interviews with interpreter, enabling all women to participate, regardless of  
30 language proficiency and literacy.
- 31 - The use of the questionnaire tool MFMCQ enables comparability across countries.
- 32 - Timing of questionnaire shortly after birth may introduce a bias as birth outcome might  
33 influence perception of maternity care.
- 34 - As the interviews were conducted in the postnatal ward, some women may have been  
35 reluctant to share negative experiences about in-patient care.

## INTRODUCTION

With rising proportions of births to migrant women across Europe, there is a growing need for more knowledge about the reproductive health of migrants<sup>1</sup>. Many migrants are of childbearing age and some have their first contact with the healthcare system in the new country when seeking maternity care. Higher maternal mortality and morbidity have been found among migrants compared to the host population in a number of European countries<sup>2-5</sup>. Several reasons for the elevated risk of adverse obstetric outcomes exist, such as substandard care and varying risk profiles for subgroups of migrants<sup>2</sup>. Other reasons include late initiation of antenatal care and fewer antenatal visits among migrants, which in turn can be caused by low health literacy<sup>6-10</sup>.

Satisfaction with care is considered a key predictor of utilization of health care services, which in turn can be a modifiable risk factor for adverse outcomes<sup>2 11-14</sup>. The World Health Organization recommends measuring maternal satisfaction of care to improve quality of health care<sup>15</sup>. Sizia and Wood define 'satisfaction' as both a measure of the care received and a reflection of the patients as it consists of the patient's personal preferences, the expectations and the actual care received<sup>16</sup>. Literature suggests that different experiences of care, for instance support from healthcare personnel and involvement in decision-making, are the most important predictors of maternal satisfaction<sup>17-19</sup>. Reproductive history, age and socioeconomic status are other known factors influencing perceived maternal satisfaction<sup>20</sup>.

Socioeconomic status is a predictor of inadequate antenatal care among migrants and as such, women born in low- or middle-income countries are at a higher risk<sup>10</sup>. Recently arrived pregnant women are particularly vulnerable. In addition to their migration experience, that for many implies a loss of social network and socioeconomic disadvantage, they are more likely to have less majority language proficiency and health system literacy<sup>21</sup>. Discrepancies exist within subgroups of migrants, where refugees and asylum-seekers seem to have higher risk for adverse outcomes, in contrast to people who migrate because of work and education, who tend to be wealthier and have better health<sup>22</sup>.

Disparities in maternal health outcomes and suboptimal quality of maternity care for migrants are also reported from Norway<sup>4 9 23 24</sup>. In order to improve quality of care it is important to gain more knowledge about determinants of migrated women's satisfaction with maternity care. A literature gap exists regarding these determinants, especially for the most recently arrived groups of migrants. The main objective of this study was therefore to examine factors associated with recently migrated women's satisfaction with maternity care. The secondary objective was to examine the association between healthcare experiences and subgroups of migrants by reason for migration. We examined these factors among women in urban Oslo, the region with the highest proportions of migrants in Norway, in a setting of free universal access to maternity care.

## 1 METHODS

### 2 Study design and setting

3 This interview questionnaire-based study is part of the Mipreg-project and was conducted  
4 between January 2019 and January 2020. The Mipreg-project is a multidisciplinary, mixed  
5 method project that seeks to identify factors that explain disparities in pregnancy outcomes among  
6 recently migrated women in Norway. Norway has universal health coverage and essential  
7 maternity care is free of charge for all legal citizens. Persons without legal residence have right to  
8 healthcare but must pay for it <sup>25</sup>. Pregnant women can choose between follow-up by a general  
9 practitioner or a midwife at a maternity and child healthcare centre <sup>26</sup>. The standard antenatal  
10 package includes eight consultations, including one routine ultrasound examination around week  
11 17-19. Almost all births in Norway occur in public hospitals. After discharge from hospital the  
12 maternity and child healthcare centre provide the postnatal follow-up <sup>27</sup>.

### 13 Study participants

14 We included internationally migrated, recently pregnant women with a length of stay in Norway ≤  
15 5 years, giving birth in urban Oslo. We excluded migrants born in high income countries,  
16 according to the Global Burden of Disease framework. Eligible women were recruited from the  
17 two public hospitals that serve urban Oslo with approximately 14 800 births annually: Oslo  
18 University Hospital and Akershus University Hospital.

### 19 Questionnaire

20 We applied a quantitative questionnaire, using a modified version of the Migrant Friendly  
21 Maternity Care Questionnaire (MFMCQ) (Supplementary 1). MFMCQ is a structured  
22 questionnaire on maternity care developed to be used in migrant populations <sup>28</sup>. It includes  
23 information on maternal socio-demographic, migration and obstetric characteristics as well as  
24 satisfaction of care and other healthcare experiences during pregnancy and birth. The original  
25 questionnaire was adapted to the health system setting of Norway and modified after inputs from  
26 pilot-testing. An interview guidebook was produced and training workshops for all the research  
27 personnel, one medical doctor and three midwives, were conducted. The interviewers met  
28 regularly to discuss challenges and experiences.

### 29 Data collection

30 The maternal health care in Norway is fragmented, meaning the healthcare before, during and  
31 after birth is administered by independent institutions. Therefore, to elicit responses from hard-to-  
32 reach groups that we would otherwise miss, the eligible women were recruited either upon  
33 admission for delivery or at the postnatal ward (figure 1). The research personnel informed  
34 women about the study and a written consent was obtained. Thereafter, they conducted the  
35 interviews face-to-face in the women's own language of choice after birth, using an interpreter  
36 when needed. In addition, to aid the women in understanding the structure of the question and the  
37 answer options, written translations of the questionnaire was provided in nine languages: Arabic,  
38 Dari, English, French, Norwegian, Somali, Sorani, Tigrinya and Urdu. The questionnaire was  
39 forward-translated by a certified translating company with extensive knowledge about medico-  
40 technical- and pregnancy-related terms. The back-translating was performed blinded. We further  
41 systematically compared the back-translated questionnaire with the source language version,  
42 noting all discrepancies and adjusted accordingly.

## 1 Outcome variable

2 Satisfaction of care was assessed using the question “Overall, were you satisfied with the care you  
3 received?” combined for the two time periods; care during pregnancy and care during birth, with  
4 the response options “always”, “sometimes”, “rarely” and “never”. As the distribution of  
5 satisfaction data was strongly skewed, we categorized the data to be binary, with “satisfied”  
6 (including “always satisfied”) and “dissatisfied” (combining “sometimes”, “rarely” and “never”).  
7 There were no missing values.

## 8 Explanatory variables

9 Country of birth was grouped into super-regions following the Global Burden of Disease  
10 classifications, based on epidemiological similarity and geographic closeness; Latin America &  
11 Caribbean; Sub-Saharan Africa; North Africa & Middle East; South East Asia, East Asia &  
12 Oceania; South Asia; Central Europe, Eastern Europe & Central Asia<sup>29</sup>. As to reason(s) for  
13 migration, we used the national classification based on the legal grounds for immigration. We  
14 grouped women into one out of three categories: refugee, work/education and family  
15 reunification. Maternal education was classified into three groups: No completed education,  
16 primary and secondary school, or university. Economic status was measured by asking the women  
17 if she had experienced difficulties making ends meet and paying monthly expenses, with  
18 responses “yes often”, “yes occasionally” or “no never”. Having a Norwegian partner implied that  
19 the partner was born in Norway, regardless of ethnicity. Healthcare experiences were examined by  
20 asking the women about eleven specific healthcare experiences, grouped binary as positive or  
21 negative experiences.

## 22 Statistical analysis

23 A sample size of approximately 360 women was required to detect a difference of 14% between 2  
24 groups with and without full satisfaction, assuming that the proportion of fully satisfied women  
25 was 73% as the reference/control group<sup>30</sup>. A 2-sided significance level of .05 and 80% power was  
26 used. We decided to include approximately 400 women to take potential missing values into  
27 account. The calculation of sample size was performed with Stata/SE version 16.1. Descriptive  
28 statistics as mean with standard deviation (SD) and frequencies with percentages were calculated  
29 for categorical and continuous variables. The difference between two independent proportions of  
30 “always satisfied” and “not-always satisfied” was tested by using a chi-squared test. Association  
31 between socio-demographic and clinical variables with primary and secondary outcomes were  
32 examined by using univariable and multivariable logistic regressions. The association was  
33 expressed as the odds ratio (OR) with 95% confidence interval (CI) and the Hosmer-Lemeshow  
34 test was used to inspect global goodness of fit for the logistic regression models. Two-sided p-  
35 values were reported, and the significance level was set at 0.05. Chi-square was used for the  
36 healthcare experiences among different migrant groups and if a significant association was found  
37 we conducted a pairwise z-test post hoc analysis with Bonferroni correction. The analyses were  
38 performed with IBM SPSS version 25.

## 39 Ethics

40 This study was approved by each hospital’s ethical review committee (approval 18/15786 +  
41 18/05310). A written consent was obtained from those who volunteered to participate in the study.

## 42 Patient and public involvement

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3 1 The MiPreg-project has, from the design phase throughout the implementation phase, involved  
4 2 user-representatives from non-governmental organizations and relevant migrant communities  
5 3 within the greater Oslo-area. The user-representatives gave feedback on readability, validity and  
6 4 cultural sensitivity of the questionnaire before data collection. After data collection, preliminary  
7 5 findings were presented, and interpretations were discussed with user-representatives.  
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## 1 RESULTS

### 2 Socio-demographic and clinical characteristics of study participants

3 In total 401 women completed the interview, 160 women from Akershus University Hospital and  
 4 241 women from Oslo University Hospital, giving an 87.5% response rate (Figure 1). The 57 non-  
 5 participating women did not differ from the participants in terms of age, length of residence or  
 6 region of birth. The main reason for not participating was “being tired” and “not having the time”.  
 7 The mean completion time for the interview was 44 mins (SD 13). All boroughs in the city of  
 8 Oslo were represented, including surrounding counties which constitute the “greater Oslo region”.  
 9 The median age for primiparous women was 29 years and 31 years for multiparous women. In  
 10 total, the women originated from 66 different countries. 28% of the women had lived in Norway  
 11 for up to 1 year and 11 months, 37% for 2 years up to 3 years and 11 months and 35% for four  
 12 years up to five years. The majority of women were primiparous. Almost one in four women had  
 13 induction of labour (24.2%) and almost every fifth women a caesarean section (18.0%). No  
 14 difference in dissatisfaction was found for women receiving maternity care from a general  
 15 practitioner (28.7%), a midwife (29.0%) or an obstetrician (28.1%) (Table 1).

16 *Table 1: Socio-demographic and clinical characteristics of all study participants and for overall*  
 17 *dissatisfaction, N (%) or mean (SD)*

Socio-demographic and clinical characteristics	All (n= 401)	Dissatisfied <sup>1</sup> (n=113)
<b>Socio-demographic characteristics</b>		
Age (years), mean (SD)	29.8 (4.7)	29.8 (4.7)
Mother's region of birth (GBD), n (%)		
Central Europe, Eastern Europe and Central Asia	132 (32.9)	37 (32.7)
Latin America and Caribbean	13 (3.2)	7 (6.2)
North Africa and Middle East	76 (19.0)	24 (21.2)
South Asia	81 (20.2)	21 (18.6)
Southeast Asia, East Asia and Oceania	37 (9.2)	8 (7.1)
Sub-Saharan Africa	62 (15.5)	16 (14.2)
<b>Partner's region of birth (GBD), n (%)<sup>2</sup></b>		
Central Europe, Eastern Europe and Central Asia	123 (30.7)	30 (26.5)
High-income	65 (16.2)	28 (24.8)
Latin America and Caribbean	1 (0.2)	1 (0.9)
North Africa and Middle East	74 (18.5)	20 (17.7)
South Asia	68 (17.0)	18 (15.9)
Southeast Asia, East Asia and Oceania	15 (3.7)	3 (2.7)
Sub-Saharan Africa	54 (13.5)	12 (10.6)
<b>Partner Norwegian, n (%)</b>		
Yes	54 (13.5)	22 (19.5)
No	347 (86.5)	91 (80.5)
Length of residency (months), mean (SD)	35.6 (19.4)	38.3 (18.1)
<b>Education, n (%)</b>		
No completed education	16 (4.0)	6 (5.3)
Primary/secondary school	151 (37.7)	27 (23.9)

University	234 (58.4)	80 (70.8)
<b>Marital status, n (%)</b>		
Single/divorced	21 (5.2)	5 (4.4)
Cohabitant/married	380 (94.8)	108 (95.6)
<b>Economic status, n (%)</b>		
Very low – low	19 (4.7)	8 (7.1)
Low – moderate	60 (15.0)	21 (18.6)
High	313 (78.1)	82 (72.6)
Unknown	9 (2.2)	2 (1.8)
<b>Employment status, n (%)</b>		
Employed	228 (56.9)	69 (61.1)
Unemployed	173 (43.1)	44 (38.9)
<b>Reason for migration, n (%)</b>		
Refugee	41 (10.2)	12 (10.6)
Family reunification	183 (45.6)	51 (45.1)
Work/education	177 (44.1)	50 (44.2)
<b>Norwegian comprehension, n (%)</b>		
None	69 (17.2)	20 (17.7)
With difficulties	149 (37.2)	39 (34.5)
Good	158 (39.4)	40 (35.4)
Fluently	25 (6.2)	14 (12.4)
<b>Clinical characteristics</b>		
BMI, mean (SD)	23.2 (4.0)	23.3 (4.1)
Number of children, mean (SD)	1.6 (0.8)	1.6 (0.8)
GA first antenatal visit, mean (SD)	9.5 (4.5)	9.5 (4.5)
<b>Care received by<sup>3</sup>, n (%)</b>		
General practitioner	328 (81.8)	94 (83.2)
Midwife	331 (83.0)	96 (85.7)
Obstetrician	114 (28.4)	32 (28.3)
<b>Parity, n (%)</b>		
Primiparous	229 (57.1)	74 (65.5)
Multiparous	172 (42.9)	39 (34.5)
<b>Evaluation of own health, n (%)</b>		
Good	363 (90.5)	104 (92.0)
Neither good nor bad	33 (8.2)	7 (6.2)
Bad	5 (1.2)	2 (1.8)
<b>Comorbidity, n (%)</b>		
Yes	79 (19.7)	17 (15.0)
No	322 (80.3)	96 (85.0)
<b>Pregnancy complication, n (%)</b>		
Yes	213 (53.1)	69 (61.1)
No	187 (46.6)	44 (38.9)
<b>Obstetric interventions, n (%)</b>		
Induction	97 (24.2)	33 (29.2)
Vacuum	52 (13.0)	18 (15.9)
Caesarean section	72 (18.0)	22 (19.5)
Episiotomy	91 (22.7)	27 (23.9)
Epidural	242 (60.3)	70 (61.9)

Pudental	21 (5.2)	9 (8.0)
Complications during birth, n (%)		
Postpartum haemorrhage	19 (4.7)	7 (22.6)
Transfer to NICU	27 (6.7)	8 (25.8)
Antibiotic treatment	55 (13.7)	16 (51.6)
Planned pregnancy, n (%)		
Yes	300 (74.8)	78 (69.0)
No	101 (25.2)	35 (31.0)

<sup>1</sup>Percentages are column percentages

<sup>2</sup>One missing

<sup>3</sup>More than one healthcare provider possible

GBD: Global Burden of Disease

### **Socio-demographic and clinical factors associated with women's dissatisfaction**

Women with a non-Norwegian partner had decreased odds of being dissatisfied with overall care, compared to women with a Norwegian partner (adjusted OR 0.38, 95% CI 0.18-0.82, Figure 2). Having completed primary and secondary education reduced the odds of being dissatisfied compared to those with higher education (adjusted OR 0.39, 95% CI 0.22-0.73). Women with a Norwegian language comprehension categorized as “good” or “with difficulties”, as compared to “fluently”, had decreased odds of being dissatisfied (adjusted OR 0.26 and 0.24, 95% CI 0.09-0.71 and 0.09-0.62). Not having a planned pregnancy were associated with greater odds of being dissatisfied with care. No significant association was found between satisfaction and migrant-specific variables such as mother’s region of birth, reason for migration and length of residency. Overall dissatisfaction with care was most pronounced during pregnancy (23%) as compared to during birth (12%). For “dissatisfaction in pregnancy” all the variables from Figure 2 were significantly associated, in addition to being primiparous (Supplementary 2). When analysing “dissatisfaction during birth” none of the variables from Figure 2 were significant, including birth-related factors “complications during birth” and “caesarean section”.

### **Negative healthcare experiences and their association with women's dissatisfaction**

We found a higher proportion of negative responses for different healthcare experiences as compared to the overall dissatisfaction of care (Table 2). One third of women (33.4%) had not understood the information provided by the healthcare personnel during a consultation or while being admitted to hospital. Of these, 85% said that they would have understood the information better in another language. Among the one-third there was a higher proportion of less fluency in Norwegian and lower education, compared to the two-thirds who understood the information. More than one fourth of the women experienced that healthcare personnel did not ask if they had questions and did not spend enough time providing explanations. Half of the women had experienced prolonged waiting time before receiving care. One in every five women had experienced that healthcare personnel made a decision without taking their wishes into account.

Healthcare personnel not taking the women’s concerns seriously (OR 6.8, 95% CI 4.2-11.2), not spending enough time providing information (OR 6.0, 95% CI 3.8-9.7) and perceived prolonged waiting time for the migrant women (OR 5.2, 95% CI 3.2-8.5) increased the odds of being overall dissatisfied the most (Figure 3).

### **Negative healthcare experiences and their association with reason for migration**

1 More refugee women felt treated differently by healthcare personnel because of religion, skin  
 2 colour, language etc. (24.4% vs 9.3%,  $p$  0.022) and understood less information (51.2% vs 27.2%,  
 3  $p$  0.008), compared to women who migrated due to family reunification and work/education,  
 4 respectively (Table 2). The majority of refugee women originated from Eritrea (34.1%), Syria  
 5 (19.5%), Iraq (7.3%) and Somalia (7.3%). Women who migrated due to family reunification were  
 6 more dissatisfied with the pain management (17.5% vs 7.3%,  $p$  0.01) and felt that decisions were  
 7 made without their wishes being taken into account (24.6% vs 14.1%,  $p$  0.03), compared to  
 8 women who migrated due to work/education.

9 *Table 2: Negative healthcare experiences for all participants and for subgroups of migrants with*  
 10 *refugee, family reunification and work/education, with frequency and percentage.*

Negative healthcare experiences	All (n=401) N (%)	Refugee (n=41) N (%)	Family reunification (n=183) N (%)	Work/ Education (n=177) N (%)
HCP did not spend enough time providing explanations	123 (30.7)	14 (34.1)	58 (31.7)	51 (28.8)
Concerns were not taken seriously by HCP	101 (25.2)	12 (29.3)	52 (28.4)	37 (20.9)
Prolonged waiting time	201 (50.1)	17 (41.5)	89 (48.6)	95 (53.7)
Decisions were made without my wishes taken into account	80 (20.0)	10 (24.4)	45 (24.6)	25 (14.1)
There are things HCP could do differently	160 (39.9)	13 (31.7)	74 (40.4)	73 (41.2)
Preferences for care were not followed	17 (4.2)	3 (7.3)	8 (4.4)	6 (3.4)
Felt treated differently to other people by HCP	50 (12.5)	10 (24.4)	17 (9.3)	23 (13.0)
HCP did not ask if I had any questions	106 (26.4)	14 (34.1)	52 (28.4)	40 (22.6)
Dissatisfied with pain management	50 (12.5)	5 (12.2)	32 (17.5)	13 (7.3)
Dissatisfied with length of hospital stay	71 (17.7)	11 (26.8)	22 (12.0)	38 (21.5)
Did not understand information by HCP	134 (33.4)	21 (51.2)	65 (35.5)	48 (27.1)

## 11 DISCUSSION

12 This study identified factors associated with maternal satisfaction with healthcare for recently  
 13 arrived migrants. A substantial proportion of participants were satisfied with the received  
 14 healthcare. However, the degree of dissatisfaction was higher among women with unplanned  
 15 pregnancy, higher education, good language skills and a Norwegian partner. One third of all  
 16 women reported not to understand the information provided by the healthcare personnel during  
 17 maternity care. In addition, more women with refugee background felt treated differently by the  
 18

1 healthcare personnel because of factors such as religion, language and skin colour, than women  
2 who migrated due to family reunification.

3  
4 Measures of satisfaction are important because it is assumed that they reflect quality of care. In  
5 consonance with the definition of satisfaction of care, “high satisfaction” can indicate good care  
6 received but also low expectations “and vice versa”<sup>31</sup>. This is especially true for the perinatal  
7 period where it may be difficult to distinguish between the childbirth experience and the actual  
8 care received<sup>32</sup>. The recently arrived migrant women’s varying background can highly affect their  
9 expectations, depending on for example previous experience with healthcare in other countries,  
10 cultural context and knowledge about Norwegian healthcare system<sup>33</sup>. This is reflected in our  
11 results; even though the overall satisfaction was high, consistent with existing literature<sup>34 35</sup>, we  
12 found a high rate of negative responses for some healthcare experiences. This emphasises that an  
13 overall satisfaction score may not be adequate to measure quality of care. In agreement with our  
14 study, a recent review article on maternity care in Nordic countries also found experiences of  
15 care-related discrimination among refugees<sup>36</sup>. This may indicate implicit bias among healthcare  
16 personnel. However, this needs to be further explored, especially since negative implicit bias  
17 among healthcare personnel has the potential to contribute to disparities in health<sup>37</sup>.

18  
19 Care during pregnancy was the time-period with highest proportion of dissatisfaction in our study.  
20 Contrary to this, a Dutch study showed that non-western migrants were most satisfied with the  
21 antenatal care<sup>38</sup>, while a British study found little difference in satisfaction between the three  
22 periods<sup>34</sup>. These differences might be explained by different ways of organizing the maternity  
23 care between countries, for instance a more non-intervening approach to perinatal care, continuity  
24 of care and more homebirths in the Netherlands compared to Norway. Contradicting previous  
25 research we found no difference in women’s satisfaction with maternity care given by a general  
26 practitioner or a midwife<sup>39</sup>.

27  
28 In our study women with high education were less satisfied, compared to those with some  
29 education. This difference can be explained by different expectations, which in turn can be  
30 influenced by health system literacy. A study specifically measuring expectations with antenatal  
31 care among vulnerable women, including migrants, found low expectations among women with a  
32 lower level of education<sup>35</sup>. Contrary to our finding, studies not looking specifically at migrants  
33 have suggested the opposite<sup>40</sup> and no association between education and satisfaction<sup>41</sup>. Indeed,  
34 several studies from developing countries have showed that women who are illiterate or with only  
35 primary education were more satisfied compared to those with higher education<sup>42 43</sup>, in line with  
36 our findings.

37  
38 Communication and language barriers have been pointed out as main obstacles in achieving high  
39 quality care for migrant women<sup>2 30 44 45</sup>, yet few quantitative studies have included language  
40 proficiency as a determinant for satisfaction. We did indeed find that a high proportion of women  
41 had not understood the information delivered by healthcare personnel and the majority of them  
42 believed they would have better understanding in a different language. This language barrier is a  
43 worrying finding in terms of quality of care. In agreement with our finding, a recent study  
44 indicated “*effective communication*” to be one of the strongest associated factors with overall  
45 satisfaction<sup>46</sup>. Hence, increased satisfaction among women with less fluency in Norwegian  
46 language as shown in our study, can be due to lower expectations. Gürbüz et al. who also used the  
47 questionnaire tool MFMCQ surprisingly found no association between language proficiency and  
48 satisfaction<sup>47</sup>. In order to ensure high quality of care there is a need for migrant-friendly  
49 communication which includes access to professional interpreter services, provision of written  
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1 materials for migrants in their language and training of healthcare personnel in intercultural  
2 communication.

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7 4 Having a Norwegian partner increased the odds of being dissatisfied in our study. A recent study  
8 5 from Norway found increased odds for adverse outcomes for babies with two migrant parents  
9 6 compared to one and linked it to disadvantages such as communication problems and levels of  
10 7 health system literacy<sup>23</sup>. Our findings may therefore reflect expectations rather than actual quality  
11 8 of care. We found no association between overall satisfaction and mother's region of birth in our  
12 9 study, in agreement with other studies<sup>19 48 49</sup>, including one conducted in Norway<sup>50</sup>. Whilst some  
13 10 studies have found higher satisfaction among migrants compared to non-migrants<sup>35 41 42</sup>, other  
14 11 studies have found the opposite<sup>40</sup>. However, we did not include non-migrants, as our aim was not  
15 12 to compare migrant women to the majority population.  
16 13

### 14 **Strength and limitations**

15 A strength of this study was the use of face-to-face interviews with interpreter when needed,  
16 16 enabling all women to participate, not limited by language or literacy. In this way we were also  
17 17 able to reduce the chance of missing data and limiting misinterpretation of questions. The use of  
18 18 the questionnaire tool MFMCQ enables comparability across countries. The clinical  
19 19 characteristics of study participants were comparable with national statistics on obstetric  
20 20 interventions and complications during birth<sup>51</sup>. As this is a cross-sectional study, true cause and  
21 21 effect relationship cannot be assessed. The questionnaire was administered within some days after  
22 22 birth to ensure responses from hard-to-reach groups but also potentially introducing bias.  
23 23 Immediately after birth women tend to show high satisfaction levels, the so-called "*halo effect*",  
24 24 where the women are filled with relief for having a healthy baby<sup>52</sup>. Social desirability bias could  
25 25 also affect the answers, since the interviews were conducted by healthcare personnel in the  
26 26 postnatal ward. However, the interviewing healthcare personnel did not provide care to the  
27 27 participating women and there is no consensus as to the right time for a survey<sup>19</sup>. The lack of  
28 28 measurement of expectations may have limited our understanding of some of the variables such as  
29 29 education and parity<sup>53</sup>.  
30 30

### 31 **Practical implications of the study and recommendations for future research**

32 The findings of this study provide usable information for the improvement of maternal care to  
33 33 become "migrant-friendly". Healthcare personnel assessing the pregnant women's literacy,  
34 34 expectations and pregnancy intention, would assist in better identifying the women in need for  
35 35 additional support services to ensure higher satisfaction with care and better use of healthcare  
36 36 services. To ensure optimal communication, tools such as provision of professional interpreter,  
37 37 support material in various languages and intercultural mediation are required. This study  
38 38 emphasises that in migrant population, specific healthcare experiences rather than overall  
39 39 satisfaction may be important to evaluate quality of care. Including more women from certain  
40 40 vulnerable subgroups such as refugees and undocumented migrants in future studies would assist  
41 41 in deeper and more fully understanding of factors associated with dissatisfaction. Additionally, it  
42 42 would be important to understand the relationship between being dissatisfied and the use of  
43 43 healthcare services as well as between dissatisfaction and maternity outcomes. Including the  
44 44 partner's perception of care and predictors for satisfaction would further assist in understanding  
45 45 pathways to achieve higher quality of care.  
46 46

### 46 **Acknowledgments**

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4 2 manuscript.

5  
6 3 **Author contributions:**

7  
8 4 SB modified the questionnaire, collected survey data, conducted the analysis, interpreted results  
9 5 and wrote the first draft of the manuscript.

10  
11 6 JS developed the idea for the study, secured the funding, contributed to results interpretation and  
12 7 contributed to manuscript revisions.

13  
14 8 BVL developed the idea for the study, secured the funding, helped interpreted results and  
15 9 contributed to manuscript revisions.

16  
17 10 SV developed the idea for the study, secured the funding, helped interpreted results and  
18 11 contributed to manuscript revisions.

19  
20 12 LMD contributed to data and statistical analysis and manuscript revision.

21  
22 13 KMO helped interpreted results and contributed to manuscript revisions.

23  
24 14 IKS developed the idea for the study, secured the funding, interpreted results and revised  
25 15 manuscript.

26  
27 16 All authors approved the final version of the manuscript

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32  
33 19  
34 20 **Competing interests:**

35  
36 21 None declared.

37  
38 22 **Ethics approval:**

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40 23 This study was approved by Oslo University Hospital's ethical review committee (approval  
41 24 18/15786) and Akershus University Hospital's ethical review committee (approval 18/05310).  
42 25 The overall MiPreg-study was approved by Regional Committees for Medical and Health  
43 26 Research Ethics (approval 2018/1086).

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45 27  
46 28 **Data sharing statement:**

47  
48 29 The data that support the findings of this study are available from the corresponding author, SB,  
49 30 upon reasonable request. The data are not publicly available due to their containing information  
50 31 that could compromise the privacy of research participants.

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8 5 **Legends for figures:**  
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10 7 Figure 1: Flowchart inclusion  
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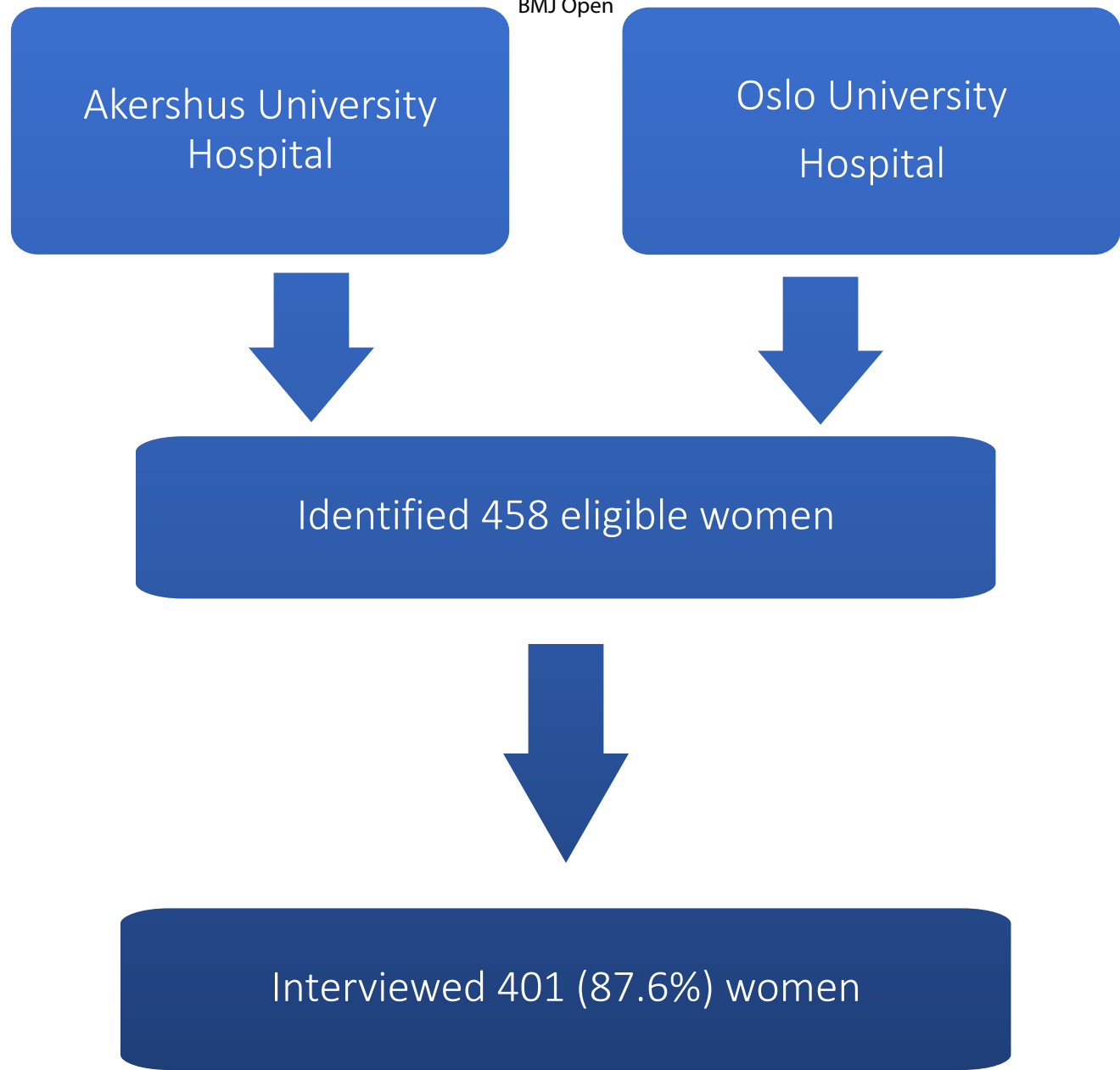
12 9 Figure 2: Association between socio-demographic and clinical factors with overall dissatisfaction  
13 10 with care (combined for during pregnancy and birth), with adjusted OR and 95% CI.  
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15 11 <sup>a</sup> Adjusted for partner Norwegian, education, Norwegian comprehension, parity, planned  
16 12 pregnancy, caesarean section, mother's region of birth, reason for migration, maternal age and  
17 13 length of residency.  
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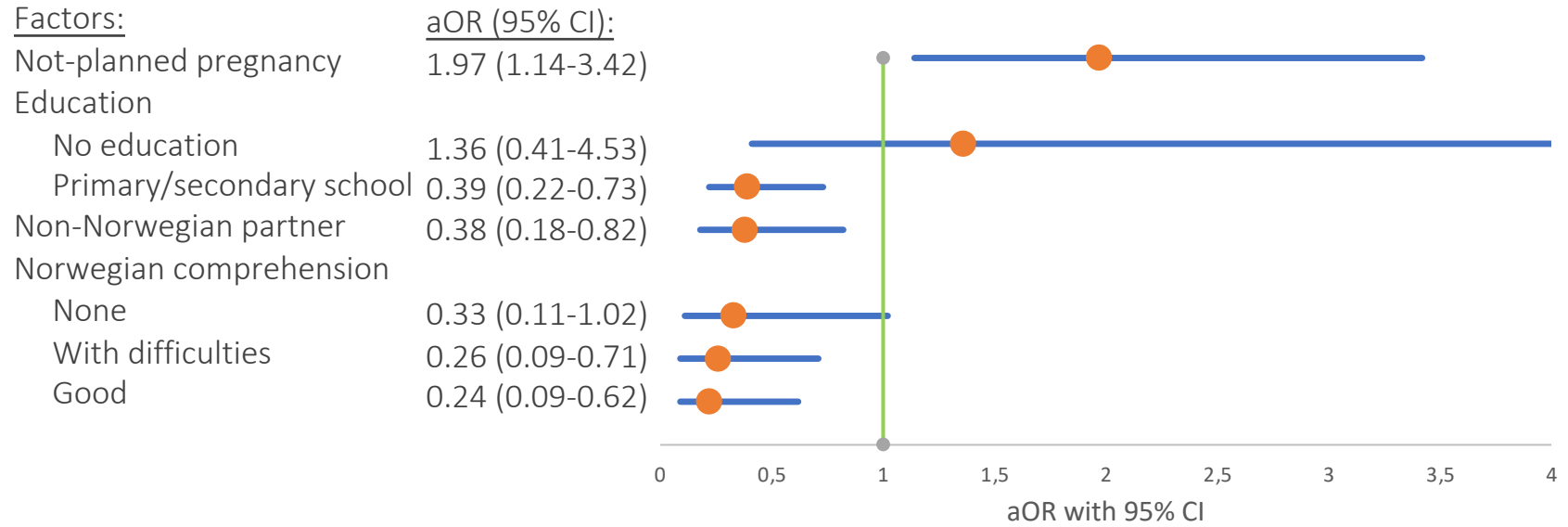
19 15 Abbreviations: CI; confidence interval. aOR; adjusted odds ratio.  
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21 16 Figure 3: Association between negative healthcare experiences and overall dissatisfaction with  
22 17 care (combined for during pregnancy and birth), with crude OR and 95% CI.  
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24 19 Abbreviations: CI; confidence interval. OR; odds ratio  
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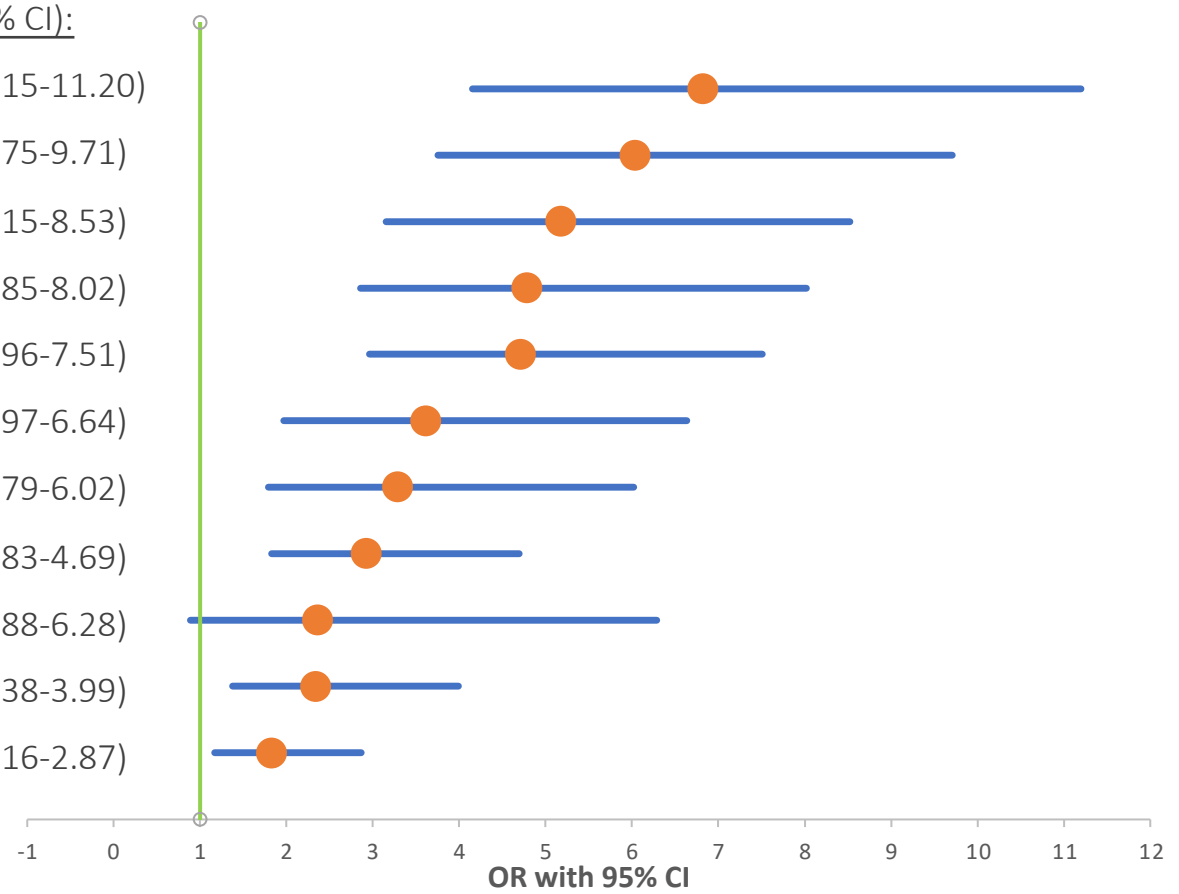


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Factors: OR (95% CI):

Concerns were not taken seriously	6.82 (4.15-11.20)
HCP did not spend enough time providing explanations	6.03 (3.75-9.71)
Prolonged waiting time	5.18 (3.15-8.53)
Decisions were made without my wishes taken into account	4.78 (2.85-8.02)
Things HCP could do differently	4.71 (2.96-7.51)
Felt treated differently to other people	3.62 (1.97-6.64)
Dissatisfied with pain management	3.29 (1.79-6.02)
HCP did not ask questions	2.93 (1.83-4.69)
Had preferences for care that were not followed	2.36 (0.88-6.28)
Dissatisfied with length of hospital stay	2.34 (1.38-3.99)
Did not understand information	1.83 (1.16-2.87)



## MIPREG QUESTIONNAIRE

## 1. GENERAL

1.1 What country were you born in?

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1.2. What country was the father of your child born in?

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1.3. How long have you lived in Norway?

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1.4. How old are you?

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1.5. What language do you use most often at home?

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1.6. How good is your Norwegian?

Oral –	Fluent	Good	Some difficulty	Not at all
Reading –	Fluent	Good	Some difficulty	Not at all
Writing –	Fluent	Good	Some difficulty	Not at all
Comprehension –	Fluent	Good	Some difficulty	Not at all

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1.7. What is your postal code?

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1.8. What is your marital status?

- Single
  - Married/cohabiting
  - Divorced
  - Widow
- 

1.9. Who do you live with?

- Partner
  - Your family (your mother/father, your brother/sister)
  - In-laws (parent in-law, your partner's brother/sister)
  - Friends/colleagues
  - Children (in addition to your newborn child)
  - None, I live alone
- 

1.10 a) Do you have anyone you trust with whom you can speak in confidence?

- Yes
  - No
- 

1.10 b) If the answer is YES, who is this person?

- Partner
  - Your family (your mother/father, your brother/sister)
  - In-laws (parent in-law, your partner's brother/sister)
  - Friends/colleagues
- 

1.11 What is the highest level of education you completed?

- I have no schooling
  - Begun, but not completed compulsory education
  - Primary/lower secondary school (first 7 to 10 years of schooling)
  - High school/upper secondary (the next 1-3 years of education)
  - Tertiary/university, short (up to 4 years)
  - Tertiary/university, long (4 years or more)
- 

1.12 Have you had paid work since coming to Norway?

- Yes
  - No
- 

1.13 In the course of the last 12 months, have you or your family had difficulties making ends meet and paying monthly expenses (food, transport, housing etc.)?

- Yes, often
- Yes, occasionally
- No, never
- Do not know/prefer not to answer

2. YOUR HEALTH BEFORE PREGNANCY

2.1. Did you have any illnesses or ailments before becoming pregnant?

- Yes
  - Diabetes
  - Heart/vascular disorder (including hypertension)
  - Autoimmune illness (rheumatoid illness, metabolic disorder, transplantation)
  - Systemic Lupus Erythematosus (SLE)
  - Anaemia (iron deficiency and thalassemia)
  - Kidney disease
  - Treated tuberculosis
  - HIV, hepatitis
  - Overweight
  - Neurological illness (such as epilepsy)
  - Lung illness (such as asthma)
  - Mental disorder (such as depression)
  - Other: i) \_\_\_\_\_ ii) \_\_\_\_\_

• No

2.2 a) How much did you weigh before pregnancy?

2.2 b) What is your height?

2.3 How would you assess your health for the time being. How would you describe your health?

... good / neither good nor bad / poor?

2.4 Describe your situation: Not troubled, A little troubled, Very troubled or Extremely troubled ...

a)... being constantly afraid or anxious?

- not troubled / a little troubled /very troubled / extremely troubled

b)... a sense of hopelessness for the future?

- not troubled / a little troubled /very troubled / extremely troubled

c)... a sense of loneliness?

- not troubled / a little troubled /very troubled / extremely troubled

We have some questions about how you planned this pregnancy and if you used birth control/contraception.

2.5 Was this pregnancy planned?

- Yes (go to part 3)
- No
- Do not know/unsure

2.5 If the pregnancy was not planned or you are not sure if it was planned, did you use any form of contraception to avoid pregnancy?

Yes

No

- 2.7 What did you use?
- Barrier methods (condom, diaphragm)
  - Non-hormonal methods/natural methods (interrupted intercourse/safe periods, breast feeding)
  - Hormonal contraceptives (The pill, mini-pill, pregnancy prevention patches, vaginal ring)
  - LARC (hormonal and/or copper spiral/IUD, contraceptive injection)
  - Other (specify) \_\_\_\_\_

- 2.8 Why did you not want to use birth control?
- Too expensive
  - Did not have enough information about different methods/options
  - I did not know where I could get hold of these
  - No access to doctor/nurse
  - Side effects
  - Religious reasons
  - Husband/partner/family did not want it
  - Other (specify) \_\_\_\_\_



## 3. OBSTETRIC CLINICAL HISTORY

3.1 How many children have you born, in total (including your new child)?

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3.2 How many births have you had (past week 23)?

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3.3 How many of your children were born in Norway (including your newborn)?

---

3.4 Have you had difficulties in previous pregnancies and births?

• Yes, which:

- Cesarean section
- Nausea during pregnancy
- Hemorrhages/bleeding/anaemia
- High blood pressure
- Preeclampsia
- Deep vein thrombosis (blood clot in the leg)
- Gestational diabetes
- Low-lying placenta
- Abruptio placenta
- Urinary tract infection
- Symphysiolysis
- Premature birth (<37 weeks)
- Premature birth (<34 weeks)
- Early rupture of membrane
- Intrauterine growth retardation (decreasing growth indicated by series measurements)
- Foetal death
- Congenital abnormalities in foetus
- Sphincter rupture (grade 3+4)
- Postpartum depression
- Other (please specify): \_\_\_\_\_
  - No, first birth
  - No, I have not had any complications

## 4. CURRENT PREGNANCY

4.1 Were you pregnant with your newborn child when you came to Norway?

- Yes
  - No
  - Do not remember/do not know
- 

4.2 Did you receive any form of health care for the pregnancy before birth from a health care provider (doctor, nurse, midwife) in Norway?

- Yes
  - No
- 

4.3 Who provided health care for your pregnancy in Norway?

- GP/Family doctor
  - Specialist (obstetrician) at the hospital
  - The midwife at the health clinic
  - Other \_\_\_\_\_
- 

4.4 How many weeks pregnant were you when you first received health care for this pregnancy in Norway?

---

4.5 Did you experience any difficulties in this pregnancy?

- Yes, which
  - Cesarean section
  - Nausea during pregnancy
  - Anaemia
  - High blood pressure
  - Preeclampsia
  - Deep vein thrombosis (blood clot in the leg)
  - Gestational diabetes
  - Low-lying placenta
  - Abruptio placenta
  - Urinary tract infection

- Symphysiolysis
- Premature birth (<37 weeks)
- Premature birth (<34 weeks)
- Early rupture of membrane
- Intrauterine growth retardation (decreasing growth indicated by series measurements)
- Foetal death
- Congenital abnormalities in foetus
- Postpartum depression
- Other (please specify): \_\_\_\_\_
- No, I had no complications

4.6. Which of the following offers did you accept during pregnancy?

- Municipal help (pregnancy course, prepare for birthing course, parental guidance)
- Other offers from non-governmental organizations (Bydelismødre etc.)
- Contact with health care providers in your home country
- Alternative medicine/rituals
- Child Welfare Services
- Ultrasound foster diagnostics at the hospital (for special patient groups)
- Routine ultrasound, Week 18
- Other (please specify) \_\_\_\_\_

4.7. Of the offers mentioned above, are there any you would have liked to use but felt they were not available during your pregnancy?

- Yes, specify (from the options above) \_\_\_\_\_
- No

4.8. Have the following factors prevented you from taking advantage of an offer from the public health service?

- Practical limitations (transportation, work, lack of time) Yes – No
- Language barriers Yes – No
- Lack of information about offers (not aware they existed, did not know how Norway's health care system works, did not think I was entitled) Yes – No

- Afraid that it could affect my visa/residency application process Yes – No
- Afraid of medical examinations and tests Yes – No
- Other (please specify): \_\_\_\_\_

4.9. What were your 2 main sources of information about pregnancy and birth during this pregnancy?

- Previous pregnancies/births
- Family/friends
- Religious/spiritual leader
- Health care providers
- Offers from my neighbourhood/district (courses)
- Mass media (books, TV, internet)
- Other (please specify): \_\_\_\_\_

4.10. Did you get enough information about the following topics in the course of this pregnancy/birth?

- Physical changes during pregnancy Yes – No
- Emotional changes (feelings) during pregnancy Yes – No
- Recommended medical tests (HIV, hepatitis) Yes – No
- Nutrition during pregnancy Yes – No
- Signs that the birth had started Yes – No
- The various phases of birth Yes – No
- Pain relief during childbirth Yes – No
- Changes in mood after the birth Yes – No
- Breastfeeding Yes – No
- Infant formula Yes – No
- Where and who you could contact if you needed advice or had questions about your health or your newborn child's health Yes – No
- Family planning and birth control Yes – No

4.11. Did you take daily vitamin supplements during pregnancy?

- Yes (skip to question 4.12)
- No (go to next question)

## 4.12. If NO, why not?

- Did not know why it should be taken
- Could not find it at the store
- Too expensive
- Did not need it
- Was not told/asked about taking it
- Other (please specify): \_\_\_\_\_

## 4.13. Which of the following statements best describes your habits during pregnancy?

- Smoking: I did not smoke, I smoked occasionally, I smoked daily
- Snuff: I did not take snuff, I took snuff occasionally, I took snuff daily
- Alcohol: I did not drink alcohol, I drank alcohol occasionally, I drank alcohol every day

## 5. BIRTH

## 5.1. How many weeks were you pregnant before giving birth?

## 5.2. How many baby(is) were born?

## 5.3. Were any of the following procedures performed during the birth?

- Labour induction
- Use of a vacuum
- Use of forceps
- Cesarean section
- Episiotomy (cutting near the opening of the vagina)
- Epidural/Spinal anaesthesia as pain relief
- Pudendal blockade as pain relief
- Other (please specify): \_\_\_\_\_

## 5.4. Did you have any complications during the birth?

- Yes

- Sphincter rupture (grade 3-4)
- Bleeding that needed transfusion
- The infant was moved to the neonatal ward
- Use of antibiotics
- Other (please specify): \_\_\_\_\_
- No

## 5.5. If your child was born via caesarean section, what was the reason for it?

- It was scheduled because the doctor recommended it for medical reasons
- It was planned, but you do not know why
- It was scheduled because you wanted it, but not for medical reasons
- It was not planned, but the birth took a long time
- It was not planned but the baby/foetus was in danger
- It was not planned but you were in danger
- It was not planned and you do not know why it was done
- Other (please specify): \_\_\_\_\_

## 5.6. Are you satisfied with the help you received from the health care provider to relieve your pain?

- Yes
- No
- Not a vaginal birth, I had a caesarean section

## 5.7. Were you allowed to have a family member or other support person (including a doula) with you in the birthing room?

- Yes
- No

## 5.8. Do you feel that the duration of your hospitalisation after birth was:

- Too short
- OK/suitable
- Too long

6. OVERALL EXPERIENCE OF PREGNANCY CARE RECEIVED

6.1. Did the health care provider refuse any care, special practice or ritual during or after birth that you requested?

- Yes
No (go to question 6.4)

6.2. If yes, what were these wishes?
i) \_\_\_\_\_ ii) \_\_\_\_\_

6.3. If YES, what reason did the health care provider give for not allowing your wishes?
i) \_\_\_\_\_ ii) \_\_\_\_\_

6.4. Is there anything you think the health care provider could have done differently or better during the pregnancy, birth or after birth?

- Yes, please specify what could have been done differently or better

and by whom \_\_\_\_\_

- No

6.5. Overall, were you satisfied with the health care you got? Did you feel welcome, was the health care provider helpful and respectful?

- a) During pregnancy – Always – Sometimes – Rarely – Never
b) During the birth – Always – Sometimes – Rarely – Never
c) After birth – Always – Sometimes – Rarely – Never

6.6. Did you understand the information the health care provider tried to convey to you?

- a) During pregnancy – Always – Sometimes – Rarely – Never
b) During the birth – Always – Sometimes – Rarely – Never
c) After birth – Always – Sometimes – Rarely – Never

6.7. Do you think you would have understood the information that was conveyed to you better in another language, such as your native language?

- Yes
No

6.8. Were you offered an interpreter?

- a) During pregnancy – yes/no/did not need an interpreter
b) During the birth – yes/no/did not need an interpreter
c) After birth – yes/no/did not need an interpreter

6.9. If you had someone there to interpret for you, who was it?

- Partner/other adult family member/friend
Child (<18 years)
Health care provider
Professional interpreter
Other \_\_\_\_\_

6.10. Were you happy with their interpretation?

- Yes
No

6.11. The health care provider asked me if I had any questions.
Always – Sometimes – Rarely – Never

6.12. I felt that my concerns were taken seriously by the health care providers
Always – Sometimes – Rarely – Never

6.13. I had to wait a long time before I got help.
a) During pregnancy – Always – Sometimes – Rarely – Never
b) During the birth – Always – Sometimes – Rarely – Never
c) After birth – Always – Sometimes – Rarely – Never

- 6.14. The health care providers made decisions without asking my opinion
- a) During pregnancy – Always – Sometimes – Rarely – Never
- b) During the birth – Always – Sometimes – Rarely – Never
- c) After birth – Always – Sometimes – Rarely – Never
- 

- 6.15. The health care provider spent enough time explaining things to me.
- a) During pregnancy – Always – Sometimes – Rarely – Never
- b) During the birth – Always – Sometimes – Rarely – Never
- c) After birth – Always – Sometimes – Rarely – Never
- 

- 6.16. Overall, do you feel that you were treated differently by the health care providers, compared with other people? (i.e. because of language, culture, religion)?
- Always – Sometimes – Rarely – Never
- 

6.17. If yes, why do you think you were treated differently?

- Language
- Culture
- Ethnic background
- Skin colour
- Religion
- Migration status/immigrant background
- Other reasons (please specify): \_\_\_\_\_

## 7. MIGRATION

7.1. What was the legal basis for your residency permit in Norway? Is it ...

- Work/partner's work
- Reunion with family

- Marriage
  - Refuge (resettlement refugee, quota refugee, humanitarian grounds, asylum)
  - Education
  - Undocumented
  - Other (please specify): \_\_\_\_\_
- 

7.2. Did you live at a reception centre for asylum-seekers while you were pregnant with this child?

- Yes
  - No
- 

7.3. If yes, how long did you live there?

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7.4. Do you have a work permit in Norway?

- Yes
  - No
- 

7.5 How satisfied or dissatisfied are you with your life after coming to Norway?

- Dissatisfied
  - Neither satisfied or dissatisfied
  - Satisfied
- 

7.6 How satisfied or dissatisfied were you with life in your home country before you came to Norway?

- Dissatisfied
- Neither satisfied or dissatisfied
- Satisfied

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Socio-demographic and clinical factors	Overall dissatisfaction		Dissatisfaction in pregnancy		Dissatisfaction during birth	
	Adjusted OR (95% CI) <sup>a</sup>	P-value	Adjusted OR (95% CI) <sup>a</sup>	P-value	Adjusted OR (95% CI) <sup>a</sup>	P-value
Partner						
Non-Norwegian	0.38 (0.18-0.82)	*0.014	0.33 (0.14-0.74)	*0.007	0.70 (0.24-1.85)	0.438
Norwegian	1.00		1.00		1.00	
Education						
No completed education	1.36 (0.41-4.53)	0.617	1.93 (0.56-6.64)	0.298	0.71 (0.13-3.92)	0.691
Primary/secondary school	0.39 (0.22-0.73)	*0.003	0.36 (0.19-0.70)	*0.002	0.55 (0.25-1.23)	0.147
University	1.00		1.00		1.00	
Norwegian comprehension						
None	0.33 (0.11-1.02)	0.054	0.30 (0.09-0.97)	*0.045	0.54 (0.13-2.28)	0.401
With difficulties	0.26 (0.09-0.71)	*0.009	0.29 (0.10- 0.81)	*0.019	0.43 (0.12-1.60)	0.199
Good	0.24 (0.09-0.62)	*0.003	0.26 (0.10- 0.69)	*0.007	0.39 (0.12-1.32)	0.129
Fluently	1.00		1.00		1.00	
Not planned pregnancy	1.97 (1.14-3.42)	*0.015	2.28 (1.27-4.09)	*0.006	0.93 (0.44-2.00)	0.858
Planned pregnancy	1.00		1.00		1.00	
Primiparous	1.67 (0.99-2.82)	0.053	1.82 (1.04-3.20)	*0.037	1.69 (0.83-3.41)	0.147
Multiparous	1.00		1.00		1.00	
Caesarean section	0.69 (0.37-1.31)	0.256	1.80 (0.86- 3.30)	0.132	1.10 (0.46-2.53)	0.873
Not caesarean section	1.00		1.00		1.00	

<sup>a</sup> Adjusted for partner Norwegian, Education, Norwegian comprehension, Planned pregnancy, Parity, Caesarean section, Mother GBD, Reason for migration, Age and Length of residency.

Abbreviations: CI; confidence interval. OR; odds ratio.

STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*

	Item No	Recommendation	Reported on page #
<b>Title and abstract</b>	1	(a) Indicate the study's design with a commonly used term in the title or the abstract	1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	2
<b>Introduction</b>			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	3
<b>Methods</b>			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	5
Bias	9	Describe any efforts to address potential sources of bias	5
Study size	10	Explain how the study size was arrived at	5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	5
		(b) Describe any methods used to examine subgroups and interactions	5
		(c) Explain how missing data were addressed	Na
		(d) If applicable, describe analytical methods taking account of sampling strategy	Na
		(e) Describe any sensitivity analyses	Na
<b>Results</b>			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	6-8
		(b) Give reasons for non-participation at each stage	6-8
		(c) Consider use of a flow diagram	Figure 1
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential	Table 1

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confounders

		(b) Indicate number of participants with missing data for each variable of interest	Table 1
Outcome data	15*	Report numbers of outcome events or summary measures	6-8
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	8-9
		(b) Report category boundaries when continuous variables were categorized	Na
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Na
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	9
<b>Discussion</b>			
Key results	18	Summarise key results with reference to study objectives	10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	11
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	10-11
Generalisability	21	Discuss the generalisability (external validity) of the study results	11
<b>Other information</b>			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	12

\*Give information separately for exposed and unexposed groups.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).